

Energy Matters

[NRC Probes Indian Points' Troubled Steam Generators](#)

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By Roger Witherspoon

Federal officials are investigating Entergy Nuclear Corps' management of its massive steam generators following the latest in a series of mechanical failures which forced six plant shut downs in the last two years.

Nuclear Regulatory Commission inspectors are specifically examining the cause of the Sept. 3 malfunction in a steam generator serving the reactor in Indian Point 2, which triggered an automatic "trip" or shut down. But NRC spokesman Neil Sheehan said Tuesday "We are always looking for trends and commonalities across the site. If the evidence points to a problem that is more systemic than merely the latest event, then that is something we want to focus on.

"We could look at this as a cross-cutting issue and ask does it affect other areas of plant operations? If they have reactor cooling pump problems at both plants, does it say something about the maintenance at the plant as a whole?"

At this point, said Sheehan, the NRC inspectors are treating this latest shut down as a stand alone incident at Indian Point 2 rather than a problem in overall management at both nuclear units 2 and 3.

But David Lochbaum, nuclear safety engineer with the Union of Concerned Scientists, said the history of steam generator problems at Indian Point should lead the NRC to taking a broader view

at the outset.

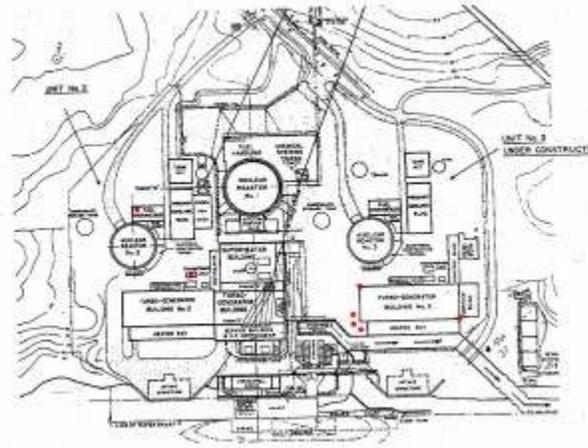


“This is a technical industry,” said Lochbaum, a former NRC instructor, “and people in the industry like to weigh things objectively. But when you look at how effective the training or maintenance is, it is harder to measure. The NRC is struggling to come up with objective measures of quality operation instead of a gut feeling that they are not doing it right.”

The plant, which produces about 1,000 Megawatts of electricity sold primarily to Consolidated Edison, the regional power distributor, remains shut while Entergy officials try to determine why the pumping system serving the steam generators failed and allowed the water levels to rise to dangerous levels.

“Entergy needs a ‘Been there, done that’ T-shirt,” said Lochbaum. “They’ve repeated this drill over and over.”

The steam generators in Indian Point 2 shut down due to erratic water levels April 21, 2008 and April 3 2009, while Indian Point 3 shut down May 15, 28, and 31 2009. The latest incident involved a malfunctioning feedwater pumps. The NRC tracks the number and types of forced shut downs under the heading of “Unplanned Scrams per 7,000 Critical Hours” (http://www.nrc.gov/NRR/OVERSIGHT/ASSESS/IP2/ip2_pi.html#IE01) and can change the safety rating of the plant if there are three or more within that time frame. If the problems turn out to be systemic, the NRC could assign a lower rating to the entire two-unit site rather than just to Indian Point 2.



The problem with unstable water levels in the steam generator is that it can trigger significant damage throughout the plant. The steam generators are heat transfer systems which form the bridge between the reactors and the 40-ton electric generating turbines. Pressurized, highly contaminated water, heated to about 700 degrees travels from the nuclear reactor to the steam generator, where it goes through several thousand U-shaped tubes and circles back to the reactor. A second water loop, with little radioactivity, runs this clean water over the tubes, where it is heated to about 500 degrees Fahrenheit but kept liquid under pressures of about 1,200 pounds per square inch. For comparison, the pressure in a home heating system is about 32 PSI.

Superheated water in the secondary loop travels to the generating turbine, where it is released from the pressure system. It then flashes into steam, expanding by a factor of about 700, and rushed past the blades of the turbine. A water bath on the other side of the turbine – drawn from the Hudson River at Indian Point and the Delaware River at New Jersey’s Salem plants – cools the steam back to water and it is sent back to the steam generator for reheating.

The problem comes when the huge pumps circulating the water malfunction and, as a result, there are drops of water mixed with the steam hitting the turbine blades, which spin at 1,800 Revolutions Per Minute. “These water droplets hit the fan blades,” explained Lochbaum, “and it can come apart sending out metal missiles as it shreds. That happened at the Salem plants in the early 1990s, and tore the turbine apart and the company paid a high price for it.

More recently, it happened at the D.C. Cook plant in Michigan in 2008, and the shreds tore through the oil lines used for lubrication and the hydrogen gas lines used to cool the generator and that triggered a pretty serious fire. You try to avoid that outcome.”