

N261. Listening to Reactor Pressure at the Boundaries for the Sounds of Cracks and Leaks

Acoustic emission methods were first considered for continuous surveillance of reactor pressure boundaries to detect cracking and/or coolant leakage in about 1965. A lengthy U.S. research and development program has provided the technology and supporting documentation to make their application a reality.

Acoustic emission (AE) enables the detection of energy released as a crack grows in a solid material or as a high-temperature, pressurized fluid leaks to atmosphere through a crack. This is accomplished by using highly sensitive, surface-mounted detectors. It can:

- Continuously survey location inaccessible during reactor operation.
- Detect cracking as it occurs, providing real-time indication of integrity degradation.
- Locate the site of cracking.
- Be interpreted to give an estimate of crack growth rate.

The research program to produce the technology was conceived in 1976 and continued for 15 years. Some major problems have been solved including coolant flow noise, sensor longevity, long-term service, identifying the AE signal and interpreting data. As the final step in evolving new technology and making it useful to industry, arrangements are being made to establish a commercial source to apply the technology on demand.

Taken from, "Listening to Reactor Pressure Boundaries for The Sounds of Cracks and Leaks," by P.H. Hutton, Nuclear Engineering International, pp. 38-40, Dec. 1993.