Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402-2801

November 24, 1998

10 CFR 50.54(f)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of	)	Docket Nos. 50-390
Tennessee Valley Authority	)	50-327
		50-328

SEQUOYAH NUCLEAR PLANT (SQN), AND WATTS BAR NUCLEAR PLANT (WBN), 180-DAY RESPONSE TO GENERIC LETTER (GL) 98-02, "LOSS OF REACTOR COOLANT INVENTORY AND ASSOCIATED POTENTIAL FOR LOSS OF EMERGENCY MITIGATION FUNCTIONS WHILE IN A SHUTDOWN CONDITION," DATED May 28, 1998

This letter provides TVA's 180-day response to the subject GL regarding loss of reactor coolant inventory and associated potential for loss of emergency mitigation functions while in a shutdown condition. This GL requests information under 10 CFR 50.54(f) on whether pressurized water reactor plants are susceptible to an event similar to that which occurred at Wolf Creek Nuclear Plant on September 17, 1994.

A review of the piping configurations at SQN and WBN indicate that both plants have a return line in the residual heat removal system which could divert reactor coolant system fluid to the refueling water storage tank if multiple operator errors are assumed in the implementation of administrative controls. In accordance with NRC's information request, Enclosures 1 and 2 provide the requested information for SQN (Units 1 and 2) and WBN (Unit 1), respectively. As directed by the GL, we have prepared a report summarizing 10CFR50 Appendix B controls that will act to prevent or assist in the mitigation of such an event. That report will be retained for NRC inspection.

Reviews of the Wolf Creek event were previously conducted in response to Information Notice 95-03 and INPO SOER 96-01. The review stemming from this GL did not identify any additional significant findings, and therefore no commitments are contained in this letter. If you have questions regarding this response, please contact Everett Whitaker at (423) 751-6369.

Sincerely,

Mark J. Burzynski

Mark J. Burzynski
Manager
Nuclear Licensing

Subscribed and sworn to before me
this 24th day of November 1998

Ginalee Petty

Notary Public

My Commission Expires March 21, 2001

Enclosures
cc: See page 3

cc (Enclosures):
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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY (TVA)
SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2

180-DAY RESPONSE TO GENERIC LETTER (GL) 98-02, "LOSS OF REACTOR COOLANT INVENTORY AND ASSOCIATED POTENTIAL FOR LOSS OF EMERGENCY MITIGATION FUNCTIONS WHILE IN A SHUTDOWN CONDITION," DATED MAY 28, 1998

GL 98-02 was issued on May 28, 1998, by NRC to request that addressees (1) assess the susceptibility of their residual heat removal (RHR) and emergency core cooling systems (ECCS) to common-cause failure as a result of reactor coolant system (RCS) drain-down while in a shutdown condition, and (2) submit certain information concerning their findings regarding potential pathways for inadvertent RCS drain-down and the suitability of their findings regarding potential pathways for inadvertent RCS drain-down, and the suitability of surveillance, maintenance, modification and operating practices and procedures regarding configuration control during reactor shutdown cooling. This enclosure documents the assessment required by Action 1 above.

The significance of the Wolf Creek event is that it involved not only a diversion of RCS water to the refueling water storage tank (RWST), but the water was diverted to the common ECCS header and as such the event could have rendered all ECCS injection inoperable. The evaluation of TVA sites for susceptibility looked for possible flow paths which could allow flow from the hot RCS to the RWST. Where paths leading to the RWST were possible, the evaluation also considered whether that flow would introduce hot water to the RWST/ECCS suction header. Flow to the RWST directly would mix with the large water volume in the RWST and subsequent flow to ECCS pumps would not pose a threat to pump operation.

Flow diagrams were reviewed to identify piping with diameters of 2-inches or greater which connects to the RWST/ECCS header. The connections were evaluated for the possibility of introducing hot RCS water to the RWST/ECCS header during Mode 4 operations. The number of potential piping paths which could introduce hot RCS water to the RWST/ECCS header is limited by TVA's use of check valves on suction piping. Consistent with conversations held with the author of the GL, check valves are assumed to work and further consideration of gross leakage through lines with check valves is not required. Check valves on ECCS suction piping provide protection from a number of potential misalignments. Of the potential flow paths identified, four could potentially allow hot RCS water into some part of the RWST header or ECCS suction piping. These flow paths are discussed below:

1. The post-loss of coolant accident (LOCA) recirculation cross-tie from the containment sump through the RHR system via FCV-63-8 could allow hot RCS water to reach the Centrifugal Charging pumps (CCP) suction header if FCV-63-8 was inadvertently opened. While this could pose a threat to the CCPs if they were operated, the design provides check valves, VLV-62-504 and VLV-62-697 in the CCP suction lines which would preclude significant diversion of fluid from the RCS through CCP suction piping. The CCP piping would pressurize beyond the saturation point of the fluid and no flashing would occur at the suction of the CCPs. This path would not pose a threat to all injection sources.

2. A similar situation exists for the safety injection (SI) pump suction. The post-LOCA recirculation cross-tie from the containment sump through the RHR system via FCV-63-11 could inadvertently open, subjecting the SI pump suction header to hot RCS water. However, hot RCS water could not reach the RWST header because of check valve, VLV-63 510, in the SI pump suction line. The check valve would stop significant flow to the RWST. This path would not pose a threat to all injection sources.

3. The RWST return line from the discharge of the RHR heat exchanger has a hand control isolation valve, HCV-74-34, that if inadvertently opened in concert with FCV-74-33 and -35 could introduce hot RCS into the RWST/ECCS suction header. This path is similar to the configuration which exists at Wolf Creek. The hand control valve is normally locked closed. Administrative controls are used to ensure that HCV-74-34 operation in Mode 4 does not result in an RCS drain-down to the RWST. These controls are discussed in detail in the report prepared in response to Action 2 of the GL which is on file at TVA.

4. A suction supply line from the RCS connects to the RHR suction and RWST/ECCS suction header. This connection to the RHR is required for normal Mode 4 operation. The hot RCS water in the line could cause problems during a Mode 4 LOCA. Flow control valve FCV-63-1 isolates the RHR suction from the RWST header and is normally closed when RHR is used for shutdown cooling. RHR suction valves FCV-74-1 and -2 are interlocked with FCV-63-1 and will not open if FCV-63-1 is open. This prevents flow from the RCS/RHR suction line back to the RWST. In the event of FCV-63-1 being opened inadvertently, check valve 63-502 prevents significant flow from the RHR suction to the RWST header. This path would not pose a threat to all injection sources.

The above evaluation of possible flow paths was used as the basis for a further review of procedures and controls that act to limit the potential for misapplication of the systems and misalignment of flow paths. This additional review was documented in a TVA report which will be available for NRC's review in accordance with Action 2 of the GL.

SUMMARY

The review of flow paths identified potential pathways for RCS water to flow into the RWST or RWST/ECCS header. Of these, four flow paths present a realistic possibility of RCS water flowing to one or more ECCS pumps, but only one path has a reasonable potential for affecting all ECCS pumps.

Plant activities affecting these flow paths were evaluated to identify vulnerabilities which would need to be addressed. Other activities which could directly or indirectly lead to establishment of undesirable flow paths were reviewed. Procedural controls and administrative processes were also reviewed for weaknesses which could lead to an RCS drain-down to the RWST.

No specific vulnerabilities which could reasonably be expected to result in a significant flow of hot RCS water to the RWST/ECCS header were identified. This is due, in part, to previous reviews performed and actions taken in response to Information Notice (95-03) and INPO SOER (96-01) which also address several aspects of the Wolf Creek event. Additionally, TVA's design at SQN includes several check valves in locations which limit the number of viable leakage pathways back to the RWST header. No corrective actions were identified as a result of this review.

REFERENCES

1. Information Notice 95-03
2. Information Notice 95-03 Suppl. 1
3. Information Notice 91-42
4. Information Notice 90-055
5. Information Notice 91-022
6. AEOD E704
7. AEOD S95-01
8. Wolf Creek followup inspection report
9. INPO SER 91-007
10. II-S-92-099, Sequoyah Incident Investigation
11. INPO SER 95-17
12. Flow Diagram 47W809-1 (FSAR Figure 9.3.4-1 through - 4), Chemical & Volume Control P&ID
13. Flow Diagram 47W809-2 (FSAR Figure 9.3.4-1 through - 4), Chemical & Volume Control P&ID
14. Flow Diagram 47W810-1 (FSAR Figure 5.5.7-1), Residual Heat Removal P&ID
15. Flow Diagram 47W811-1 (FSAR Figure 6.3.2-1), Safety Injection P&ID
16. Flow Diagram 47W812-1 (FSAR Figure 6.2.2-1), Containment Spray P&ID
17. Flow Diagram 47W830-1 (FSAR Figure 11.2.2-1), Waste Disposal P&ID
18. Flow Diagram 47W855-1 (FSAR Figure 5.5.7.1), Fuel Pool Cooling & Cleaning P&ID

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY (TVA)
WATTS BAR NUCLEAR PLANT (WBN) UNIT 1

180-DAY RESPONSE TO GENERIC LETTER (GL) 98-02, "LOSS OF REACTOR COOLANT INVENTORY AND ASSOCIATED POTENTIAL FOR LOSS OF EMERGENCY MITIGATION FUNCTIONS WHILE IN A SHUTDOWN CONDITION," DATED MAY 28, 1998

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The significance of the Wolf Creek event is that it involved not only a diversion of RCS water to the refueling water storage tank (RWST), but the water was diverted to the common ECCS header and, as such, the event could have rendered all ECCS injection inoperable. The evaluation of TVA sites for susceptibility looked for possible flow paths which could allow flow from the hot RCS to the RWST. Where paths leading to the RWST were possible, the evaluation also considered whether that flow would introduce hot water to the RWST/ECCS suction header Flow to the RWST directly would mix with the large water volume in the RWST and subsequent flow to ECCS pumps would not pose a threat to pump operation.

Flow diagrams were reviewed to identify piping with diameters of 2 inches or greater which connects to the RWST/ECCS header. The connections were evaluated for the possibility of introducing hot RCS water to the RWST/ECCS header during Mode 4 operations. The number of potential piping paths which could introduce hot RCS water to the RWST/ECCS header is limited by TVA's use of check valves on suction piping. Consistent with conversations held with the author of the GL, check valves are assumed to work, and further consideration of gross leakage through lines with check valves is not required. Check valves on ECCS suction piping provide protection from a number of potential misalignments. Of the potential flow paths identified, four could potentially allow hot RCS water into some part of the RWST header or ECCS suction piping. These flow paths are discussed below.

1. The post-loss of coolant accident (LOCA) recirculation cross-tie from the containment sump through the RHR system via FCV-63-8 could allow hot RCS water to reach the Centrifugal Charging pumps (CCP) suction header if FCV-63-8 was inadvertently opened. The valve is closed and tagged with power removed upon entering Mode 4. While the valve could pose a threat to the CCPs if was operated, the administrative controls should preclude misalignment. The design also provides check valves, CKV-62-504 and CKV-62-697, in the CCP suction lines which would preclude significant diversion of fluid from the RCS

through CCP suction piping. There would, therefore, be no demand for ECCS injection. This path would not pose a threat to all injection sources.

2. A similar situation exists for the safety injection (SI) pump suction. The post-LOCA recirculation cross-tie from the containment sump through the RHR system via FCV-63-11 could inadvertently open, subjecting the SI pump suction header to hot RCS water. The valve is closed and tagged with power removed upon entering Mode 4. Further, hot RCS water could not reach the RWST header because of a check valve, CKV-63-510, in the SI pump suction line. The check valve would stop significant flow to the RWST.

3. The RWST return line from the discharge of the RHR heat exchanger has a hand control isolation valve, HCV-74-34, that if inadvertently opened in concert with FCV-74-33 and -35 could introduce hot RCS into the RWST suction header. This path is similar to the configuration which exists at Wolf Creek. The hand control valve is normally locked closed. Administrative controls are used to ensure that HCV-74-34 operation in Mode 4 does not result in an RCS drain-down to the RWST. These controls are discussed in detail in the report prepared in response to Action 2 of the GL which is on file at TVA.

4. A suction supply line from the RCS connects to the RHR suction and RWST suction header. This connection to the RHR is required for normal Mode 4 operation. The hot RCS water in the line could cause problems during a Mode 4 LOCA. Flow control valve FCV-63-1 isolates the RHR suction from the RWST header and is normally closed when RHR is used for shutdown cooling. RHR suction valves FCV-74-1 and -2 are interlocked with FCV-63-1 and will not open if FCV-63-1 is open. This prevents flow from the RCS/RHR suction line back to the RWST. In the event of FCV-63-1 being opened inadvertently, check valve 63-502 prevents significant flow from the RHR suction to the RWST header.

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REFERENCES

1. Information Notice 90-055,
2. Information Notice 91-022
3. Information Notice 91-42
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5. Information Notice 95-03 Suppl. 1
6. AEOD E704
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17. Flow Diagram 47W830-1 (FSAR Figure 11.2-1), Waste Disposal P&ID
18. Flow Diagram 47W855-1 (FSAR Figure 9.1-3), Fuel Pool Cooling and Cleaning System P&ID