



Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37384-2000

April 10, 2006

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

10 CFR 50.73

Gentlemen:

**TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT (SQN)  
UNITS 1 AND 2 - DOCKET NO. 50-327 AND 50-328 - FACILITY  
OPERATING LICENSES DPR-77 AND DPR-79 - LICENSEE EVENT REPORT  
(LER) 50-327/2006-001-00**

The enclosed LER provides details concerning a potential loss of component cooling water to the seal water heat exchanger during an Appendix R fire event. This event is being reported, in accordance with 10 CFR 50.73(a)(2)(ii)(B), as the plant being in an unanalyzed condition that significantly degraded plant safety.

Sincerely,

P. L. Pace  
Manager, Site Licensing and  
Industry Affairs

Enclosure

cc (Enclosure):

INPO Records Center  
Institute of Nuclear Power Operations  
700 Galleria Parkway, SE, Suite 100  
Atlanta, Georgia 30339-5957

**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: 50 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.

<b>1. FACILITY NAME</b> Sequoyah Nuclear Plant (SQN) Unit 1	<b>2. DOCKET NUMBER</b> 05000327	<b>3. PAGE</b> 1 OF 6
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**4. TITLE**  
Potential Loss of Component Cooling Water to the Seal Water Heat Exchanger During an Appendix R Fire

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
02	09	2006	2006	- 001 -	00	04	10	2006	SQN Unit 2	05000 328
									FACILITY NAME	DOCKET NUMBER
										05000

<b>9. OPERATING MODE</b> 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§:</b> (Check all that apply)							
<b>10. POWER LEVEL</b> 100	<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)(ii)	<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)(iii)(A)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(iii)(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"/> 50.73(a)(2)(x)
	<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)(4)	<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"/> 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)(D)	<input type="checkbox"/> OTHER	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)		

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME J. W. Proffitt, Nuclear Engineer	TELEPHONE NUMBER (Include Area Code) 423-843-6651
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>	MONTH	DAY	YEAR

**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)**

On February 9, 2006, based on a review of an industry operating experience issue, engineering personnel identified a scenario involving a potential loss of component cooling system (CCS) water to the seal water heat exchanger during an Appendix R fire event. The scenario involves a loss of component cooling system flow to the seal water heat exchanger due to fire damage resulting in high suction temperature on the running centrifugal charging pump (CCP) causing a loss of adequate suction head (NPSH). During an Appendix R fire event, CCP suction is aligned in the refueling water storage tank (RWST), normal charging and letdown are isolated and the only makeup flow is via the reactor coolant pump (RCP) seal injection flow path. If the seal water heat exchanger cooling is lost, the CCP recirculation flow and RCP seal return flow are not cooled and would mix with 30-40 gpm of cool water from the RWST resulting in concerns with pump cavitation and damage to the RCP seals. A realistic analysis reveals that failure of CCS flow is unlikely and even lower likelihood of excessive seal leakage. The cause of this event was that previous SQN fire safe shutdown analysis did not recognize the need to protect the seal water heat exchanger for hot safe shutdown, or to evaluate the ramifications of not protecting the heat exchanger. Interim compensatory measures were to post roving fire watches in the affected areas. These actions were replaced with a procedure revision to perform manual actions to ensure safe shutdown.

**LICENSEE EVENT REPORT (LER)**

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Sequoyah Nuclear Plant (SQN) Unit 1	05000327	YEAR	SEQUENTIAL NUMBER	REVISION	2 OF 6
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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 February 9, 2006, based on a review of an industry operating experience issue, engineering personnel identified a scenario involving a potential loss of component cooling water to the seal water heat exchanger during a 10 CFR 50 Appendix R fire event. The scenario involves a loss of component cooling system [EISS Code CC] flow to the seal water heat exchanger [EISS Code CB] because of fire-induced damage resulting in high suction temperature on the running centrifugal charging pump (CCP) [EISS Code CB] resulting in a loss of adequate suction head. During a 10 CFR 50 Appendix R fire event, the CCP suction is aligned to the refueling water storage tank (RWST), normal charging and letdown are isolated and the only makeup flow is the reactor coolant pump (RCP) seal injection flow path. If the seal water heat exchanger cooling is lost, the CCP recirculation flow, approximately 60 gallons per minute (gpm) and RCP seal return flow, approximately 16 gpm are not cooled and would mix with 30-40 gpm of cool water from the RWST. The net result is that the CCP suction temperature could reach saturation temperature leading to pump cavitation. The temperature increase could be high enough to cause damage to the RCP seals.

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

None.

C. Dates and Approximate Times of Major Occurrences:

January 27, 2006	Engineering reviewed operating experience regarding a potential Appendix R fire scenario as described above.
February 2, 2006 at 0830 Eastern Standard Time (EST)	Precautionary fire watches established in areas potentially affected.
February 4, 2006 at 0628 EST	Precautionary fire watches were discontinued based on establishment of a procedure revision for operators to perform manual actions to ensure safe shutdown is maintained.

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February 9, 2006      Engineering personnel determined the fire scenario was applicable. No other occurrences were identified where a support system should have been protected for hot safe shutdown.

D. Other Systems or Secondary Functions Affected:

No other systems or secondary functions were affected by this event.

E. Method of Discovery:

The condition was discovered during a review of an operating experience item from another utility.

F. Operator Actions:

No operator actions were required.

G. Safety System Responses:

Not applicable – no safety system response was required.

III. CAUSE OF THE EVENT

A. Immediate Cause:

The immediate cause of the condition was failure to protect the seal water heat exchanger from the effects of an Appendix R fire.

B. Root Cause:

The cause of the event was that previous SQN fire safe shutdown (FSSD) analysis did not recognize the need to protect the seal water heat exchanger for hot safe shutdown, or to evaluate the ramifications of not protecting the heat exchanger. Additionally, the fire protection program upgrade project did not identify the subject scenario. The scope of the fire protection program upgrade effort did not include a re-analysis of the FSSD compliance strategies. The intent of the effort was to develop the analysis to support transformation of the operating procedures from diagnostic type formats to prescriptive fire area by fire area requirements.

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**C. Contributing Factor:**

There were no contributing factors to this condition.

**IV. ANALYSIS OF THE EVENT**

The condition identified is applicable to fire areas in which the CCS is not available for cooling of the seal water return heat exchanger. Since the design of the heat exchanger is such that it can only be cooled by the A-header of CCS, the safety significance is applicable for the affected fire areas in which the CCS A-header cannot be credited for hot standby functions.

The fire areas identified include full area automatic suppression and detection systems, with the exception of the Unit 2 additional equipment building. The Unit 2 additional equipment building is equipped with 2 cross-zoned ionization detectors, 2 portable fire extinguishers, and 2 hose stations. The combustible loading in the fire area is low. In addition, the area is considered to be a low-risk fire area. Therefore, for the fire areas identified, the installed fire protection features and onsite fire department would prevent a fire from developing to the extent that there would be a loss of CCS to the seal water heat exchanger.

If a fire in one of these fire areas did result in a loss of CCS to the seal water heat exchanger, the temperature at the suction and discharge of the CCP would increase. When nominal seal injection and seal return flow rates are used, the temperature of the water at the suction of the CCP is about 200 degrees F. This suction water temperature is low enough that adequate pump NPSH is maintained. The water heats up about 20 degrees F across the pump and about another 30-40 degrees F prior to entering the RCP seals so the temperature of the seal injection water is about 250 degrees F. This seal injection water temperature is above the maximum temperature allowed for seal operation (180 degrees F), but well below the 550F design temperature of the No. 1 seal high temperature O-rings. Therefore, it is unlikely that the RCP seals would leak much above their nominal values, in which case the CCP would continue to operate and seal injection could be maintained.

**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.

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

**VI. CORRECTIVE ACTIONS**

**A. Immediate Corrective Actions:**

Immediate action taken was to require roving fire watches in the suspected areas until engineering completed their assessment of the issue.

As an interim action, abnormal operating procedure (AOP) N.08, "Appendix R Fire Safe Shutdown," was revised to include main control room manual actions to isolate the RCP seal return line and a local manual action to isolate the RCP seal return line for a fire in the Unit 1 6.9-kV Shutdown Board Room A, the elevation 734 access room and elevation 714 general area.

**B. Corrective Actions to Prevent Recurrence:**

SQN revised the applicable design basis documentation to incorporate the actions to isolate the RCS seal water return line into the applicable fire area compliance strategies and the manual action timeline analyses.

**VII. ADDITIONAL INFORMATION**

**A. Failed Components:**

None

**B. Previous LERs on Similar Events:**

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

**C. Additional Information:**

None

**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).

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E. Loss of Normal Heat Removal Consideration:

This condition did not result in a loss of normal heat removal.

VIII. COMMITMENTS

None.