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Failure is not an option for most plants, but even more so if you're talking about the emergency cooling system of a nuclear power-gen operation.

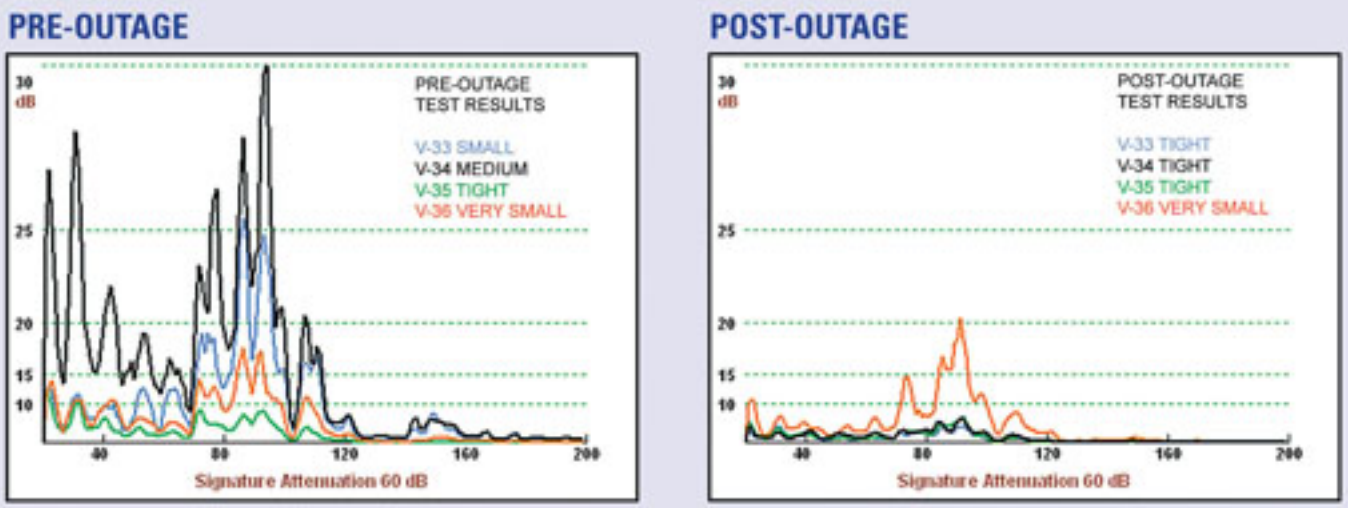
Wolf Creek Nuclear Generating Station in Burlington, KS, operates a single pressurized water reactor to produce a rated electrical output of about 1150 megawatts. If normal reactor coolant system circulation is lost, the plant's safety injection pumps draw borated water from pressurized accumulators and pump it into the reactor. The boron stops the nuclear reaction and the water cools the reactor.

The accumulators are kept pressurized to 650 psi by a nitrogen blanket, so the borated water becomes saturated with nitrogen. Any decrease in pressure causes the gas to come out of solution. Voids of gas in the suction piping for the safety injection pumps can cause those pumps to malfunction.

Technical Specification Surveillance Requirement 3.5.2.3 requires that Emergency Core Cooling System (ECCS) piping be verified full of water once every 31 days. A combination of ultrasonic testing (UT) and/or venting is used to ensure that the piping in the ECCS pump casings and accessible discharge piping high points are full of water.

The problem

During the January 2, 2008, performance of this surveillance test procedure, the guidance for maximum vent times was not met. The operators vented 110 seconds of air from a vent valve between Safety Injection Pump A and the Reactor Cooling System—110 seconds is significantly greater than the guidance of two seconds outlined in the procedure. A condition report was written for Engineering to evaluate the potential impacts on system operability. Testing of the void gas indicated 99.4% nitrogen



"These acoustic signatures are typical results showing the direct comparison method. They are similar to those taken by Wolf Creek. The pre-outage image on the left shows four similar valves. The client couldn't determine which of them was leaking. LDS determined that V-34 was the main culprit and that repairs be made to V-33 and V-34. The post-outage image on the right shows the same four valves following LDS's repair recommendations. Note that V-33 and V-34 are now tight."

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