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February 7, 1992

U.S. Nuclear Regulatory Commission
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Gentlemen:

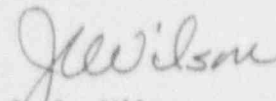
TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 1 - DOCKET
NO. 50-327 - FACILITY OPERATING LICENSE DPR-77 - LICENSEE EVENT REPORT
(LER) 50-327/91016, REVISION 1

The enclosed LER revision provides an updated schedule for completion of corrective actions concerning operation with unqualified penetration seals because of thermal pipe movements. Fire watch patrols will be maintained in the affected area until the corrective action is implemented. This event was initially reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as an operation prohibited by technical specifications.

The changes from TVA's original report are designated by vertical bars in the right-hand margin.

Very truly yours,

TENNESSEE VALLEY AUTHORITY


J. L. Wilson

Enclosure
cc: See page 2

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U.S. Nuclear Regulatory Commission

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cc (Enclosure):

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Sequoyah Nuclear Plant, Unit 1 DOCKET NUMBER (2) 015010131217110F1015 PAGE (3) 5

TITLE (4)

Operations with Unqualified Penetration Seals Caused by Thermal Movements

EVENT DAY (5)			LER NUMBER (6)		REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)	
01	07	11	01	01	01	07	11	Sequoyah, Unit 2	015010131218	
01	07	11	01	01	01	07	11		015010131218	

OPERATING MODE (9) 1 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:

(Check one or more of the following)(11)

POWER LEVEL (10)	1	0	0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
				20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
				20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	XX OTHER (Specify in
				20.405(a)(1)(iii)	XX 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	Abstract below and in
				20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	Text, NRC Form 366A)
				20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	Special Report

LICENSEE CONTACT FOR THIS LER (12)

NAME Melissa Meade, Compliance Licensing TELEPHONE NUMBER 615843-7766

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) X NO EXPECTED SUBMISSION DATE (15)

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On July 11, 1991, with both units operating in Mode 1, a condition was identified involving unqualified penetration sleeve seals because of piping thermal movements. The unqualified sleeve seals consist of Dow-Corning 3-6548 room temperature vulcanizing (RTV) silicone foam. Piping through four Unit 1 and five Unit 2 penetrations exceeded the axial movement criteria of 15 percent of the minimum annular distance and three Unit 1 and three Unit 2 penetrations exceeded the 1/4-inch limit for radial movements. The cause of the existing unqualified penetrations is that original design requirements relative to RTV foam seals were inadequate. Corrective actions include maintaining required fire watch coverage in the interim, modifying the unqualified seals and establishing an action plan to address the remaining sleeve seal issues. This report is being submitted as required by 10 CFR 50.73(a)(2)(i)(B) and in follow-up to Special Report 91-11.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
Sequoyah Nuclear Plant Unit 1	05000131217	91	016	00	02	01	5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

Description of Event

On July 11, 1991, at 2115 Eastern daylight time (EDT) with Units 1 and 2 operating in Mode 1 (100 percent power, 578 degrees Fahrenheit, and 2,235 pounds per square inch gauge), a condition was identified involving eight penetration sleeve seals (EIIIS Code SEAL) on Unit 2 that are not qualified as a result of inadequate consideration of piping thermal movements. This condition was identified during reanalysis of the Unit 2 residual heat removal (RHR) system (EIIIS Code BP) piping for an upcoming modification. This condition was then determined to be applicable to seven corresponding Unit 1 penetrations. The sleeve seals consist of Dow-Corning 3-6548 room temperature vulcanizing (RTV) silicone foam and are located in penetrations through the walls of the RHR pump rooms and RHR and containment spray (RHR/CS) heat exchanger rooms. Piping through four Unit 1 and five Unit 2 penetrations exceeded the axial movement criteria of 15 percent of the minimum annular distance, established by the seal manufacturer, Dow-Corning. Additionally, piping through two Unit 1 and two Unit 2 penetrations exceeded the 1/4-inch limit for radial movements that was also established by the manufacturer. One penetration on each unit exceeded both the axial and radial movement criteria. These limits ensure that gaps that could potentially effect the pressure, hydraulic, and fire rating of the seal are not created by pipe movement.

Upon notification of this condition, both units entered Limiting Condition of Operation (LCO) 3.7.12, Action Statement (a), at 2115 EDT, and a fire watch was established in accordance with this action at 2145 EDT. The RHR pump rooms are equipped with detection and suppression capability; therefore, roving fire watch patrols will observe these rooms. The RHR/CS heat exchanger rooms are not equipped with suppression and detection and are being observed by a continuous fire watch stationed outside the doors of the heat exchanger rooms for ALARA (as low as reasonably achievable) considerations.

A visual inspection of the sleeves affected by the RHR reanalysis revealed that in many cases, some disbonding at the top of the sleeve or at the pipe had occurred, with gaps approximately 1/4-inch wide. These gaps could result in the penetrations not being in accordance with fire tested configurations, regardless of the piping movement concern. These gaps could have been caused by past pipe movement or normal seal shrinkage. No other damage to the seals was observed. The Surveillance Instruction (SI) 233.1 series are the procedures for visual inspections of the penetrations on an 18-month frequency, as required by Surveillance Requirement 4.7.12. A review of the most recently performed SI for these areas determined that the gaps had not been identified. Formation of these gaps since the SI performance is unlikely. This surveillance procedure has recently been determined to be technically inadequate, as reported in LERs 50-327/91008, Revision 2, dated July 31, 1991, and 50-327/91013, Revision 1, dated July 31, 1991. The identified procedure inadequacies resulted in inconsistencies in determining the penetrations' acceptability.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		SEQUENTIAL	REVISION				
Sequoyah Nuclear Plant Unit 1		YEAR	NUMBER	NUMBER			
		050003	12	17	9	1	5

TEXT (If more space is required, use additional NRC Form 366A's) (17)

Through various industry notices and internal corrective action documents, SQN had identified a generic problem with documenting that penetration seal designs comply with tested configurations. Corrective actions had been completed to qualify the shield building penetrations for fire barrier, hydraulic, and pressure retention functions (as reported in LER 50-327/87040, Revision 1, dated February 25, 1988). These corrective actions completely ensured penetration qualification for the shield building and plant qualification from a hydraulic standpoint; however, the fire barrier and pressure retention functions have not been verified for remaining seismic Category I plant structures, as was identified in an internal corrective action document (Condition Adverse to Quality Report [CAQR] SQP900072). The condition described in this report is the first confirmed example of unqualified seals in structures other than the shield building, resulting from the documentation problems noted above. Fire watches are established in plant areas containing penetrations, as a prudent measure, to generically address the potential for unqualified seals. For areas that are not accessible because of ALARA considerations, thermocouples are being installed and monitored.

Cause of the Event

The original design requirements for the RTV silicone foam seals were incomplete; maximum piping movement, piping temperature, and annular space for seal qualification were not specified. Additionally, no mechanisms existed to ensure appropriate interdisciplinary interfaces occurred for sleeve seal design.

As stated in LERs 50-327/91008 and 50-327/91013, the cause of the inadequacies in the SI-233.1 series could not be conclusively determined because of the extended duration of the condition.

Analysis of Event

This report is being submitted as required by 10 CFR 50.73(a)(2)(i)(B) as an operation prohibited by TS and in follow-up to Special Report 91-11.

The thermal movement limits, established by the manufacturer, ensure that gaps that could potentially affect the pressure, hydraulic, and fire rating of the seal, are not created by pipe movement. The hydraulic function of the seals ensures a flooded condition on one side of the wall is not transferred to the other side. The shield building is the only building required to provide a hydraulic barrier during a design basis flood; the auxiliary building is assumed to flood during this event. Therefore, the identified deficiencies are not required to be hydraulically qualified. The fire barrier function of the seals is required in compartmentation walls. The time for which the seal must be qualified depends on the rating of the associated compartmentation barrier, three hours for the identified unqualified seals. Pressure retention is required for areas that are required to be pressurized to ensure radiation leakage is in the desired direction, including the auxiliary building, containment, and the control building. The identified, unqualified seals are located in the auxiliary building, but are not in an auxiliary building secondary containment enclosure (ABSCE) boundary wall; therefore, they do not provide a pressure retention function.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)				PAGE (3)			
Sequoyah Nuclear Plant Unit 1		SEQUENTIAL		REVISION					
		YEAR	NUMBER	NUMBER					
		050003127911	--016--	0005	01				

TEXT (If more space is required, use additional NRC Form 366A's) (17)

Additional Information

LER 50-327/87040, Revision 1, was issued on February 25, 1988, and inappropriately concluded, that fire seals of other safety-related structures were not affected by the condition, and no corrective actions were necessary. Had the broader penetration seal qualification condition been recognized, these specific unqualified seals could have been identified and corrected earlier.

LERs 50-327/91008, Revisions 2, issued July 31, 1991, and 50-327/91013, Revision 1, issued July 31, 1991, reported the identified deficiencies associated with the SI-233.1 series procedures and contained corrective actions to be completed that would have identified the existing gaps in the seals.

Commitments

1. The unqualified seals on the RHR piping penetrations will be modified as necessary to ensure their qualification by March 27, 1992.
2. The corrective action document addressing this problem (CAQR SQP900072) will be reviewed to ensure remaining issues are properly addressed. An action plan to correct any potential deficiencies will be developed from this review. (This commitment has been superseded by corrective actions detailed in the Fire Protection Improvement Plan submitted to NRC by letter dated October 4, 1991.)

PL090204/1001

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)		
		YEAR	NUMBER	REVISION	NUMBER	OF	PAGES
Sequoyah Nuclear Plant Unit 1	050013 12 17 19 11	0	1	6	0	0	4
					01 5		

TEXT (If more space is required, use additional NRC Form 366A's) (17)

The functional integrity of fire barrier penetrations ensures that fires will be confined or adequately retarded from spreading to adjacent portions of the facility. Although the penetrations in this wall were not qualified, they were intact and would have inhibited communication with adjacent areas. Additionally, the insulation on the pipes, which is Calcium Silicate, extends nearly to the surfaces of the seals. This material is used in some fire stop seal configurations and is a fire inhibitor. Although this is not a tested configuration, the insulation would limit the propagation of flames and hot gasses to the opposite side of the barrier. Further, the foam material expands when heated. In the event of a fire, this expansion would likely fill any voids in the seal.

For these reasons, there is assurance that, in the event of a fire, flames and hot gases would not rapidly spread to adjacent facilities. Additionally, the existing suppression and detection coupled with the fire watch patrols ensure appropriate response actions would be initiated if a fire occurred. Therefore, the health and safety of the public was not threatened.

Corrective Action

Upon discovery of this condition, the affected areas with suppression and detection were included in the surveillance of roving, hourly fire watch patrols. Continuous fire watch coverage was established for the areas without suppression and detection. Fire watches have been established in other plant areas containing penetrations, as a prudent measure, to generically address the potential for unqualified seals. For areas that are not accessible because of ALARA considerations, thermocouples are being installed and monitored.

The unqualified seals on the RHR piping penetrations will be modified by March 27, 1992, to ensure their qualification. To address the broader issue concerning the documentation of seal qualification for other plant locations, the corrective action document addressing this problem (CAQR SQP900072) will be reviewed to ensure remaining issues are properly addressed. An action plan to correct any potential unqualified seals will be developed from this review.

Several design control processes have been established to ensure the adequacy of seal designs. A defined design criteria for sleeve seals was issued June 1, 1989. Additionally, rigorous analysis handbook, Section SQN-RAH-205, Revision 2, was issued April 10, 1984, requiring the piping analyst to notify Mechanical Engineering if piping displacements at sleeves exceed 1/4 inch. Also, the design change procedure now contains an Appendix R checklist, which requires addressing Appendix R requirements and also requires a cross discipline review of design change notices.

As stated in LERs 50-327/91008 and 50-327/91013, the SI-233.1 series will be reviewed and appropriate revisions will be made to clarify inspection requirements and correct acceptance criteria deficiencies. Performance of these surveillances will follow the procedure revisions to ensure penetrations are inspected and gaps are corrected.