TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

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January 17, 1984

WBRD-50-390/82-111
WBRD-50-391/82-104

U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - POSTULATED ACCIDENT BLOWDOWN OF MORE THAN ONE STEAM GENERATOR - WBRD-50-390/82-111, WBRD-50-391/82-104 - FINAL REPORT FOR UNIT 2

The subject deficiency was initially reported to NRC-OIE Inspector D. Quick on October 15, 1982 in accordance with 10 CFR 50.55(e) as NCR GEN NEB 8211. Interim reports were submitted on November 22, 1982 and June 23, 1983. Our final report for unit 1 and third interim report for unit 2 was submitted on September 30, 1983. Enclosed is our final report for unit 2.

If you have any questions, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Licensing

Enclosure
cc: Mr. Richard C. DeYoung, Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Records Center (Enclosure)
Institute of Nuclear Power Operations
1100 Circle 75 Parkway, Suite 1500
Atlanta, Georgia 30339

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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
POSTULATED ACCIDENT BLOWDOWN OF MORE THAN ONE STEAM GENERATOR
NCR GEN NEB 8211
WBRD-50-390/82-111, WBRD-50-391/82-104
10 CFR 50.55(e)
FINAL REPORT FOR UNIT 2

Description of Condition

TVA's design intent is such that nonsafety grade equipment will not fail in such a manner as to adversely affect the safe operation of the plant. It has been determined that the nonsafety grade automatic control loop for the steam generator power-operated relief valves (PORVs) (atmospheric relief valves) could fail in such a manner as to cause the PORVs to stick open. During a postulated main steam or main feedwater line break, a stuck open PORV could cause uncontrolled blowdown of more than one steam generator (the WBN FSAR assumes accident blowdown of only one steam generator). It should be noted that TVA has provided safety grade position indication and manual override in the main control room for the PORVs. However, TVA's analysis assumes no operator action for 10 minutes.

Safety Implications

If the uncontrolled blowdown of two steam generators was due to a feedwater line break on SG-1 and a failed open PORV on SG-4, the turbine driven pump may not be available after 10 minutes. The analysis assumes that motor-driven pump A is available and motor-driven pump B failed to start due to single failure. The availability of pump A is assured by isolating the pump from the faulted steam generator in accordance with the emergency operating instructions. If the turbine driven pump and motor driven pump B are not available, the heat removal capability of the auxiliary feedwater systems (AFW) could be degraded below its design basis. Consequently, the ability of the affected system to safely shutdown the reactor may be degraded.

Corrective Action

The safety problems associated with the degraded heat removal capability of the AFW system was analyzed by using the following assumptions for unit 1 (a similar analysis was used for unit 2):

1. A feedwater or steam line break occurs in steam generator loop 1 within the steam vault.

2. The PORV on steam generator loop 4 sticks open due to failures in the PORV nonsafety-related automatic control loop.

3. The 125V DC Battery Board II failed due to single failure criteria.

Given the above conditions, it was concluded that the required flow of 470 gpm from the AFW system could be limited to one steam generator. The design basis for the AFW system requires two or more steam generators be available for decay heat removal. The AFW system failed to perform its intended safety function because failure of Battery Board II prevented motor-driven pump 1B-B from starting (which supplies emergency feedwater to steam generator loops 2 and 3), and it also contributed to the loss of the turbine-driven feedwater pump. The turbine-driven feedwater pump failed due to loss of motive steam supply from steam generator loops 1 and 4. Steam generator loop 1 quickly depressurized through the break, and steam generator loop 4 depressurized through the stuck open PORV on loop 4. The PORV on loop 4 could not be closed by the remote manual control circuit (safety grade) due to loss of power from Battery Board II. The only AFW pump available is pump 1A-A which supplies emergency feedwater to steam generator loops 1 and 2. Since steam generator loop 1 is dry and has been isolated in accordance with the emergency operating instructions, all the flow from pump 1A-A (470 gpm) is directed to steam generator loop 2.

To correct this condition, TVA will rearrange the power supplies to the steam generator PORV remote manual control circuits which are safety grade on steam generator loops 1 and 4. The rearranging of the power supplies will ensure that:

The turbine-driven pump and one motor-driven pump will always be available for heat removal; OR

Two motor-driven pumps will always be available for heat removal. Consequently, three independent feedwater supplies will be available for decay heat removal.

The design basis for the AFW System including the effects due to single failure will not be violated by any design basis event.

TVA has completed all the required Unit 2 design work under ECN 3925. All construction rework associated with ECN 3925 will be complete by September 21, 1984.

TVA considers this nonconformance to be an isolated design problem for which further actions to prevent recurrence are not required.