

## **N263. Options For Leak Detection**

Early detection of leaks from the reactor coolant pressure boundary is vital for reliable operation and the prevention of accidents. Acoustic detection methods can help.

Several methods can be used to detect leaks in the pressure boundary of nuclear reactors. The most important sources of leaks in both PWRs and BWRs are valves and pumps. Detection methods and success rates vary with reactor type.

In the U.S., the improved acoustic leak detection technology has been applied to both PWRs and BWRs. With this technology the pressure boundary can be monitored continuously by using acoustic emission sensors placed on wave guides in direct contact with reactor components. It has two great advantages: it reacts to a leak immediately, and it can be used to acquire quantitative information about the leak.

Industry practice has shown that changes of 0.5-1.0 gal/min in water flow rate can readily be detected in containment pumps by monitoring changes in flow rate, pump water level, or operating frequency of pumps. If pumps and tanks used to collect unidentified leakages and air cooler condensate were to include instrumentation to give an alarm when normal flow rates increased by 0.5-1.0 gal/min, they would detect increases in leakage in most cases.

Increased humidity in the atmosphere indicates that water vapor has been released to the containment. Dewpoint measurements can be used to monitor the humidity of the containment atmosphere--a one degree increase in dew point is well within the sensitivity range of available instruments. The monitoring of humidity levels is most useful as an alarm, or as an indirect indication of change to alert an operator to a potential problem. It is not necessary that all of the above-mentioned leakage detection methods or systems be used in a specific nuclear power plant. The final choice of detection methods should include enough different systems to ensure effective monitoring at times when one type of detection system may be ineffective or inoperable

*Taken from, "Considering Options for Leak Detection," by D. Kupperman, Nuclear Engineering International, pp. 41-42, Dec. 1993.*