

Accelerated Relay Aging Tests to Shed Light on Remaining Service Life

The research will help assess whether changes are needed to preventive maintenance programs to ensure reliable relay operation throughout plant life.

Relays fulfill many tasks in nuclear power plants, including alarms, control functions, and protective actions. If the relay does not perform as expected, undesirable results may occur. Relay failures can cause false indications, starting or stopping of equipment, power transients and plant trips, as well as render safety systems unavailable. Maintaining high availability and reliability in critical relays helps ensure that systems are available when called upon to operate.

There are several methods for managing relay aging, the most common being a preventive maintenance program that periodically tests and replaces relays on a set schedule. Early replacement, however, can add significant expense, require more maintenance resources, and increase the probability of infant failure and human error.

To assess replacement frequency, EPRI is subjecting relays removed from nuclear plants to accelerated thermal aging. Data from these tests will be used to analyze what additional service life remained in these relays at the time they were removed. EPRI is working with nuclear plant owners to obtain relays of various models for testing, including the Agastat ETR, SSC, and EGP; Cutler Hammer D26; MidTex 156; Potter and Brumfield KH; and Westinghouse ARD.



When completed in 2016, this research will provide engineers with activation energy values for the tested relays, which can be used to calculate their thermal service lives. Engineers will still need to consider specific installation details, operating experience, and other stressors (such as contact wear and corrosion) for their relays, but the accelerated aging results can provide a technical basis for making informed decisions regarding extended relay life where the organic materials (coils, etc.) are the limiting factor.

For more information, or to contribute relays to the testing program, contact David Knapp at 704.595.2960 or dknapp@epri.com.