

## **Feds: Calif. nuke plant to remain shut for probe**

MICHAEL R. BLOOD - Associated Press - Associated Press

The troubled San Onofre nuclear plant in Southern California will remain shut down until federal regulators can determine why tubes carrying radioactive water in the plant's massive generators are rapidly decaying.

The announcement Tuesday formalized an agreement with operator Southern California Edison on the same day that a report commissioned by an environmental group claimed the utility misled the Nuclear Regulatory Commission about design changes that are the likely culprit in excessive tube wear.

A four-page letter from NRC Regional Administrator Elmo E. Collins laid out a series of steps Edison must take before restarting the seaside reactors located 45 miles north of San Diego.

Elmo wrote that the problems in the generators must be resolved and fixed and "until we are satisfied that has been done, the plant will not be permitted to restart."

The plant's four steam generators each contain nearly 10,000 alloy tubes that carry hot, pressurized water from the reactors. The Unit 3 reactor was shut down as a precaution in January after a tube break, and extensive wear was found on similar tubing in its twin, Unit 2, which has been shut down for maintenance.

Authorities in California have been scrambling to find additional power in case the reactors remain off-line through summer, when energy use typically peaks. That could include restarting retired plants in Huntington Beach in northern Orange County.

The company has found that the tube wear is being caused by vibration and friction with adjacent tubes and bracing, however investigators don't know why that's happening.

The company "has been committed from the beginning to not returning Unit 2 or Unit 3 to service until we are satisfied it is safe to do so," SCE spokeswoman Jennifer Manfre said in a statement.

The problems have raised questions about the integrity and safety of replacement generators the company installed at the two reactors in a multimillion-dollar makeover in 2009 and 2010. Traces of radiation escaped during the January leak, but officials said there was no danger to workers or neighbors.

The report by nuclear consultants Fairewinds Associates warned that a more detailed study is needed on the alloy tubing in the generators before the reactors are restarted.

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The study was produced for nuclear watchdog Friends of the Earth and was authored by engineer Arnie Gundersen, a former nuclear industry executive who was a licensed reactor operator.

A series of equipment and design changes to the generators "created a large risk of tube failure at the San Onofre reactors," the report found, citing a review of publicly available records. It said the rapid tube wear can raise the potential for an accident that could release radioactivity.

Among the modifications, the report said the tube alloy was changed, bracing was redesigned and more tubes were added. It said the company never disclosed that such extensive changes were made, instead describing it as an exchange of similar equipment that allowed SCE "to avoid the requisite NRC oversight of a steam generator replacement."

Manfre, the company spokeswoman, said SCE provided "open and transparent information" to the NRC. Agency spokesman Scott Burnell said in a statement that the agency was aware of the design changes.

The company "had to show by analysis that their design was acceptable. All the information available at that time showed the replacement steam generators would meet our requirements for safe operation," Burnell said.

Gundersen, however, said he believed the additional tubes were a way to allow SCE to set the stage to generate more power at San Onofre, while avoiding more scrutiny from regulators that would come with ramping up power.

"They made too many changes. The only thing I can conclude is the ultimate goal was a power upgrade, to squeeze more power out of the plant," Gundersen said.

A team of federal investigators was called in to try to determine the cause of heavy wear.

Following the January leak, tests found that eight tubes that carry radioactive water from the reactor were in danger of rupturing under high pressure in Unit 3.

The company has said a total of 321 tubes will be plugged and taken out of service at the two reactors, well within the margin to allow them to keep operating.

Inside a steam generator, hot pressurized water flowing through bundles of tubes heats a bath of non-radioactive water surrounding them. The resulting steam is used to turn turbines to make electricity.

The tubes are one of the barriers between the radioactive and non-radioactive sides of the plant. If a tube breaks, there is the potential that radioactivity from the system that pumps water through the reactor could escape into the atmosphere.

Serious leaks also can drain cooling water from a reactor.

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The steam generators were manufactured by Japan-based Mitsubishi Heavy Industries, according to company officials.

Fairewinds is a Vermont-based consultant that has worked with groups critical of nuclear power.

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