

TRANSMISSION LINE CONDUCTOR AND SHIELD WIRE PERFORMANCE ANALYSIS



PROJECT HIGHLIGHTS

- Understand conductor and shield wire population end of life
- Technical basis to prioritize capital investments
- Maintain service reliability
- Enhance system resilience

Background, Objectives, and New Learnings

Numerous factors may contribute to transmission line conductor and shield wire deterioration. Factors such as years in service, original manufacture materials, conductor configuration, location along the span, environmental corrosion (atmospheric pollution), weather, loading, and circuit configuration may affect the condition of conductors and wires. Analysis of utility-provided field-aged conductor and shield wire samples in addition to application data can help researchers understand and potentially quantify the influences of such factors. This project aims to utilize laboratory test results along with condition assessment and replacement data of field-aged conductor and shield wire samples data to develop insights to inform asset management decisions.

EPRI researchers intend to catalog forensic condition assessment results from laboratory testing of conductor samples, analyze data to see what information can be derived that is pertinent to the sampled lines and review analysis results and assess how and where they can be applied.

If sufficient data are available at multiple ages in the range of 20 to 65 years of age it might be possible to generate a statistically valid model relating condition to age for a conductor or shield wire subset.

If condition assessment data represents several samples taken from conductor/shield wire at the same age, the analysis would investigate what information can be derived that is pertinent to the sampled lines and provide any recommendations regarding the applicability to a broader set. For example, it might be possible to investigate the spread of test result values for both torsion and tensile strength among multiple samples from the same conductor at different locations along the conductor.

Benefits

Potential public benefits of this research include increased power system reliability and safety.

The proposed activity generates substantial new learning on risk assessment and management for overhead transmission assets. This new learning may be incorporated into EPRI R&D program 34 (Transmission Asset Management Analytics) and program 35 (Overhead Transmission). The results are ultimately made available to the public or used for the benefit of the public through the publishing of EPRI reports.

Project Approach and Summary

This project is intended to be executed in the following research activities:

1. Develop and provide protocol for taking samples from different line segments. This is meant to guide utility participants in proper selection of samples for analysis (where and how many, for instance).
2. Develop details of laboratory tests to be performed on each sample.
3. Develop and provide labels for tagging each sample. Participating utilities would ship samples to EPRI laboratories in Charlotte, NC.
4. Obtain pertinent demographic and application data for the line(s).
5. Obtain, when practical, information on the in-service exposure of the conductor/connector (this includes, line tension, electrical loading, climate, etc.)
6. Upon receipt EPRI would inspect, prepare, and test each sample.
7. Create a database of forensic condition assessment results from laboratory testing of conductor samples.
8. Analyze data to see what information can be derived that is pertinent to the sampled lines.
9. Review analysis results and assess if they might be more broadly applied.
10. Provide periodic status updates using email, power point presentations, conference calls and webcasts.
11. Document methodology, approach, and results in a in a detailed presentation.

Deliverables

Expected deliverables include the following:

1. Test plan, sampling criteria and database of test results
2. Periodic email and webcast status updates
3. Methodology, analysis, insights, and results documented in a PowerPoint presentation.

Price of Project

The project cost estimate for the 3-year duration is \$50k/year for a project total of \$150k per utility.

Project Status and Schedule

The project is expected to be accomplished within 36 months of project kickoff.

Who Should Join

Utilities seeking to better understand the survivability of their overhead transmission line conductors. Utilities seeking to provide a quantitative basis to justify conductor end of life to various stakeholders. Utilities seeking to prioritize replacements.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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