Ginna atomic plant scrapped by steel?

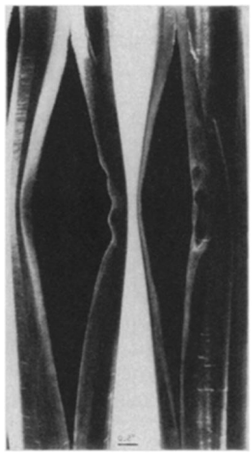
A spear-shaped scrap of steel plate, accidentally left behind inside a steam generator after a 1975 design change, may have contributed to the tube rupture that shut down the Robert E. Ginna nuclear power plant in Ontario, N.Y., on January 25 (SN: 1/30/82, p. 68). The six-inch-long, half-inch-thick plate was one of several foreign objects and tube fragments found wedged among the tubes or lying on the tubesheet, which supports the thousands of thin-walled tubes in the steam generator (SN: 2/13/82, p. 105).

Although the direct cause of the rupture is still uncertain, Ginna plant engineers suspect that the steel plate, tossed around by turbulent water flows, severed a tube previously plugged and taken out of service. This loose tube, in turn, rubbed against the tube that eventually ruptured. The outside of the ruptured tube shows fret marks near the fish-mouth-shaped gash, centered about 5 inches above the tubesheet.

Richard Peck, a spokesman for the Rochester Gas and Electric Corp., which operates the nuclear reactor, says 24 tubes, many showing similar fretting wear, have been removed, and maintenance work is continuing to ready the plant for a mid-May startup.

A Nuclear Regulatory Commission report on the Ginna incident, released last week, concludes that in general, the plant operators "demonstrated that they understood their plant and the procedures and philosophy for coping safely with steam generator tube rupture events." It also says, "Comparing the risk from exposure to radioactive materials released from Ginna with the risk from the normal incidence of cancer fatalities and genetic abnormalities in the general population, the risk to the public health and safety from this exposure is insignificant."

However, the reactor shutdown did not go smoothly because it was plagued by two important valve failures. In one instance, a power-operated relief valve on the pressurizer stuck open, allowing the reactor coolant pressure to fall rapidly. As a result, a steam bubble, which complicated efforts to control the cooldown, formed in the reactor vessel. At the same time, the task force studying the incident



A loose scrap of steel plate (upper left) found in the Ginna steam generator may have indirectly caused the 4-inch rupture in the tube shown from two angles in the closeup view above.

noted evidence for a sharp drop in temperature during the first hour that indicated a rush of cold water may have reached the reactor vessel and put sudden stress on the reactor walls. The possibility of significant thermal shock cannot be ruled out, the report says.

Because of the leak from the reactor coolant through the ruptured tube to the secondary steam line, initially at about 750 gallons per minute, the steam line flooded with water. A safety valve on the steam line opened five times and apparently also leaked water for at least 50 minutes into the environment. In all, about 117,000 pounds of slightly radioactive steam and water were released. The safety valve was designed to handle steam rather than the water that flooded the line.

The NRC notes that Ginna's steam generator tube rupture procedure did not contain instructions for coping with a failed open valve or a leaking atmospheric safety valve. The report illustrates how complex the situation was during the incident. A relief valve was stuck open, both pressurizer relief block valves were shut, a steam bubble had formed in the reactor vessel head, the pressurizer had filled with liquid and a safety valve was periodically relieving reactor coolant to the environment. "The operators recognized the need to cool down the reactor vessel head, collapse the steam bubble and then depressurize the reactor coolant system to limit the radioactive material releases to the environment," the report says.

The report estimates that about 90 curies of noble gas radiation were released along with 0.4 curies of iodine-131 and 1.3 curies of cobalt, molybdenum, barium and cesium in the water that escaped. A major portion of the radioactive materials was deposited within the site boundary, partly because falling snow and moist, cold air prevented them from spreading further. —*I. Peterson*

Colleges: Cashing in their chips

As an answer to foreign competition and because of the shortage of highly trained scientists and engineers, several of the semiconductor industry's largest companies have joined to form the Semiconductor Research Cooperative to support basic research in universities. Erich Bloch of IBM, chairman of the research cooperative, said at a news conference in Washington, D.C., last week that the emphasis would be on long-term semiconductor research projects of 3 to 10 years' duration, implemented through contracts with universities and nonprofit research organizations. The cooperative's projected budget for its first year, beginning May 1, is $6 million.

Bloch said the privately funded joint venture would make better use of the equipment and trained people available, eliminate unnecessary duplication and spread funding over a larger base. Because of increasingly complex problems and the need for sophisticated tools, few individual companies could afford long-term basic semiconductor research. Bloch said well-defined research contracts would benefit both companies and universities.

Andrew J. Steckl of the Rensselaer Polytechnic Institute, chairman of the cooperative's university advisory committee, said a tremendous amount of enthusiasm and excitement greeted the proposal at the committee's first meeting early in April. "If industry has a problem, then the way to solve it is directly with the support of universities," Steckl said.

The research program is expected to cover key aspects of integrated circuit use, design and manufacture, such as options in computer-aided design and the use of materials like gallium arsenide for advanced chips, while product development and work in advanced technology would be left to member companies.

One question yet to be resolved is what direct benefits the participating companies will receive. Bloch noted that universities would be able to get patents and issue licenses for their discoveries, but a participant's financial contribution to the program could be considered as prepayment of royalties. Steckl said, "You have to come to some compromise that serves both one's institutional needs and the national need. What that compromise would be is not clear."

At the same time, it was uncertain how the research program would mesh with government concerns about technology exports and national security. Robert N. Noyce, chairman of the Semiconductor Industry Association, which is sponsoring the cooperative, said, "We expect this to be open-community research. We would be opposed to any kind of restriction on the information flow." —*I. Peterson*