



Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37379-2000

January 27, 2010

10 CFR 50.73

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

Sequoyah Nuclear Plant, Units 1 and 2
Facility Operating License Nos. DPR-77 and DPR-79
NRC Docket Nos. 50-327 and 50-328

Subject: Licensee Event Report 327 and 328/2009-008-01, "Fuel Assemblies in Spent Fuel Pool not Stored in Conformance With Technical Specifications"

The enclosed Licensee Event Report (LER) provides details concerning an event where Sequoyah Nuclear Plant arranged fuel assemblies in the spent fuel pool in a configuration that was not allowed by the design features specified in technical specifications (TSs). On December 24, 2009, the Tennessee Valley Authority (TVA) submitted Revision 0 of the enclosed LER. At that time, TVA was completing the root cause evaluation for the event. TVA has completed the root cause evaluation and is providing this LER revision. The revisions are annotated by a vertical bar to the right of the text.

This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(B), as an event that was prohibited by the plant's TSs requirements.

Respectfully,

Christopher R. Church
Site Vice President
Sequoyah Nuclear Plant

Enclosure:

cc: NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Sequoyah Nuclear Plant

JE22
NRK

LICENSEE EVENT REPORT (LER)
 (See reverse for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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4. TITLE:
Fuel assemblies in Spent Fuel Pool not stored in conformance with Technical Specifications

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	28	2009	2009	008	01	1	27	2010	SQN Unit 2	05000328
									FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)											
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)								
10. POWER LEVEL 100	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)								
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)								
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)								
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)								
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)								
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)								
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER								
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A								

12. LICENSEE CONTACT FOR THIS LER

NAME Norm Thomas	TELEPHONE NUMBER (Include Area Code) 423-843-7749
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
A				N					

14. SUPPLEMENTAL REPORT EXPECTED <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	15. EXPECTED SUBMISSION DATE MONTH: _____ DAY: _____ YEAR: _____
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

This LER is being revised to include the results of the root cause evaluation for this event. On October 28, 2009, at 1708 Eastern daylight time, it was discovered that four fuel assemblies in the SQN spent fuel pool (SFP) were not in conformance with criticality control requirements of Technical Specifications (TS) 5.6.1.1.c. These configuration errors occurred during the October 2009 SFP reconfiguration campaign to maintain conformance with the SFP decay heat dispersion requirements. The fuel assembly transfer forms (FATFs) prepared for this reconfiguration campaign did not correctly incorporate the TS 5.6.1.1.c criticality requirements and erroneously specified unacceptable SFP locations for the four fuel assemblies. The fuel assemblies were moved in accordance with the FATFs which resulted in the SFP nonconformance. Once the nonconformance was discovered, corrective actions were initiated to move the four assemblies within the SFP to a TS compliant configuration. The cause of the mis-configuration was insufficient procedural guidance in designing a SFP arrangement and creation of the FATFs.

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

I. PLANT CONDITION(S)

Units 1 and 2 were operating at 100 percent power.

II. DESCRIPTION OF EVENT

A. Event:

On October 28, 2009, at 1708 Eastern daylight time (EDT), while reviewing the spent fuel pool (SFP) (EISS code ND) configuration in preparation for Unit 2 Cycle 16 (U2C16) core offload, SQN determined that four fuel assemblies were in locations not in conformance with the criticality control requirements of Technical Specifications (TS) 5.6.1.1.c. The TS 5.6.1.1.c requirements ensure an arrangement of fuel in the SFP that maintains criticality within an acceptable and analyzed range. These fuel assemblies had been placed in this improper configuration during fuel moves on October 1 and October 7, 2009. Fuel movements are planned and performed to arrange the SFP fuel assemblies in a configuration that disperses the thermal energy in the SFP to minimize the potential impacts of specific events at a nuclear power plant. The October 2009 fuel assembly arrangement design should have incorporated both event-related configuration requirements and the TS 5.6.1.1.c configuration requirements. However, the fuel assembly transfer forms (FATFs) prepared for SFP reconfiguration did not correctly incorporate the TS 5.6.1.1.c criticality requirements for four used fuel assemblies. As a result, four used fuel assemblies were incorrectly placed adjacent to fresh fuel assemblies, which was not in compliance with TS 5.6.1.1.c requirements. The preparation of the SFP arrangement was performed for the first time by site reactor engineers without Corporate support. Following the discovery of the mis-configuration on October 28, 2009, the SFP boron concentration was verified to be within TS limits. The SFP boron concentration was verified at least once per 72 hours until the assemblies were moved to comply with TS 5.6.1.1.c in accordance with TS Surveillance Requirement (SR) 4.7.13.2. In addition, the configuration of the SFP with the four discrepant assembly locations was evaluated for safety significance. An analysis of the SFP array determined that significant margin to criticality existed and that the incorrect configuration was bounded by the limiting accident analysis. A revised SFP fuel assembly arrangement design was initiated and the required fuel moves were performed in order to return the SFP to an allowable configuration on October 31, 2009.

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

None.

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C. Dates and Approximate Times of Major Occurrences:

Date	Description
September 22 - 29, 2009	The fuel assembly transfer forms (FATFs) prepared for SFP reconfiguration did not correctly incorporate the TS 5.6.1.1.c criticality requirements for four fuel assemblies.
October 1, 2009, at 0919, 1106, 1150 EDT	Three fuel assemblies were moved to locations that were not in compliance with TS 5.6.1.1.c.
October 7, 2009, at 0900 EDT	One fuel assembly was moved to a location that was not in compliance with TS 5.6.1.1.c.
October 28, 2009, at 1708 EDT	During preparation of offload FATFs for the U2C16 outage, it was discovered that four assemblies in the SFP were not in compliance with TS 5.6.1.1.c.
October 28, 2009, at 1730 EDT	In order to comply with SR 4.7.13.2, the SFP boron concentration was verified to be greater than the TS required 2000 parts per million (ppm) and within limits at least once per 72 hours until the assemblies were moved to comply with TS 5.6.1.1.c.
October 31, 2009, at 0254 EDT	The four fuel bundles in question were relocated to appropriate storage locations on October 31, 2009.

D. Other Systems or Secondary Functions Affected:

No other systems or secondary functions were affected.

E. Method of Discovery:

On October 28, 2009, at 1708 EDT, while preparing the fuel offload SFP design arrangement for the U2C16 core offload, four fuel assemblies were found not in their correct configuration to meet the criticality requirements of TS 5.6.1.1.c.

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F. Operator Actions:

Following the discovery of the mis-configuration on October 28, 2009, the SFP boron concentration was verified to be greater than 2000 ppm and within limits at least once per 72 hours in accordance with TS SR 4.7.13.2.

G. Safety System Responses:

No safety system response was required.

III. CAUSE OF THE EVENT

A. Immediate Cause:

The cause of the event was the inadequate criticality review of the SFP fuel assembly design arrangement. This was the result of failures in the use of human performance tools during preparation of the spent fuel pool design plan.

B. Root Cause:

The root cause of this event was insufficient procedure guidance in designing a SFP arrangement and creation of the fuel assembly transfer forms. The procedures lacked sufficient detail to ensure the required aspects for proper spent fuel configuration would be achieved.

C. Contributing Factor:

A contributing factor was weakness in supervisory oversight during the SFP design and subsequent criticality verification.

IV. ANALYSIS OF THE EVENT

Unit 1 and Unit 2 were operating in mode 1 at 100 percent power when the mis-configuration of the four fuel assemblies occurred. Once the mis-configuration was discovered, the SFP boron concentration was verified to be 2274 ppm, which is greater than the 2000 ppm required by TS 3.7.13. The SFP was verified greater than 2000 ppm at least once per 72 hours to comply with TS SR 4.7.13.2. An analysis of the SFP arrangement determined that significant margin to criticality existed and that the incorrect configuration was bounded by the limiting accident analysis. During the period of time the four fuel assemblies were mis-configured, the SFP boron concentration was greater than 2000 ppm, which is significantly higher than the analysis requirements of greater than 700 ppm. A revised SFP fuel assembly

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higher than the analysis requirements of greater than 700 ppm. A revised SFP fuel assembly design was initiated and the required fuel moves were performed in order to return the SFP arrangement to compliance with TS 5.6.1.1.c.

V. ASSESSMENT OF SAFETY CONSEQUENCES

Based on the above "Analysis of The Event," this event did not adversely affect the health and safety of plant personnel or the general public.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions:

Corrective actions included revising the SFP fuel assembly design and performing the required fuel assembly moves in order to return the SFP arrangement to compliance with TS 5.6.1.1.c.

B. Corrective Actions to Prevent Recurrence - The corrective actions are being managed by the Sequoyah Nuclear Plant Corrective Action Program.

A procedure will be issued providing instructions on designing and documenting SFP fuel arrangements. The procedure for criticality verification will be revised to provide specific guidance on determining compliance with TS 5.6.1.1.c. In addition, Engineering supervisors will receive training on human performance tools.

VII. ADDITIONAL INFORMATION

A. Failed Components:

None.

B. Previous LERs on Similar Events:

A review of previous reportable events for the past 10 years did not identify any previous similar events.

C. Additional Information:

None.

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D. Safety System Functional Failure:

This event did not result in a safety system functional failure in accordance with 10 CFR 50.73(a)(2)(v).

E. Unplanned Scram with Complications:

This condition did not result in an unplanned scram with complications.

VIII. COMMITMENTS

None.