PDR

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To Recipients of NUREG/CR-4047, ORNL/TM-9444, "An Assessment of the Safety Implications of Control at the Oconee 1 Nuclear Plant: Final Report," by R. S. Stone et al., March 1986

Please insert the attached revised page xv in your copy of the subject report by removing the backing and placing the gummed page over the existing page xv.

Thank you.

Very truly yours,

R. S. Stone

R. S. Stone
Instrumentation and Controls Division

RSS:lek

Attachment

ORNL no RC
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STEAM GENERATOR OVERFILL

Steam generator overfill also can lead to two classes of problems that may compromise the system:

1. The primary system coolant may be overcooled directly by its thermal contact with an excessive amount of heat rejection on the secondary side. Using the hybrid computer program, this effect was studied in considerable detail for cases of no reactor trip. Low power levels produce more pronounced effects than high power levels, but the integrated control system appears capable of bringing the system to a new steady state whether the power is high or low.

2. A more serious event occurs when the overfill occurs in one SG, is rapid, and produces a reactor trip. The reactor trip can come as a result of cooling and power asymmetry in the core, or indirectly as a result of a turbine trip caused by excessive water present at the HP turbine outlet, water which had been introduced by excessive flow from a SG. Such an event can lead to water ingress to the steam line at rates and in amounts sufficient to cause damage to steam line instruments, associated components such as valves, and steam line supports. Such damage from SG overfills has occurred at Beznau, Switzerland (1969). If steam line supports are damaged, there is a reasonable probability that the steam line will deform or collapse and rupture, with some probability of consequent steam tube rupture. No event of this magnitude has occurred. Were such an event to occur, it would be a small-break loss-of-coolant accident (LOCA) vented directly to the atmosphere.

INADEQUATE CORE COOLING

Rapid inadequate core cooling can occur as a result of failure of the plant systems that replace lost reactor coolant. Three failure modes were found to require operator intervention to avoid possible rapid reactor overheating. Two failure modes involve failure of integrated control system power supply branch circuits (auto power and hand power), resulting in loss of automatic control of the main feedwater; the third consists of failure of a letdown cooler tube.

RECOMMENDATIONS AND FUTURE WORK

Proper operator intervention can, in general, avert the possible safety consequences resulting from the failures investigated in this study. The following actions are recommended:

1. redesign the steam generator high-level main feedwater pump trip circuitry from a series to a parallel configuration;