

SUCCESS STORY



Underground Transmission Cable Condition Assessments Help Improve Safety, Minimize Outages, and Reduce System Operating Costs

Reliable underground transmission lines are essential for delivering power consistently. Reliability may be negatively impacted as underground laminar dielectric cable circuit condition degenerates. Consistent condition assessment of these cable circuits provides essential input for energy companies to provide reliable and safe operation and to develop an effective maintenance and replacement strategy.

LEAK IN AGING CIRCUITS PROMPTS A CLOSER LOOK

EPRI recently completed a condition assessment of aging underground transmission cable systems for Southern Company. Georgia Power Company (GPC), the largest subsidiary of Southern Company, has a subset of four 115 kV high-pressure fluid-filled underground circuits in Atlanta, with installation dates ranging from 1945 through 1963, and a combined total circuit length of almost 10 miles.

In late 2020, GPC experienced a pipe fluid leak on one of the four lines. GPC located the leak using perfluorocarbon tracer technology and repaired the



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EPRI helped us better understand and improve conditions of the cable system, especially in the area of cathodic protection. EPRI’s expertise is very deep. We felt confident bringing them in to carry out the project. We have had great success working with EPRI.

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~ **MARK SMITH**

*Principal Engineer,
Transmission Line
Standards
Southern Company*

damaged pipe. In addition, the GPC team found that one of the circuits appeared to be isolated from the active cathodic protection system. Then the company reached out to EPRI for help with a more comprehensive study.

EPRI APPROACH ON BURIED STEEL PIPE CORROSION ASSESSMENT

For many years, EPRI has conducted research into understanding the degradation and assessment of buried steel pipes for high-pressure fluid-filled pipe-type cable systems. Based on the research results, EPRI developed a comprehensive approach for buried steel pipe condition assessment in electric transmission systems. In this approach, the team evaluates pipe coating conditions, cathodic protection effectiveness along the entire length of the circuit, and external factors, including stray currents and interference. The steps EPRI recommends include evaluating systems and records; performing aboveground surveys; installing monitoring systems at selected locations; performing direct assessment; planning needed repairs; analyzing and determining root causes of operating and performance issues; and finally providing recommendations to enhance overall system performance.



APPLICATIONS OF EPRI RESEARCH RESULTS

The EPRI-GPC project team applied EPRI-developed procedures to assess the condition of the four underground transmission lines, starting with a review of historical records, including pipe-to-soil potential readings and close interval survey results from previous years provided by GPC. They conducted manhole inspections, evaluated cathodic protection sufficiency, buried steel pipe coating conditions, and ac/dc stray current interference on the four cable circuits. They also carried out a root cause analysis of the recent fluid leak and investigated the circuit isolated from the cathodic protection. The assessment results led to recommendations to develop a more effective maintenance and replacement strategy.

ANALYSIS INFORMS PREVENTIVE MAINTENANCE

The GPC project led to a better overall understanding of pipe-type cable system aging mechanisms and end-of-life criteria. This research provides insights into corrosion issues for transmission pipe-type cable circuits installed in metropolitan areas. The results can help improve the reliability of underground transmission circuits, minimize system outages, increase system reliability, improve public safety, and reduce system operating costs.

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