



## Distribution Transformer Quality Assurance (Single-Phase Padmount and Polemount)

— Technical Presentation —  
Thursday, March 29, 2018

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### 1. Abstract

Electric utilities deploy many thousands of single-phase distribution transformers on their systems. As such, they represent a major investment for utilities. Although transformers are purchased with the expectation that they will provide 30 or more years of reliable service, they sometimes fail prematurely due to poor build quality. Many NEETRAC utility members were concerned with the overall quality of transformers currently produced and requested that NEETRAC initiate a collaborative project to evaluate transformer quality.

Transformers from seven North American manufacturers were included in the evaluation. Forty-six transformers were subjected to a battery of tests/examinations that included watts-loss, impulse, TTR and visual examinations. In addition, 12 units were selected for a detailed teardown and examination. In a follow-up project, the results were shared with each of the manufacturers with the goal of soliciting their feedback and understanding any improvements implemented since the evaluation was conducted.

This presentation has three parts. Yamille del Valle will provide an introduction and initial project overview. Dean Williams will give an overview of the visual examination results and current research efforts concerning padmount corrosion. Thomas Champion will give an overview of the electrical tests conducted and the teardown portion of the project.

### 2. Learning Objectives

The objective of this presentation is to share the NEETRAC transformer quality findings with the IEEE Transformers Committee members with the goal of raising quality issue awareness and generating a dialog on how the industry can work together to help minimize quality problems that can shorten transformer life.

### 3. Learning Outcomes

As a result of attending this presentation, attendees will gain an understanding of the following:

- Procedures used to assess the overall quality of single-phase distribution transformers
- Areas where quality improvements are needed to maximize transformer life

#### **4. Presenters' Biographies**

**Thomas Champion** is a Research Engineer II with NEETRAC, having over 40 years of experience in forensics and failure analysis of electrical equipment. Current responsibilities include project management for projects dealing with equipment and material failure analysis, new technology application and research and cable system design. He has served in various officer positions on the IEEE Insulated Conductors Committee, including chairing the Committee in 2014 and 2015. Prior to working for NEETRAC, he was employed by Georgia Power Company for 23 years in various positions, including substation, generation, distribution and division operations. He has authored a number of papers and presentations on cable accessories, failure analysis, transmission cable qualification and overhead line ampacity.

**Yamille del Valle** is a Senior Research Engineer at NEETRAC, part of the Georgia Institute of Technology in Atlanta. She received her M.S. and Ph.D. degrees from Georgia Institute of Technology in 2007 and 2009 respectively. At NEETRAC, she is responsible for work in the reliability area, including condition assessment and asset management of transmission and distribution (T&D) assets, failure analysis of power system components and optimization of power system performance. As part of her work, she coordinates research efforts with numerous utilities, manufacturers and industry experts to develop data-driven reliability solutions that preserve utility knowledge, aid decision processes for managers and engineers and create awareness of current technological advancements in the T&D sector.

**F. Dean Williams** is a NEETRAC Research Coordinator II with 40 years of quality assurance experience in various disciplines. Current responsibilities include conducting forensic evaluations of cable systems and various component failure analyses, inspection of three-phase distribution transformers and serving as the principal investigator on various projects within NEETRAC. Prior to NEETRAC, he worked for Georgia Power Company for 15 years in a variety of positions within nuclear power plant construction and the former Georgia Power Company Research Center.

