



Tennessee Valley Authority, Sequoyah Nuclear Plant, P.O. Box 2000, Soddy Daisy, Tennessee 37384

October 3, 2016

10 CFR 50.73

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

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

Subject: **Licensee Event Report 50-327 and 50-328/2016-007-00, Unanalyzed  
Condition Due to Emergency Gas Treatment System not Meeting Single  
Failure Criteria**

The enclosed licensee event report provides details concerning a design issue that was identified, which could have prevented the Emergency Gas Treatment System from performing its required safety function. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(i)(B), 10 CFR 50.73(a)(2)(ii)(B), and 10 CFR 50.73(a)(2)(v).

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

Respectfully,

A handwritten signature in blue ink, appearing to read "P. Pratt", written over the word "Respectfully,".

Preston P. Pratt  
Plant Manager  
Sequoyah Nuclear Plant

Enclosure: Licensee Event Report 50-327 and 50-328/2016-007-00  
cc: NRC Regional Administrator – Region II  
NRC Senior Resident Inspector – Sequoyah Nuclear Plant



## LICENSEE EVENT REPORT (LER)

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 and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [Infocollects.Resource@nrc.gov](mailto:Infocollects.Resource@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.

1. FACILITY NAME Sequoyah Nuclear Plant Unit 1	2. DOCKET NUMBER 05000327	3. PAGE 1 OF 6
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4. TITLE Unanalyzed Condition Due to Emergency Gas Treatment System Not Meeting Single Failure Criteria
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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
08	02	2016	2016	- 007	- 00	10	03	2016	Sequoyah Nuclear Plant Unit 2	05000328
									FACILITY NAME	DOCKET NUMBER
									NA	

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
10. POWER LEVEL 100	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(i)
	<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)(vii)	<input type="checkbox"/> 73.77(a)(2)(ii)
		<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER	
LICENSEE CONTACT Scott T Bowman	TELEPHONE NUMBER (Include Area Code) 423-843-6910

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

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

On August 2, 2016, during review of the Emergency Gas Treatment System (EGTS) circuits, Engineering discovered that the EGTS may automatically swap from the flow control path in A-Auto to the Standby flow control path upon the start of a design basis event (DBE). The intended design of the EGTS swap-over circuit was to detect an actual failure of the control path in A-Auto and swap to the Standby control path. The unnecessary automatic swap to Standby could prevent the EGTS train, configured in A-Auto, from performing its required safety function during a DBE. On August 5, at 1658 eastern daylight time (EDT), the condition was resolved when the automatic swap-over circuit was disabled. On August 17, at 1722 EDT a past operability evaluation determined the configuration of the EGTS flow controllers constituted an unanalyzed condition that significantly degraded plant safety due to the EGTS not meeting single failure criteria. Engineering analysis determined that the failure of both trains of EGTS controllers would not result in exceeding 10 CFR 100 limits. The cause of the event was that the EGTS control circuitry was not designed to account for situations that should have been anticipated. Corrective actions include implementing a permanent modification to disable the EGTS automatic swap-over function.

NRC FORM 366A  
(11-2015)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104

EXPIRES: 10/31/2018



## LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Sequoyah Nuclear Plant Unit 1	05000327	YEAR	SEQUENTIAL NUMBER	REV NO.
		2016	- 007	- 00

### NARRATIVE

#### I. PLANT OPERATING CONDITIONS BEFORE THE EVENT

At the time of the event, Sequoyah Nuclear Plant (SQN) Unit 1 and Unit 2 were in Mode 1 at 100 percent rated thermal power.

#### II. DESCRIPTION OF EVENTS

##### A. Event:

On August 2, 2016, during review of the Emergency Gas Treatment System (EGTS) [EIS: BH] circuits, Engineering discovered that the EGTS may automatically swap from the flow control path in A-Auto to the Standby flow control path upon the start of a design basis event (DBE). The intended design of the EGTS swap-over circuit was to detect an actual failure of the control path in A-Auto and swap to the Standby control path. The unnecessary automatic swap to Standby could prevent the EGTS train, configured in A-Auto, from performing its required safety function during a DBE. On August 5, at 1658 eastern daylight time (EDT), the condition was resolved when the automatic swap-over circuit was disabled. On August 17, at 1722 EDT a past operability evaluation determined the configuration of the EGTS flow controllers constituted an unanalyzed condition that significantly degraded plant safety due to the EGTS not meeting single failure criteria. Engineering analysis determined that the failure of both trains of EGTS controllers would not result in exceeding 10 CFR 100 limits.

An 8-hour non-emergency event notification (EN 52187) was made to the NRC in accordance with 10 CFR 50.72(b)(3)(ii)(B), as an unanalyzed condition that significantly degraded plant safety. This LER documents the reportable event under 10 CFR 50.73(a)(2)(ii)(B).

Additionally, this event is reportable under 10 CFR 50.73(a)(2)(i)(B) as any operation or condition which was prohibited by the plant's Technical Specifications (TS) when it was determined that the Conditions and Required Actions of TS 3.6.10 would not have been met because this condition has existed since initial plant startup. This event is also reportable under 10 CFR 50.73(a)(2)(v) as an event or condition that could have prevented fulfillment of a safety function of structures or systems that are needed to: (C) control the release of radioactive material and (D) mitigate the consequences of an accident.

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

No inoperable structures, components, or systems contributed to this event.

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**NARRATIVE****C. Dates and approximate times of occurrences:**

Date/Time (EDT)	Description
08/02/16	Engineering discovered that the EGTS may automatically swap from the flow control path in A-Auto to the Standby flow control path upon the start of a DBE.
08/05/16, 0723	Operations declared B train of the EGTS inoperable for both units based on completion of a prompt determination of operability. Both units entered Condition A of TS 3.6.10 with the time of entry declared to be August 2, 2016, at 1647.
08/06/16, 0348	B train of the EGTS for Unit 2 was declared operable due to implementation of a temporary modification that disabled the swap-over logic. Concurrently, the Unit 2, A train EGTS dampers were declared non-functional. A train of the EGTS for Unit 2 was declared inoperable and Unit 2 entered Condition A of TS 3.6.10.
08/06/16, 0355	B train of the EGTS for Unit 1 was declared operable due to implementation of a temporary modification that disabled the swap-over logic. Concurrently, the Unit 1, A train EGTS dampers were declared non-functional. A train of the EGTS for Unit 1 was declared inoperable and Unit 1 entered Condition A of TS 3.6.10.
08/06/16, 0408	Both trains of the EGTS were declared operable for both units based on both units' A and B train EGTS controllers isolation dampers being placed in A-Auto with the swap-over logic disabled. Both units exited Condition A of TS 3.6.10.
08/17/16, 1722	A past operability evaluation determined the configuration of the EGTS flow controllers constituted an unanalyzed condition that significantly degraded plant safety due to the EGTS not meeting single failure criteria.
08/17/16, 1746	An 8-hour non-emergency event notification (EN 52187) was made to the NRC in accordance with 10 CFR 50.72(b)(3)(ii)(B), as an unanalyzed condition that significantly degraded plant safety.

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

There was no component that failed during the event.

**E. Other systems or secondary functions affected:**

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

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

Engineering was reviewing circuits associated with the EGTS and discovered the issue.

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

There was no component that failed during the event.

**H. Operator actions:**

Following review and concurrence of a prompt determination of operability, the B train of EGTS was declared inoperable for both units and both units entered TS 3.6.10 Condition A.

**I. Automatically and manually initiated safety system responses:**

There were no automatic or manual system responses associated with this event.

**III. CAUSE OF THE EVENT****A. The cause of each component or system failure or personnel error, if known:**

There was no component or system failure associated with this event.

The apparent cause was that the EGTS control circuitry was not designed to account for situations that should have been anticipated. The cause relates to the original design of the EGTS, and no current operational or programmatic weaknesses were identified.

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

There was no identified human performance related root cause.

**IV. ANALYSIS OF THE EVENT**

The design bases for the EGTS are (1) to keep the air pressure within each Shield Building annulus below atmospheric at all times in which the integrity of that particular containment is required, and (2) to reduce the concentration of radioactive nuclides in annulus air that is released to the environs during a loss of coolant accident (LOCA) in either reactor unit to levels sufficiently low to keep the exclusion area boundary dose rate below the 10 CFR 100 guideline value.

The EGTS circuit contains four pressure switches [EIS: PS] designed to cause an automatic swap over if the annulus pressure increases more positive than the pressure switch setpoint. These switches are in the EGTS circuit to detect a suspected control function failure, and upon actuation, result in the isolation of the A-Auto flow control path and automatically swap to the Standby flow control path. With one flow path in A-Auto, and EGTS swapping to a failed opposite train due to a DBE, neither train would be available for the event.

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## NARRATIVE

Engineering determined that there are three plausible scenarios in which the EGTS would not perform as designed during a DBE which could result in the EGTS not fulfilling its required safety function. The three scenarios are a large or small break LOCA and a Phase A signal received while either unit's annulus is at atmospheric pressure. For each of the three scenarios, coincident with an assumed loss of one train of control air, the EGTS would swap to an isolated Standby flow path, which would result in both of the EGTS fans not having an exhaust path. The EGTS would not be able to pull a vacuum in the annulus, resulting in the annulus pressure becoming positive. This could result in a continuous, unmonitored release to the environment.

## V. ASSESSMENT OF SAFETY CONSEQUENCES

The SQN probabilistic risk assessment model does not consider EGTS in core damage and large early release frequencies. Engineering analysis determined that the failure of both trains of EGTS controllers could have resulted in a more than minimal increase in dose associated with the current dose analysis; however the dose would have remained below 10 CFR 100 limits.

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

There were no components or systems that failed during the event.

- 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:

The event did not occur when the reactor was shutdown.

- 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:

The B train of the EGTS for Unit 2 was inoperable for approximately 83 hours. The B train of the EGTS for Unit 1 was inoperable for approximately 83.2 hours.

## VI. CORRECTIVE ACTIONS

This event was entered into the Tennessee Valley Authority Corrective Action Program under Condition Reports (CR) 1198440 and 1200028.

- A. Immediate Corrective Actions:

Engineering notified the appropriate individuals and Operations requested a prompt determination of operability evaluation. The condition was resolved when the automatic swap-over circuit was disabled.

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**NARRATIVE**

- B. Corrective actions to reduce probability of similar events occurring in the future:

Corrective actions include implementing a permanent modification to disable the EGTS automatic swap-over function.

**VII. ADDITIONAL INFORMATION**

- A. Previous similar events at the same plant:

A review of SQN LERs identified an event with a similar cause. LER 327/2013-003 reported a condition prohibited by technical specifications associated with the Emergency Core Cooling System. The cause of the event was the conduit penetrations for the residual heat removal containment sump isolation valve were not designed to account for groundwater infiltration through the plant concrete structures resulting in leakage into the conduit and subsequently the limit switch compartment.

- B. Additional Information:

None.

- C. Safety System Functional Failure Consideration:

This condition resulted in a safety system functional failure.

- D. Scrams with Complications Consideration:

There was no scram associated with this event.

**VIII. COMMITMENTS**

None.