

Electric Component Test Facility

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The Nuclear Energy and Infrastructure Systems (NEIS) Division carries out research on the aging of electrical components used in safety-related applications at nuclear power plants. Aging is a concern since any degradation that may occur with time could lower a component's performance and so reduce its reliability. If left unchecked, it could increase plant risk.

The NEIS division has over 15 years experience in assessing aging in these risk-important electrical components and systems to characterize the degradation to which they are susceptible.

As part of these aging assessments, the components under study sometimes are tested to quantify the effect that aging has on their performance (Figure 1). Testing involves accelerating the rate of aging of the components to simulate their long-term exposure to service stressors, and then measuring various indicators of the components' condition and performance.



Figure 1 Researchers review the results of a cable test in the ECTF

To support the testing of electrical components, the NEIS Division developed and maintains the Electric Component Test Facility (ECTF). The ECTF is a state-of-the-art research facility for studying age degradation in electrical components and its effect on the component's performance.



Typical cable specimen tested in the ECTF.

Convection ovens are available in the ECTF to accelerate the thermal aging of the equipment. An environmental chamber also is available to simulate service conditions with varying levels of humidity and temperature (Figure 2).



Figure 2 Convection ovens and environmental chamber for accelerating aging in the ECTF

Test equipment is available at the ECTF to perform several condition monitoring tests, including the following:

- High-potential Test
- AC Impedance/Dielectric Loss
- Insulation Resistance Test
- Indenter (compressive modulus)
- Time Domain Reflectometry
- Oxidation Induction Time/Temp.
- Infrared Spectroscopy

The ECTF has supported the following research programs sponsored by the U.S. Nuclear Regulatory Commission:

- *Evaluation of Environmental Qualification Practices for Instrumentation and Control Cables*
- *Collaborative Research on Wire System Aging*

Future plans for the ECTF include supporting a research program to study the degradation of aircraft wiring due to aging, which is being sponsored by the Federal Aviation Administration.