NEETRAC
National Electric Energy Testing, Research, and Applications Center

NEETRAC NEWS

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In This Issue...

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Cable Quality Assurance Program

NEETRAC's cable quality assurance program conducts rigorous and thorough testing of new cable to verify compliance with both industry standards and utility specifications. In 2023, our Cable QA team worked tremendously hard and tested a record amount of cable, as seen below.

- In 2023, the Cable QA team completed testing on 927 orders.
- All of the orders tested represent a record 76,338,991 feet of cable, or 14,455 miles, which would stretch across the U.S. 4.9 times. This beat our previous record by almost 2 million ft.
- The largest single order tested represented 945,948 ft of cable (74 samples).
- Testing covered a total of 113 different cable designs from nine manufacturers, representing 15 manufacturing plants and over 42 production lines.

For more information regarding the Cable Quality Assurance program, please contact Stacy Elledge (stacy.elledge@neetrac,gatech.edu).

Covered Conductor Quality Assurance

In addition to testing cable, NEETRAC also operates a covered conductor quality assurance (CCQA) program. Running for 4 years, this program has shown to be very effective at detecting a number of problems, which enables utilities and manufacturers to collaborate and improve offerings. Below are the statistics for the CCQA program in 2023.

- NEETRAC completed testing on 122 orders of covered conductor.
- All of the orders tested represent a record 16,416,691 feet of covered conductor.
- The largest single order tested represented 300,000 ft..

For more information regarding the Covered Conductor Quality Assurance program, please contact Alex Pearson (alex.pearson@neetrac.gatech.edu).

Meet GA Tech Faculty at the May MB Meeting

The next meeting of the NEETRAC Advisory and Management Boards happens May 22 & 23, 2024. We are planning to hold the Wednesday evening dinner on the main campus and will have presentations from The Georgia Tech Strategic Energy Institute (SEI). SEI is one of Georgia Tech's ten Interdisciplinary Research Institutes. It integrates energy activities across Georgia Tech – from generation, to distribution, to use. After completion of the board meeting on Thursday, Scott Duncan will present information on the Tech Square Microgrid over lunch. If possible, we will arrange short tours of the facility.

Baseline Projects Recently Launched

NEETRAC launched the following Baseline projects presented during the September 2023 Management Board Meeting. If you would like to serve as an advisor for any of these projects, please email suzanne.schmidle@neetrac.gatech.edu and indicate which projects interest you.

Investigation of Mechanical Cycling as a Connector Qualification Parameter

Baseline Project Number 23-171

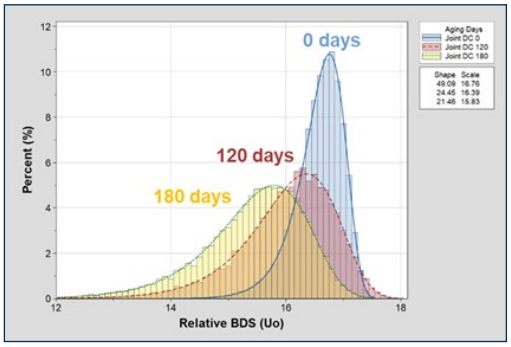
PI: Joe Goldenburg, joe.goldenburg@neetrac.gatech.edu

Testing of overhead connectors has mainly focused on thermal cycle test methods (CCT). Over the past 12 years, standards bodies have been considering incorporating tension into CCTs. Test results from project 16-123 indicated that tension does have an effect, but the extent of this effect is unknown. To date, no one has assessed the effects of mechanical cycling. If mechanical cycling proves to have a primary and dominant effect, the test time required for connector qualification testing could be significantly reduced. This test project aims to further understand the effects of mechanical cycling on connectors and to explore the feasibility of using mechanical cycling as the sole test parameter for connector qualification testing.

Performance Assessment of MV Joints by Wet Accelerated Aging

Baseline Project Number 23-179

PI: Thomas Parker, thomas.parker@neetrac.gatech.edu



The standards for qualifying underground distribution cables insulated with EPR or TRXLPE require a one-year accelerated aging test. However, the standard for qualifying underground cable joints only requires a 30-day accelerated aging test. NEETRAC's Baseline projects 16-061 and 19-081 conducted aging tests on underground cable joints, following the cable aging test protocol. A methodology was developed to use the collected data to evaluate the relative performance of field circuits consisting of both cables and joints. This NEETRAC project aims to address specific technical concerns identified at the conclusion of project 19-081. These concerns include collecting data on an additional pre-molded joint, exploring the use of different connectors within the same joint body, and investigating potential correlations between initial connector temperatures and joint performance.

Correlation between Distribution Transformer Aging Models and Condition Assessment Techniques

Baseline Project Number 23-181

PI: JC Hernandez, jean.hernandez@neetrac.gatech.edu

Distribution transformers have become increasingly critical assets, particularly due to lingering supply chain issues following COVID-19 and the resulting higher costs. There is a growing interest in thermal modeling as a method to estimate the loss of life of these transformers. This interest is fueled by the availability of loading data from the Advanced Metering Infrastructure (AMI) and sensors, which can be leveraged to enhance asset management strategies. However, there is limited (if any) information available on the use of condition assessment techniques for aged distribution transformers deployed in the field. As a result, correlations between distribution transformer life and condition assessment techniques are not widely known. This project aims to investigate such correlations by studying transformers that have undergone accelerated aging in a laboratory environment.

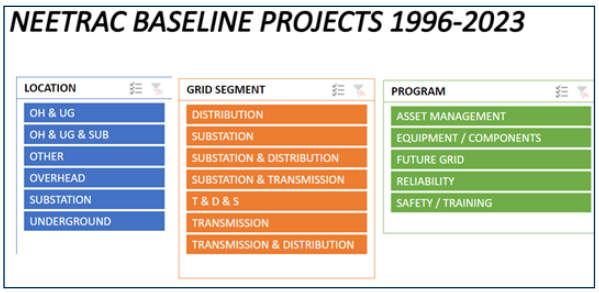
Baseline Projects Recently Completed

The following Baseline project closeouts were presented at the September 2023 Management Board Meeting. The reports will be finalized and distributed to eligible Members in the coming months. In the meantime, please contact the project PI listed below for more information.

Organization of NEETRAC Baseline Projects

Baseline Project Number 16-194

PI: Diana Ramirez, diana.ramirez@neetrac.gatech.edu

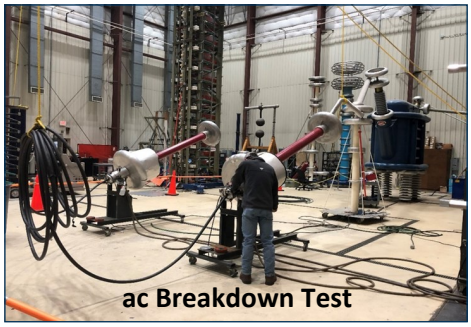


NEETRAC has successfully completed over 330 Baseline projects in the past 26 years. However, the deliverables from these projects, while valuable in their time, were historically organized only numerically with brief project summaries. This arrangement made it challenging for NEETRAC staff and Members to efficiently search through and utilize the information contained in these historical reports. To address this issue, new project descriptors and themes have been introduced to categorize the projects based on common topics. Additionally, a new database tool has been developed to archive and catalog all NEETRAC Baseline projects, providing a more accessible and organized resource for staff and members. This database is accessible through NEETRAC's secure Member website.

Assessing the Loss of Performance in Mature Field Aged Cables

Baseline Project Number 18-057

PI: JC Hernandez, jean.hernandez@neetrac.gatech.edu


ac Breakdown Test

This project assessed the performance and aging characteristics of extruded underground cables that have been installed over decades. The primary reasons for conducting this assessment are as follows:

1) **Differences in Industry Information:** The project acknowledges that the current industry information on cable aging may not be directly applicable to the cables used in North America. This suggests that there may be variations in design and manufacturing principles between North America and other regions, which could affect the aging process and performance of these cables.
2) **Challenges in Laboratory Testing:** The aging of cables in real-world service conditions may differ from the results obtained through accelerated aging tests conducted in a laboratory. Accelerated aging tests are typically designed to simulate the aging process but may not fully replicate the complex interactions and conditions that actual cables experience in the field.

The project's approach involved conducting aging assessments on cables that have been in service for a significant period. These assessments included cables with different insulation materials such as XLPE (Cross-Linked Polyethylene) and TRXLPE (Tree Retardant Cross-Linked Polyethylene). By examining cables that have been in service, the project gathered real-world data on the aging of these cables. The aging assessment data was then corelated with breakdown performance and water tree analysis. This comparative analysis provided valuable insights into how these cable technologies perform in North American field conditions, helping members gain a more comprehensive understanding of cable aging and performance.

Baseline Projects Recently Completed - Cont'd

Field Diagnostics for Distribution Transformers - Scoping Study

Baseline Project Number 20-108

PI: JC Hernandez, jean.hernandez@neetrac.gatech.edu

Distribution transformers play a critical role in delivering reliable electricity to consumers as part of utility infrastructure. However, they may experience premature failure due to various factors. The current landscape is further complicated by climate change, increasing energy demands, integration of distributed energy resources, supply chain challenges, new efficiency standards, heightened resiliency needs, and the push for rapid electrification. This complex environment presents utilities with challenges in maintaining reliable operations and effectively managing their distribution transformer assets.

In this evolving context, the traditional practice of replacing distribution transformers after failure may no longer be the most efficient asset management approach. Therefore, there is a growing importance placed on diagnostic techniques for distribution transformers. Utilities are increasingly interested in diagnostic tools and alternative approaches that can assess the condition of their distribution transformers, for better asset management.

In response to these challenges, NEETRAC conducted a thorough review of existing and potential diagnostic assessment methods for evaluating the condition of distribution transformers. This project also examined the challenges utilities face in ensuring the reliability of their distribution transformers. Lastly, a technical review was carried out to evaluate the effectiveness and suitability of diagnostic techniques applicable to distribution transformers, both before and after deployment.

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Management Board Meetings

The next three Management Board meetings have been scheduled for the following dates:

May 22 - 23, 2024

September 25 - 26, 2024

February 5 - 6, 2025

For details, please visit the Member Section of the NEETRAC website at www.neetrac.gatech.edu.

2023/2024 NEETRAC Member Management Board Representatives

1. Aluma-Form…….. Pete Landsgaard
2. Ameren……. John Crotty
3. American Electric Power…….. Ramadan Issack
4. BC Hydro…….Hudson Giesbrecht
5. Borealis Compounds, Inc.……..Susan Song
6. Conductores Monterrey……. Raul Garcia
7. Consolidated Edison……. Frank Doherty
8. Dominion Energy……..Liz Sullivan
9. Dow ……..…….. Tim Person
10. DTE Energy…….Abdalla Sadoon
11. Duke Energy……...Chris Fletcher
12. Eaton…….. Alan Yerges
13. Exelon……. Lisa Perrone
14. FirstEnergy……..Chris Slattery
15. Gresco Utility Supply……..Brad Schafer
16. Hubbell Power Systems……Jeff Butler
17. LS Cable & System……Tim West
18. Nova Scotia Power……Charlene MacMullin
19. NRECA……Reed Cooper
20. Okonite……...Bill Crawford
21. Pacific Gas & Electric…….. Connie Taylor
22. PPL Corporation……..……April Markley
23. Prolec GE…….. Carlos Gaytan
24. Prysmian Group……Jared Weitzel
25. Rauckman Utility Products……Jim Rauckman
26. San Diego Gas & Electric……..…. Kevin Galloway
27. Slacan Industries……..Ian Pollock
28. Smart Wires…….. Frank Kreikebaum
29. Southern California Edison……Alan Kasanow
30. Southern Company……..Susan White
31. Southern States, LLC…….. Steve Fan
32. Southwire Company……... Yuhsin Hawig
33. Tacoma Power……..Joe Rempe
34. TE Connectivity……Brian Ayres
35. TVA…… Steven Coley
36. WEC Energy Group…….. Michael Smalley