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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AUG 12 1980

50-335

Mr. Thomas Anderson, Manager
Nuclear Safety Department
Westinghouse Electric Corporation
P. O. Box 355
Pittsburgh, Pennsylvania 15230

Dear Mr. Anderson:

SUBJECT: VOID FORMATION IN VESSEL HEAD DURING ST. LUCIE NATURAL CIRCULATION COOLDOWN EVENT OF 6/11/80

On June 11, 1980, the St. Lucie reactor was shutdown due to a loss of component cooling water to the reactor coolant pump seals. This also required shutdown of the reactor coolant pumps and cooldown was accomplished by natural circulation.

At approximately 4 hours into the event, charging flow, which was initially being divided between the cold legs and the auxiliary pressurizer spray, was diverted entirely to the auxiliary spray to enhance the depressurization and reduce the system pressure on the pump seals. At this time, abnormally rapid increases in pressurizer level were observed which could not be explained by the charging flow rate alone. Detailed evaluation and follow-up analyses by the licensee and NSSS supplier have indicated that a steam void was probably formed in the upper head region of the reactor vessel and displaced water from the vessel into the pressurizer.

Continued alternating realignment of charging flow between the cold legs and auxiliary spray line produced a "saw-tooth" pressurizer level behavior. Relevant information and data available to the staff to date are provided in the enclosure.

It has been postulated that the steam void in the upper vessel was produced when the system pressure dropped below the saturation pressure corresponding to the temperature of the fluid in the upper head. Because the measured hot and cold leg temperatures at the time of voiding were highly subcooled (~200°F), it appears that the fluid in the upper head was much hotter, relatively stagnant, and in poor communication with the fluid exiting the core and in the upper plenum. In addition, stored heat in the upper head structures most likely contributed to the voiding.

Because of the unexpected occurrence of the void, the failure of the operators to immediately recognize the void formation and take corrective action, and the question of whether such void formation is properly accounted for in safety

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analyses (Chapter 15), we have sent a list of questions documenting our concerns to the licensee. These questions are also provided in the enclosure for your information.

We are presently evaluating the need to pursue this issue generically with all PWR licensees. Prior to taking any definitive action however, we are soliciting your technical opinion and advise regarding the potential for void formation under similar circumstances in NSSS's designed by you. Specifically, we need to know if you can justify why the voiding phenomenon cannot occur in NSSS's designed by you (or can confirm that such phenomena can be properly predicted by your transient analysis models), and if it can occur, is properly accounted for in operating procedures (e.g., cooldown rates), operator guidelines, and operator training (including the simulator)

The urgency of this matter requires you advise us within fifteen (15) working days after receipt of this letter whether a supplemental information submittal by you on the subject would preclude the need to expeditiously pursue this issue generically with your customers.

Original Signed by
Paul S. Check

Paul S. Check, Assistant Director for
Plant Systems
Division of Systems Integration
Office of Nuclear Reactor Regulation

cc: E. Case
ACRS (16)
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