RFA-17-14612, Radiation Aging of Nuclear Power Plant Components

Currently, two of Analysis and Measurement Services Corporation's (AMS's) primary research and development projects are focusing on: (1) developing an in-situ technology for cable condition monitoring and (2) testing and evaluating new sensor technologies that could be used in small modular and advanced reactor applications. As plants begin to pursue subsequent license renewals for operation up to 80 years, the long-term health and reliability of important plant components such as cables, metallic and concrete structures have become a concern for the nuclear industry. AMS has been performing research over the last five years to address the nuclear industry's need for non-destructive test techniques capable of evaluating aged cables installed in nuclear power plants.

In addition to addressing concerns over aging components in the current fleet of nuclear reactors, the industry is in need of new sensor technologies that can be used in small modular and advanced reactor designs. Due to their unique design specifications (e.g., minimal instrumentation ports, integral designs, etc.) and operating conditions (e.g., high temperatures, corrosive environments, etc.), existing nuclear-grade sensor technologies may not be suitable for these new reactors. As a result, new sensor technologies are needed that are capable of long-term reliable operation under these conditions. Over the last several years, AMS has conducted research that focuses on testing and evaluating the performance characteristics of many different types of process sensors to determine if they are suitable for next generation reactor applications.

Both of the research and development efforts listed have generated successful results for both AMS and the nuclear industry. AMS has successfully developed, tested, and commercialized the cable condition monitoring system. In addition, several sensors have been tested and evaluated after exposure to harsh environmental conditions (e.g., high temperatures). However, the cable aging and sensor environmental testing research has been limited to only thermal testing. To expand the capabilities of the cable condition monitoring system and fully evaluate the performance characteristics of the new sensors, radiation and combined thermal/radiation aging, testing and evaluation is needed, which AMS is not capable of doing without the use of a radiation testing facility at Oak Ridge National Laboratory.