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BROWNS FERRY FACTS & ISSUES

1. TVA had a very poor operational record at all three Browns Ferry reactors during the first 10 - 15 years of operation. There were a high number of Reportable Events, including what was considered at the time to be a very high number of SCRAMS (automatic shutdowns) of all three reactors. The negative impact of SCRAMS is that they cool the reactor far more quickly than normal shutdowns, thermally shocking the reactor containment structure. These thermally induced stresses reportedly weaken and cause premature aging and metal fatigue of the Reactor Pressure Vessels, which are already near their 40 year design life. Thus, all three reactor containment structures at Browns Ferry may have been prematurely aged during their early use and may now be in a weakened state – after more than 270 emergency SCRAMS between them.

2. A paper published by the Nuclear Information and Resource Service (NIRS) entitled "Hazards of GE Boiling Water Reactors in the United States" reveals very disturbing weaknesses in the three Browns Ferry GE Mark I Boiling Water Reactors (BWR) that raise serious concerns regarding the lasting integrity of the Reactor Pressure Vessels and questions the adequacy of the system design. Some of the issues included the following:

A. In 1972 before Browns Ferry became operational, Atomic Energy Commission safety official responsible for reviewing the Mark I system, recommended the pressure suppression system be discontinued and no more systems of this type be given construction permits. The report says his boss, Joseph Hendrie, agreed with the recommendation, but rejected it on the grounds that "it could mean the end of the nuclear power industry in the U.S." In 1976, three General Electric (GE) nuclear engineers working on the system publicly resigned their positions citing dangerous shortcomings in the GE Mark I design. In 1986, Harold Denton, NRC's top safety official, stated that the WASH 1400 Safety Study revealed a 90% probability of Mark I containment failing in the case of a significant malfunction, which resulted in a direct torus vent pipe being installed in all Mark I's allowing the control operator to release unfiltered emissions to save containment. These are all very serious concerns about the safety, integrity, and reliability of these systems.

B. A 1993 NRC report (not related to anything discussed above) confirmed that "age-related degradation in Boiling Water Reactors will damage or destroy vital safety related components inside the reactor vessel *BEFORE* the forty year license expires" (emphasis added). It was determined that the Reactor Vessel cracks were the result of the deterioration of Type 304 Stainless Steel due to exposure to chronic radiation, heat, corrosive chemistry, and fatigue. Recently, the 40 year license for each reactor has been extended another 20 years beyond design specifications, to give it a total licensed life of 60 years, greatly increasing the likelihood of critical component failure.

C. Three of the Mark I reactors at Fukushima exploded when hydrogen escaping from the reactor pressure vessels built up in the secondary containment structures and blew the reactor buildings apart. The secondary containment – sheet metal structure above the cooling pools – is seriously insufficient in both size and strength. The highly controversial "hardened vent" modification (added to Fukushima and all 23 U.S. Mark I reactor pressure suppression systems) reportedly failed to relieve pressure on all three Fukushima reactors, resulting in the buildup of hydrogen gas in the reactor pressure vessel. The massive pressure from the hydrogen gas buildup escaped through the weakest part of the Primary Containment (the removable reactor head, where fuel is reloaded) into the Secondary (sheet metal building) Containment and exploded.

D. The NIRS report explains how the Core Shroud provides the sealed containment that enables re-flooding of the fuel rods in case of a loss-of-coolant-accident. "Extensive cracking of circumferential welds on the core shroud have been discovered in a growing number of U.S. and foreign BWRs [boiling water reactors]. A lateral shift along circumferential cracks at the welds by as little as 1/8 inch can result in the misalignment of the fuel and the inability to insert the control rods coupled with loss of fuel core cooling capability. This scenario can result in a core melt accident." This raises serious concerns about the lasting containment integrity of all three Browns Ferry reactors.

3. There is seriously insufficient overhead containment of the cooling pools in the Mark I reactors. TVA is storing over three million pounds of highly radioactive spent fuel in raised pools at Browns Ferry with only sheet metal, warehouse style protection overhead. The TN River Valley is a tornado corridor, and 1968 Mark I design tests for tornado safety make unscientific assumptions reaching questionable conclusions in their report. Over 314 million Curies of radioactive waste is stored at Browns Ferry, and there is sufficient reason to consider the lack of overhead containment of cooling pools a hazardous design defect for this active tornado region.

4. A strange irony of nuclear power plants is that they require constant power to remain stable. The reactor cores and the cooling pools (with 5 to 10 times more long-lived radioactivity than the cores themselves) must have a supply of power to pump tremendous amounts of coolant to prevent meltdowns. Without power, the highly enriched fuel in the cooling pools will boil off the pool water, resulting in a fire. An Institute for Policy Studies report says, "A severe pool fire could render about 188 square miles around the nuclear reactor uninhabitable, cause as many as 28,000 cancer fatalities, and cause $59 billion in damage, according to a 1997 report for the NRC by Brookhaven National Laboratory." There was a 37.5% failure rate of emergency backup generators within the first two days of the 7 day tornado power loss in April 2011.

All of these stated defects and on-going problems, in combination, raise considerable cause for concern among valley residents – and for action on the part of the TVA, especially to publish and act upon a schedule for removal of spent fuel from the cooling pools into more secure dry cask storage facilities. BEST/MATRR has recorded high radiation levels near and downwind of Browns Ferry, and we are concerned about public health and safety in our valley.

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