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In Tour, U.S. Nuclear Plant Opens Doors to Make Case

By **MATTHEW L. WALD**

ATHENS, Ala. — The Tennessee Valley Authority opened the doors to its **Browns Ferry nuclear plant** on Friday to present perhaps the most detailed case so far that American reactors of the same design and vintage as the ones damaged in Japan do not face the same risks.

The **agency** seemed to be seeking to project a balance of confidence and openness to improvements, a challenge now faced by the entire American nuclear industry as the nation watches the Japanese struggle to contain their crisis.

The containment buildings surrounding the three reactors at the Browns Ferry plant here, all of the Mark 1 variety made by General Electric, are almost identical to the ones at the Fukushima Daiichi Nuclear Power Station, which were wrecked by a tsunami on March 11. But the T.V.A. says that the devil is in the details, and that, in many small ways that could be crucial, Browns Ferry is better prepared for the unknown than Fukushima was.

In the decade since the Sept. 11 attacks, the **Nuclear Regulatory Commission** says, all American reactors have made preparations to limit damages from potential threats like airplanes piloted by terrorists. Some details have been released.

Yet it is clear that from fire hoses to batteries on wheels to components like a strobe light, the three reactors at Browns Ferry have preparations in place that operators say would help in a nightmare situation like Japan's, a loss of electricity for running its pumps, valves and safety systems. While a tsunami is not an issue in northern Alabama, more than 300 miles from the sea, the loss of all power is always a threat. The plant sits on the banks of the Tennessee River, where floods can reasonably be anticipated, although plant officials say that water levels have never risen high enough to threaten the reactors.

Still, Browns Ferry is ready for "a one-in-a-million-year flood, or however many zeroes you want to go out," said **Preston D. Swafford**, the T.V.A.'s chief nuclear officer, who led a group of reporters on a three-hour tour through the plant.

Inside the reactor building, near the entrance to the primary containment structure, are carefully marked spaces with two lime green carts about the size of hand trucks that a supermarket worker might use to roll cases of soda cans to the proper aisle. Each is loaded with batteries.

One cart could power the instruments that measure the water level in the reactor vessel, an ability that Japanese operators lost a few hours after the tsunami hit. Another could operate critical valves that failed early at Fukushima.

“They’re like a backup to the backup,” said Keith J. Polson, the T.V.A.’s vice president for the Browns Ferry site. “That’s what we think the Japanese didn’t have.”

In the best tradition of an industry whose terminology is ever more impenetrable to outsiders, the battery carts are known as E.D.M.G.’s, a label for hardware derived from the industry’s Extensive Damage Mitigation Guidelines, largely put into effect after the Sept. 11 attacks.

Deeper into the building, in an odd-shaped space in the basement between a corner of the square reactor building and the round containment shell is a steam-driven pump. This is something that the designer, General Electric, intended to be available to deliver up to 600 gallons per minute of cooling water into the reactor core even if the electrically driven pumps failed for want of power. An overheating reactor would be likely to have ample supplies of steam to run it.

That worked at Fukushima for a while but appears to have stopped functioning later; the Japanese plant’s operator, the Tokyo Electric Power Company, has not provided an explanation. Again, the T.V.A. suggests that it has backup tools that the Japanese utility, known as Tepco, probably lacked: a battery-powered strobe light stored in a nearby cabinet, and a valve that usually runs on electricity but also has a hand crank.

While the details of the Fukushima catastrophe may be months in reaching plant operators elsewhere, the T.V.A. hypothesizes that Tepco ran out of battery power to control the steam pump. But T.V.A. engineers say they could use the strobe light to determine how fast the pump’s shaft was turning, enabling workers to adjust its speed with a hand-cranked valve nearby.

In plant stairwells, there are fire hoses attached to hydrantlike fittings that could hurriedly be connected to a reactor’s spent fuel pools. Water would be fed in from the outside — either the purified water normally used around the plant or, in a pinch, raw water from the Tennessee River, operators say.

Fukushima sprayed seawater into its spent fuel pools but appears to have had problems getting the hoses and pumps in place before the water level in at least one of the pools, at the plant's Unit 4 reactor, became dangerously low or possibly reached the bottom.

Officials at the Alabama plant concede that they do not know exactly what went wrong in Japan. "They let the spent fuel pools get away from them; it's kind of hard to fathom how," Mr. Swafford said. "I'm glad I'm not living in their shoes," he added.

Perhaps more than most American nuclear plant officials, executives at Browns Ferry should realize they can expect the unexpected. In 1975, an electrician looking for an air leak in a cable room lighted a candle to see which way the smoke would blow and set off a fire that disabled most plant systems at Reactor No. 1. The plant was shut down for 18 months. And in 1985 the T.V.A. shut all of its reactors because of a variety of safety problems that industry experts say mostly boiled down to bad management. The others reopened, but Browns Ferry 1 stayed closed for 22 years.

Restarting it required a five-year effort to rip out and replace much of the electric cabling, among other improvements.

The authority also operates two nuclear plants in Tennessee: Sequoyah, in Soddy-Daisy, and Watts Bar, near Spring City. Combined with Browns Ferry, the plants make enough electricity to power more than three million homes in the Tennessee Valley, the T.V.A. says.

The plants have massive, robust structures that assure safety, and many features have been added since they were opened in the 1970s to further reduce the risk of an accident, said [William R. McCollum Jr.](#), the authority's chief operating officer. "Having said all that, we are not going to be complacent or satisfied," Mr. McCollum added.

Japan's crisis has already prompted a shift in the T.V.A.'s strategic thinking, said Mr. Swafford, the authority's chief nuclear officer. "We've started doing the what-ifs, what we've started calling 'stacked' events," he said. "What clearly has shown up in Japan is multiple, stacked events. We've not analyzed for all those things."

He said the authority would keep exploring "until we're comfortable we've gotten every one that's humanly imaginable."

Yet Mr. McCollum said there were limits to the contingency planning. "There has to be a reasonableness to each one of these," Mr. McCollum said of the plans, "or I think you could take it out to the 10th degree."

