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

March 27, 2014

10 CFR 50.73

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

Sequoyah Nuclear Plant, Unit 1
Facility Operating License No. DPR-77
NRC Docket No. 50-327

Subject: **Licensee Event Report 50-327/2013-004-01, "Failure to Comply with Technical Specification"**

Reference: TVA Letter submitted to NRC, dated December 24, 2013, "License Event Report 328/2013-004, 'Failure to Comply with Technical Specification'"

The enclosed licensee event report has been revised with supplemental information concerning the failure to comply with Technical Specification. A penetration affecting the auxiliary building secondary containment enclosure was breached without required compensatory measures. This revised report reflects the results of an evaluation that operability of the auxiliary building gas treatment system was not affected. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(B), as an event or condition that is prohibited by technical specifications. Changes to the previous report are indicated by revision bars on the right side margin of the page.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact Mr. Michael McBrearty, Sequoyah Site Licensing Manager, at (423) 843-7170.

Respectfully,

John T. Carlin
Site Vice President
Sequoyah Nuclear Plant

Enclosure: Licensee Event Report 50-327/2013-004-01
cc: NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Sequoyah Nuclear Plant

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NRR

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

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 FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resources@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.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE: Failure to Comply with Technical Specifications for Containment Penetrations during Fuel Movement Resulting from Ineffective Procedures

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	21	2013	2013	- 004 -	01	03	27	2014	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE
6

10. POWER LEVEL
0%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☒ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	*Specify in Abstract below or in NRC Form 366A*

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Rusty Proffitt	(423) 843-6651

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

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

Between October 21-28, 2013, workers breached SQN Unit 1 containment penetration X-108 several times during fuel movement while performing plant maintenance. Technical Specification 3.9.4, Containment Building Penetrations, requires that containment building penetrations providing direct access from the containment atmosphere to the outside atmosphere shall be closed during fuel movement. Workers were not aware that use of X-108 penetration was not allowed during movement of irradiated fuel. On October 27, 2013, a Senior Reactor Operator identified penetration X-108, affecting the auxiliary building secondary containment enclosure (ABSCE), was breached without required compensatory measures. The penetration manual valves were subsequently closed and secured. The root cause is ineffective procedures for controlling containment penetration breaches during Modes 5 and 6. A governing procedure will be developed and implemented for controlling breaches of the shield building, ABSCE, control room boundaries, and design basis flood barriers.

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I. Plant Operating Conditions before the Event

At the time of the event, Sequoyah Nuclear Plant (SQN) Unit 1 reactor was in Mode 6 for a refueling outage. Unit 2 was in Mode 1 at 100 percent power.

II. Description of Events

A. Event:

Between October 21-28, 2013, workers breached SQN Unit 1 containment penetration X-108 several times during fuel movement while performing plant maintenance. Technical Specification 3.9.4, Containment Building Penetrations, requires that containment building penetrations providing direct access from the containment atmosphere to the outside atmosphere shall be closed during fuel movement. Workers were not aware that use of X-108 penetration was not allowed during movement of irradiated fuel.

A maintenance flange was installed in penetration X-108 on October 18, 2013, for the refueling outage. The maintenance flange was installed with one air line and one water line passing through the penetration. The penetration is considered breached any time the valve on one of these lines is open. The maintenance flange allows temporary connections to a water treatment skid and an air compressor, to support maintenance in the ice condenser [BC]. When the penetration is breached (valve(s) open), compensatory actions are required for isolating the penetration (closing the valve(s)) in an event that requires the penetration to be isolated. Compensatory measures had not been established for breaching of the penetration. When a unit is in Mode 5 or 6, the containment is part of the auxiliary building secondary containment enclosure (ABSCE) when containment is open to the auxiliary building.

On October 27, 2013, a Senior Reactor Operator identified penetration X-108, was breached without required compensatory measures. The SRO instructed personnel to isolate the lines going through the penetration when containment is open to the auxiliary building.

Operations personnel declared both trains of the Auxiliary Building Gas Treatment System (ABGTS)[BH] inoperable and entered Technical Specifications (TS) Limiting Conditions for Operation (LCOs) 3.7.8, 3.9.12, and 3.0.3 actions for Unit 2 and TS LCO 3.9.12 action for Unit 1. TS LCO 3.7.8 requires: two independent auxiliary building gas treatment system (ABGTS) filter trains shall be operable in Modes 1 through 4; TS LCO 3.9.12 action requires: one auxiliary building gas treatment filter train shall be operable whenever irradiated fuel [AC] is in the storage pool [DA]. With neither train of ABGTS operable TS LCO 3.0.3 is applicable.

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A subsequent evaluation determined the operability of ABGTS was not affected. Therefore, Unit 2 was not affected by this condition.

The integrity of the penetration is a requirement for fire barrier, containment integrity, ABSCE, and containment building penetrations during refueling operations. Each of these has different compensatory or immediate actions to be taken when the penetration is breached.

On October 28, with fuel movement in progress, the isolation valve for the water line passing through this penetration was found open. Plant personnel were instructed to isolate the line. Later on October 28, the water line isolation valve was again found open. Site personnel were instructed to close the valve, secure with tape, and post a sign not to open the air or water valves without Operations' permission. Another source of air was found and penetration X-108 was not used for the duration of the outage. During the investigation, it was determined the penetration had been breached on October 21, 2013, during fuel movement.

B. Status of structures, components, or systems that were inoperable at the start of the event and contributed to the event:

There were no structures, components, or systems that contributed to the event.

C. Dates and approximate times of occurrences:

Dates and Times	Description
October 14, at 0000 EDT	Unit 1 is shutdown for a refueling outage.
October 14, at 0719 EDT	Unit 1 enters Mode 5 allowing blind flanges to be removed from containment penetrations and replaced with mechanical breaching flanges.
October 17 at 0430 EDT	Unit 1 enters Mode 6.
October 18	Instructions were provided that penetration X-108 would be required to be isolated. Workers were not provided with devices for communication to isolate the penetration.
October 18 at 0200 EDT	The blind flange is removed from containment penetration X-108 and replaced with a mechanical breaching flange.
October 19	Modifications personnel receive initial brief for closing penetration X-108 from Operations. This brief ensures compliance with general operating procedures for isolating

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	containment for loss of residual heat removal [BP] or fuel handling accident. It requires carrying a pager with instructions to isolate the penetration if the pager is activated.
October 19 at 0719 EDT	Reactor core off load begins. When fuel handling is in progress, penetration X-108 is not allowed to be open in accordance with TS LCO 3.9.4.
October 19	A turn-over with night shift was performed; compensatory actions as required by TS and procedures for penetration X-108 were not included in the turn-over because the actions were not applicable at the time.
October 20-21	The air and water lines to the penetration are verified correct. Modifications personnel began to use the equipment. The work practices are to operate the valves through the penetration as needed. Operations personnel were unaware of the ABSCE compensatory actions requiring constant staffing and did not track each time the penetration opened or closed. The tracking notes for penetration X-108 indicate that none of its valves can be open during fuel movement even with administrative controls because it goes to the outside atmosphere. The notes do not tie to TS LCO 3.9.4 or state how the valves will be positively controlled.
October 21 at 2350 EDT	An Operations SRO directs Modifications personnel to close the valves for the lines passing through penetration X-108 as fuel movement is in progress. The SRO was aware of the penetration being breached at different times during the shift, and each time told Modifications personnel to close the valve. The SRO did not log entry into TS LCO 3.9.4 or take required action to stop movement of irradiated fuel. No actions were taken to secure the valves closed or require permission from Operations prior to opening the associated valves. The breaches were opened without positive controls in place. A subsequent evaluation determined the operability of ABGTS was not affected.
October 22 at 1025 EDT	Core offload is complete. Unit 1 is in no-mode.
October 26 at 1100 EDT	Containment Penetration X-108 is documented as open without compensatory actions.
October 27 at 1730 EDT	An Operations SRO, reviewing requirements for upcoming reload, questions Modifications personnel about penetration X-108 and compensatory actions. Operations evaluated and tried to interpret what was meant by the requirements in site procedures regarding breaches and effect on actions of LCO 3.9.4. No definite conclusion was reached. Engineering was contacted and it was recognized the

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	ABGTS compensatory actions were also applicable but were not being performed. Unit 2 entered TS LCO actions of 3.0.3, 3.7.8, and 3.9.12 for inoperable ABGTS. Unit 1 entered TS LCO 3.9.12 action. A subsequent evaluation determined the operability of ABGTS was not affected and Unit 2 entry into TS LCO actions of 3.0.3, 3.7.8, and 3.9.12 for the inoperability of ABGTS was not required.
October 27 at 1732 EDT	TS LCOs 3.0.3, 3.7.8, and 3.9 12 actions on Unit 2 and LCO 3.9.12 action on Unit 1 were exited when the valves associated with penetration X-108 were closed.
October 27 at 1904 EDT	Unit 1 core reload begins.
October 27 at 2229 EDT	NRC was notified of the event.
October 28	The water line passing through penetration X-108 was found open on two separate occasions. Modifications personnel were instructed to close the valve. TS LCO 3.9.4 action was not entered, although it was applicable.
October 31 at 0519 EDT	Unit 1 core reload was completed

D. Manufacturer and model number of each component that failed during the event:

There were no component failures associated with this event.

E. Other systems or secondary functions affected:

There were no other systems or functions affected by this event.

F. Method of discovery of each component or system failure or procedural error:

On October 27, while reviewing requirements for upcoming fuel reload, a SRO identified a penetration affecting ABSCE was breached without compensatory measures.

G. The failure mode, mechanism, and effect of each failed component, if known:

There were no component failures associated with this event.

H. Operator actions:

Following the discovery on October 27, 2013, Operations personnel assessed the condition for operability and entered into TS LCOs 3.7.8, 3.9.12, and 3.0.3 actions for Unit 2 and TS LCO 3.9.12 action for Unit 1. A subsequent evaluation determined the operability of ABGTS was not affected and Unit 2 entry into TS LCO actions of 3.0.3, 3.7.8, and 3.9.12 for the inoperability of ABGTS was not required.

I. Automatically and manually initiated safety system responses:

During the event, plant conditions did not require automatic or manual initiated safety system response.

III. Cause of the event

A. The cause of each component, system failure or personnel error, if known:

The failure to maintain the penetration closed during movement of irradiated fuel was the lack of positive control of the valves for the lines passing through the penetration.

B. The cause(s) and circumstances for each human performance related root cause:

The root cause of this event was determined to be ineffective procedures for controlling penetration breaches during Modes 5 and 6.

IV. Analysis of the event:

The design bases for the ABSCE are to assure that an effective barrier will exist for airborne fission products that may leak from the primary containment during a loss-of-coolant accident (LOCA). Within the scope of these design bases are requirements that influence the size, structural integrity, and leak tightness of the secondary containment enclosure. Specifically, these include a capability to: (a) Maintain an effective barrier for gases and vapors that may leak from the primary containment during all normal and abnormal events; (b) Delay the release of any gases and vapors that may leak from the primary containment during a LOCA; (c) Allow gases and vapors that may leak through the primary containment during a LOCA to flow into the contained air volume within the secondary containment where it will be diluted, held up, and filtered prior to being released to the environs; (d) Bleed to the annulus secondary containment, each air-filled containment penetration enclosure, which extends beyond the shield building and is

formed by automatically actuated isolation valves; and (e) Maintain an effective barrier for airborne radioactive contaminants, gases and vapors originating in the auxiliary building during all normal and abnormal events.

The design basis of ABGTS is to provide two independent trains of ABGTS for accident mitigation. ABGTS is designed to 1) establish and keep an air pressure that is below atmospheric within the portion of the auxiliary building serving as a secondary containment enclosure during accidents; 2) reduce the concentration of radioactive nuclides in air releases from the ABSCE to the environs during accidents to levels sufficiently low to keep the site boundary dose rate below the 10 CFR 100 guideline value; and 3) minimize the spreading of airborne radioactivity within the auxiliary building following an accidental release in the fuel handling areas.

With ABGTS capable of maintaining the ABSCE below atmospheric pressure, fission products released from containment to the ABSCE during a LOCA design basis accident (DBA) will pass through the ABGTS HEPA filter and charcoal absorbers before being released to the environment.

If a fuel handling accident should occur inside the primary containment, the containment may be ventilated through a single train of reactor building purge ventilation system. The containment equipment hatch and personnel air locks may be open during fuel handling operations, and although the purge line would be quickly isolated, activity release is assumed to continue through these open penetrations. However, initial activity is assumed to be exhausted by one train of containment purge directly to the environment. After the containment purge line is isolated, the activity remaining in the containment is assumed to be released by way of the penetrations. All activity is assumed to be released within two hours of the fuel damage occurring. The results of penetration X-108 being open would not have any effect on the dose analysis since the updated final safety analysis report (UFSAR) analysis of the fuel handling accident does not credit ABGTS filtering of the fission product release from the fuel pool.

In summary, as a result of the condition identified, it is a reasonable expectation that the supply of outside air (from air compressor) to the ABSCE would not have affected ABGTS or a release to the environment that would result in dose limits being exceeded. Therefore, ABGTS and the ABSCE would have been capable of performing their safety functions during the time of the identified condition.

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V. Assessment of Safety Consequences

A. Availability of systems or components that could have performed the same function as the components and systems that failed during the event:

Penetration X-108 was discovered to be open and unmanned violating the site breach control procedure. The open penetration resulted in an unanticipated ABSCE breach, potentially adversely affecting the safety functions of ABGTS. During the condition, Unit 1 was defueled and in Mode 6 while Unit 2 was in Mode 1 operating at 100 percent power. The primary safety functions of ABGTS are to:

1) Keep the ABSCE (negative 1/4 inch water gauge or more negative) below atmospheric pressure. This applies any time either unit is in Modes 1-4.
2) To reduce radioactive nuclide releases from the ABSCE during accidents by routing all exhaust air through an air cleanup charcoal filter bank prior to release to the atmosphere. The total flow through the ABGTS shall be 9,000 cubic feet per minute (plus or minus 10 percent).

The primary safety function of the ABSCE is to establish a low leakage envelope surrounding those portions of the auxiliary building that may be subject to radioactive airborne releases following a DBA such that the ABGTS can maintain a negative 1/4 inch water gauge or more negative. This shall be accomplished by means of closing doors and isolation dampers and sealing penetrations of the boundary envelope. Air shall then be drawn from the fuel handling areas, waste packaging areas, and from the ECCS pump areas and the reactor building of either unit in Mode 5 or 6 while the unit's equipment access doors and equipment hatches are breached, and the opposite unit is operating in Mode 1,2, 3, or 4.

Therefore, as described above ABGTS and the ABSCE would have been capable of performing their safety functions during the time of this condition had a LOCA occurred. Additionally, as a result of the condition identified, it is a reasonable expectation that X-108 being open would not have affected a release to the environment that would result in dose limits being exceeded.

B. For events that occurred when the reactor was shut down, availability of systems or components needed to shutdown the reactor and maintain safe shutdown conditions, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident:

This event occurred with Unit 1 shutdown in Mode 6 and Unit 2 in Mode 1 at 100 percent power. With Unit 1 reactor shutdown, the systems and components needed to maintain safe shutdown conditions and remove

residual heat were not affected. The ABGTS is not credited for fuel handling events, but it is required to help control the release of radioactive material and mitigate the consequences of a LOCA-DBA.

C. For failure that rendered a train of a safety system inoperable, an estimate of the elapsed time from discovery of the failure until the train was returned to service:

When the condition was identified on October 27, 2013, ABGTS was considered inoperable for approximately 2 minutes. A subsequent evaluation determined the operability of ABGTS was not affected.

VI. Corrective Actions

Corrective Actions are being managed by TVA's Corrective Action Program under problem evaluation report number 800432.

A. Immediate Corrective Actions:

The penetration manual valves were closed and secured.

A sign was placed on the air and water valves to avoid further manipulation.

Permits with the same requirements were verified for compliance; no discrepancies were identified.

The maintenance flange was removed and the blind flange was reinstalled.

B. Corrective Actions to prevent recurrence or to reduce probability of similar events occurring in the future:

General Operation Procedure 0-GO-15, Containment Closure Control, will be revised to add details about controlling penetration breaches during fuel movement.

A governing procedure will be developed and implemented for controlling breaches of the shield building, ABSCE, control room boundaries, and design basis flood barriers. This will place breaching requirements, including compensatory actions, in one procedure.

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VII. Additional Information

A. Previous similar events at the same plant:

A review of previous reportable events for the past 3 years did not identify any previous similar events.

B. Additional Information:

None.

C. Safety System Functional Failure Consideration:

This condition did not result in a safety system functional failure.

D. Scrams with Complications Consideration:

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

VIII. Commitments:

None