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**HEADLINE:** Bad parts used at nuke plant

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**BODY:**

Con Ed sued maker of generator tubes but didn't install replacements quickly

**Roger Witherspoon**

The Journal News

For more than 20 years, Consolidated Edison chose to operate steam generators at Indian Point 2 that it knew were defective, running the risk of a catastrophic accident, rather than pay to replace them with safer equipment.

In a 1982 federal lawsuit, the utility disclosed that from the time the nuclear power plant opened in 1974 it was plagued by the serious deterioration of key components of the steam generators and electric generating turbine.

The lawsuit accused Westinghouse Electric Corp. of covering up corrosion problems that decayed the steam generators' tubes, causing denting and cracking. Con Edison also charged that corrosion was a "progressive" problem, which it blamed on "defective design and engineering" by Westinghouse.

A Con Edison spokesman last week said the utility determined how best to work with the questionable generators, adding that public safety was not at risk before they were ultimately replaced last year.

It was a corroded tube in the plant's original steam generators that burst Feb. 15, 2000, causing a spill of nearly 20,000 gallons of contaminated water and triggering the plant's first and only emergency alert. The plant shut down for nearly 10 months, losing about \$600,000 a day, and restarted amid a series of problems last month.

But Con Edison did not have to use equipment it called defective 20 years earlier.

Con Edison's lawsuit was one of 14 filed by utilities with identical Westinghouse steam generators and tube degradation problems in their nuclear power plants. The case was settled in 1988 and each utility was given new, safer steam generators.

Thirteen utilities that used the older Westinghouse steam generators switched to the newer model - including the New York Power Authority, the former operator of Indian Point 3.

"The other ones had been degraded so badly," said Jack Murphy, a power authority spokesman. "We had a serious problem keeping the steam generators running, and the decision was to replace them."

Only Con Edison chose to store the new equipment, avoid the installation expense, and continue using steam generators it had insisted in court were defective. The new generators ultimately were installed after last year's accident, at a cost of \$150 million, but only after the utility bowed to public and political pressure that it not fix the older equipment.

"We made a decision that there was no need to change them at that time (after the lawsuit)," Con Edison spokesman Chris Olert said. "We made corrections to water and altered the way they were run. Those alterations were reviewed by the (U.S. Nuclear Regulatory Commission) and independent third parties, and they showed the steam generators were healthy and didn't need to be replaced. And they were running safely for 18 years - that isn't an engineering judgment, that's a fact."

David Lochbaum, a nuclear safety engineer with the Union of Concerned Scientists in Washington said Con Edison's explanation "smacks of tombstone regulation, where the regulation is OK until people die. When you are dealing with nuclear accidents, that is not the right philosophy. Unfortunately, the NRC didn't step in to protect the public until after the accident happened. Then it was a classic case of closing the barn door after the horses left."

NRC spokesman Neil Sheehan acknowledged that Con Edison based its decision on economics.

"They haven't tried to sugarcoat that," he said. "And as long as they met the criteria for the safe operation of the steam generators, there was no reason for us not to allow them to operate with the old steam generators."

The NRC allowed Con Edison to operate the equipment under what the agency deemed was heightened scrutiny, despite overall concerns that aging, defective steam generator tubes could lead to radioactive contamination or a catastrophic accident.

Sheehan said the NRC was aware of the degradation problems with the early Westinghouse systems, and chose to tighten the operating requirements for steam generator components and increase the inspections of steam generator tubes. It was up to the utilities, he said, to decide if they could manage those critical systems within the more restrictive NRC safety specifications, or if they should make the economic decision to replace them.

Marilyn Elie, of the Westchester Citizens Awareness Network, said it was "bizarre" that every other utility that sued Westinghouse chose to replace their steam generators, but Con Edison did not.

According to an NRC technical paper, called Steam Generator Tube Issues, the tubes play an important safety role "because they constitute one of the primary barriers between the radioactive and non-radioactive sides of the plant."

"For this reason, the integrity of the tubing is essential in minimizing the leakage of water between the two sides of the plant," the paper states. "There is the potential

that if a tube bursts while a plant is operating, radioactivity from the primary coolant system - the system that pumps water through the reactor core - could escape directly to the atmosphere in the form of steam."

A small amount of radioactive steam leaked into the atmosphere during last year's accident, although Con Edison and NRC officials said it posed no public health threat.

The most serious event that can occur at a nuclear power plant is what is known as a "loss of coolant accident" in the nuclear reactor. A total loss of coolant accident triggers a meltdown of the radioactive core; contamination of a plant's non-nuclear, power generating side; and the release of radiation into the atmosphere.

Such events can result from defective tubes in steam generators, which are located in a pressurized water reactor. The generators can measure 70 feet in height and weigh as much as 800 tons. They contain anywhere from 3,000 to 16,000 tubes, each about three-quarters of an inch in diameter, which hold water superheated by the reactor core and kept in liquid form by high pressure.

Nonradioactive water is circulated around the tubes and brought to boiling. The resulting steam turns the blades of the turbines and produces electricity. When tubes deteriorate and break, pressurized radioactive water spews out into the clean water system that flows out of the plant's containment building.

Former NRC Commissioner Kenneth C. Rogers, speaking at a 1988 international symposium on nuclear power plant aging, said the concern was not the leakage from or failure of a single tube.

"The concern is with sudden multiple tube failures," Rogers said. "Such failures could come about by having essentially uniform degradation of the tubes. Degradation would decrease the safety margins so that, in essence, we have a 'loaded gun,' an accident waiting to happen."

Con Edison's lawsuit accused Westinghouse of knowing that, in 1974, similar power plants were having problems of progressive degradation in their steam generator tubes. Individual tubes were "plugged" at other plants, according to the lawsuit, as they became corroded or cracked.

In March 1975, court papers state, Westinghouse examined the steam generator tubes at Indian Point 2 and found "evidence of dented tubes and structural deterioration in the IP2 plant steam generators." But the company did not report the corrosion problem to Con Edison, the lawsuit states.

In March 1976, the utility said, "Westinghouse advised Con Edison that there has been no evidence of denting in the IP2 plant tubes examined so far."

Westinghouse didn't admit the problem until September 1976, Con Edison said, and by then tubes in all four steam generators showed corrosion and denting, and several tubes were partially closed. The problem affected virtually all of Westinghouse's steam generators, and emanated from the use of a metal alloy called Inconel-600.

"This is a carbon-steel alloy," said Jim Riccio, of the Public Citizen Energy Project. "It had excellent heat transfer properties. Unfortunately, the metal was basically water

soluble."

The NRC report on steam generator tube problems states that the alloy caused widespread corrosion problems. "This has contributed to seven steam generator tube rupture events, numerous forced reactor shutdowns, extensive tube repairs and outage extensions, significant occupational exposure of personnel to radiation and steam generator replacement at 22 plants," the report states.

Westinghouse spokesman Vaughn Gilbert said Inconel-600 was replaced with a corrosion-resistant alloy called Inconel-690.

"They were all Inconel-600 in the lawsuits," said Gilbert. "And like most companies, we constantly try to improve our product. It is a different Inconel used now. We made that change as part of our ongoing effort to improve the quality of the product, and is not an indication that we felt there was anything wrong with the previous product."

Westinghouse settled all 14 lawsuits for cash and discounted goods. The agreements were all sealed and the exact terms of each settlement undisclosed.

"After the lawsuit," said Olert, Con Edison's spokesman, "we made a sophisticated analysis of the steam generator and everything around that. We made changes in our operating procedures and policies, and those changes kept the steam generators alive and operating towards the life they were scheduled to go to."

He said the NRC and Con Edison engineers developed "very sophisticated monitoring techniques" so they would know when each tube was getting too thin to use safely. The NRC requires utilities to repair or plug a tube if its thickness is degraded by 40 percent or more.

Sheehan said the NRC did not believe it should tell a company what equipment to use. The agency sets safety and performance standards and lets utilities decide what equipment will meet those standards, he said.

The NRC set new performance standards for the older Westinghouse tubes still in use at Indian Point 2, Sheehan said, and instead of sampling a few tubes periodically, inspected every tube, every time the reactor was shut down for refueling or repairs.

But a postmortem on last year's leak at Indian Point 2 found that a series of tests on the steam generator tubes' condition in 1997 received only a cursory study from Con Edison and was ignored by NRC experts. The NRC's Office of Inspector General concluded that the lack of attention paid to the tubes by the utility and the NRC contributed to the accident.

"We could have done a better job in '97," said Sheehan, "and are trying to do a better job going forward. But there is no way you can guarantee there won't be another tube failure. You can never guarantee there will never be another incident. You can only minimize the possibility of it, and we have put steps in place to minimize the likelihood of it happening again."