



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

July 14, 2017

10 CFR 50.73

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

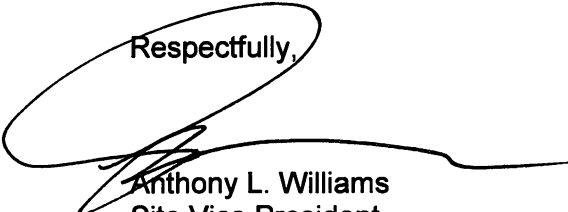
Sequoyah Nuclear Plant, Units 1 and 2
Renewed Facility Operating License Nos. DPR-77 and DPR-79
NRC Docket Nos. 50-327 and 50-328

Subject: Licensee Event Report 50-327 and 50-328/2017-002-00, Automatic Actuation of Emergency Diesel Generators Due to Loss of Power to 6.9kV Shutdown Board

The enclosed licensee event report provides details concerning an automatic actuation of the four emergency diesel generators as a result of the loss of power to a 6.9kV shutdown board. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(iv)(A), as any event or condition that resulted in manual or automatic actuation of emergency ac electrical power systems, including emergency diesel generators.

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,



Anthony L. Williams
Site Vice President
Sequoyah Nuclear Plant

Enclosure: Licensee Event Report 50-327 and 50-328/2017-002-00
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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to 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
Automatic Actuation of Emergency Diesel Generators Due to Loss of Power to 6.9kV Shutdown Board

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
05	23	17	2017	- 002	- 00	07	14	17	Sequoyah Nuclear Plant Unit 2	05000328
									FACILITY NAME	DOCKET NUMBER
									NA	05000

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)(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 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)						
10. POWER LEVEL 100	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<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 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 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 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 Bowman	TELEPHONE NUMBER (Include Area Code) 423-843-6910
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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
N/A					N/A				

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

On May 23, 2017, at 2330 eastern daylight time (EDT), while transferring the 2A-A 6.9 kilovolt (kV) Shutdown Board (SDBD) from its alternate power source to its normal power source, in support of outage testing for Unit 2, a loss of power to the 2A-A 6.9kV SDBD resulted in the automatic actuation of all four emergency diesel generators. The power was restored to the SDBD on May 24, at 0027 EDT.

At the time of the event, Unit 1 was in Mode 1 at 100 percent power and Unit 2 was in Mode 5 for a refueling outage. There were no actual safety consequences as a result of this event.

The cause of the event was indeterminate. The direct cause of the event was an upstream unit board overcurrent relay actuation associated with the A phase. The corrective action was to obtain acceptable test results from all equipment in the zone of protection. This included all the cables, current transformers, relays and breakers that were in contact with the associated relay. There was no evidence of equipment degradation. Transient monitoring will be performed for 6.9kV SDBD normal and alternate feeder breakers. Data will be captured for each initial transfer. Any identified anomalies will be addressed via the corrective action program.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to 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	2. DOCKET NUMBER	3. LER NUMBER		
Sequoyah Nuclear Plant Unit 1	05000-327	YEAR	SEQUENTIAL NUMBER	REV NO.
		2017	- 002	- 00

NARRATIVE

I. Plant Operating Conditions Before the Event

At the time of the event, Sequoyah Nuclear Plant (SQN) Unit 1 was in Mode 1 at 100 percent rated thermal power. Unit 2 was in Mode 5 for a refueling outage.

II. Description of Event

A. Event Summary:

On May 23, 2017, at 2330 eastern daylight time (EDT), while transferring the 2A-A 6.9 kilovolt (kV) Shutdown Board (SDBD) [EIS: EA, ECBD] from its alternate power source to its normal power source, in support of outage testing for Unit 2, a loss of power to the 2A-A 6.9kV SDBD resulted in the automatic actuation of all four emergency diesel generators (EDGs) [EIS: EK, DG].

During transfer of the 2A-A 6.9kV SDBD, the hand switch [EIS: HS] for the normal feeder breaker [EIS: BKR] on the SDBD was maintained in the "CLOSE" position while the alternate feeder breaker hand switch was placed in "TRIP." As expected, the alternate feeder breaker opened and the normal feeder breaker closed. However, the upstream supply breaker to the normal feeder breaker immediately tripped due to an overcurrent relay [EIS: RLY] actuation on the A phase. As a result, the 2A-A 6.9kV SDBD de-energized, initiating a blackout signal that started all four EDGs.

During load shedding of the SDBD to prepare for the automatic re-energization from the EDG, the normal feeder breaker to the 2A A 6.9kV SDBD remained closed, as designed. With the normal feeder breaker hand switch in the "CLOSE" position, the associated relay coil [EIS: CL] remained sealed in. Because the normal feeder breaker remained closed, the 2A-A EDG emergency feeder breaker could not close as it must be the only source supplying the SDBD when running in the emergency mode.

As a result, the 2A A 6.9kV SDBD remained de-energized following the event. This prevented the cooling water supply valve for the 2A-A EDG from opening due to the loss of motive power. Per procedure, the lack of cooling water caused operators to emergency stop the 2A-A EDG.

Main control room (MCR) operators entered the appropriate response procedures and re-established power to required loads. Power was restored to the SDBD on May 24, at 0027 EDT.

An 8-hour non-emergency event notification (EN 52769) was made to the NRC in accordance with 10 CFR 50.72(b)(3)(iv)(A) as any event or condition that resulted in manual or automatic actuation of emergency ac electrical power systems, including EDGs. This LER documents the reportable event under 10 CFR 50.73(a)(2)(iv)(A).



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CONTINUATION SHEET**

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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.

C. Dates and approximate times of occurrences:

Date/Time (EDT)	Description
05/23/17, 1732	MCR operators transferred the 2A-A 6.9kV SDBD from normal to alternate power during 6.9kV unit board transfer testing.
05/23/17, 2330	While transferring 2A-A 6.9kV SDBD from its alternate power source to its normal power source, the normal supply breaker on the upstream 6.9kV unit board opened causing the 2A-A 6.9kV SDBD to de-energize. All four EDGs automatically started.
05/24/17, 0027	The 2A-A 6.9kV SDBD was energized from its alternate power supply.
05/24/17, 0500	EDGs 1A-A, 1B-B, and 2B-B were stopped and returned to standby.
05/24/17, 0529	The 2A-A EDG was returned to standby.

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 systems or secondary functions affected by this event.

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

While transferring 2A-A 6.9kV SDBD from its alternate power source to its normal power source, the SDBD de-energized. This resulted in a loss of power to the SDBD and the automatic actuation of all four EDGs.

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:

Control room operators entered the appropriate response procedures and re-established power to required loads.



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CONTINUATION SHEET**

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I. Automatically and manually initiated safety system responses:

Following loss-of-voltage to the 2A-A 6.9kV SDBD, nonpermanent loads were shed and the four EDGs started. With the normal feeder breaker handswitch in the "CLOSE" position, the associated relay coil remained sealed in. Because the normal feeder breaker was closed, the 2A-A EDG feeder breaker could not close, by design, as it must be the only source supplying the SDBD when running in emergency mode. The 2A-A SDBD was re-energized from its alternate power supply. All system logic functioned as intended by design.

III. Cause of the Event

A. Cause of each component or system failure or personnel error:

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

The cause of the event was indeterminate. The direct cause of the event was an upstream unit board overcurrent relay actuation associated with the A phase.

B. 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 Class 1E alternating current (AC) Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power sources), and the onsite standby power sources (Train A and Train B EDGs). The design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The onsite Class 1E AC Electrical Power Distribution System is divided into two redundant and independent load groups with two 6.9kV SDBDs in each load group. Each 6.9kV SDBD has a connection to a preferred offsite power source and an EDG. The 6.9kV SDBDs in a load group (i.e., 1A-A and 2A-A, or 1B-B and 2B-B) are normally powered by the same offsite power circuit. Each 6.9kV SDBD can also be powered by a dedicated EDG. Two EDGs associated with one load group can provide all safety related functions to mitigate a loss of coolant accident (LOCA) in one unit and safely shut down the other unit. The Train A and Train B ESF systems each provide for the minimum safety functions necessary to shut down the plant and maintain it in a safe shutdown condition.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

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An EDG starts automatically on a safety injection (SI) signal or on a 6.9kV SDBD degraded voltage or loss-of-voltage signal. After the EDG has started, it will automatically tie to its respective 6.9kV SDBD after offsite power is tripped as a consequence of a 6.9kV SDBD degraded voltage or loss-of-voltage signal, independent of or coincident with an SI signal. Following the trip of offsite power, a loss-of-voltage signal strips nonpermanent loads from the 6.9kV SDBD. When the EDG is tied to the 6.9kV SDBD, loads are then sequentially connected to its respective 6.9kV SDBD by individual load sequence timers.

In this event, when the 2A-A 6.9kV SDBD was de-energized the EDGs started as required; however, the 2A-A SDBD did not tie onto the 2A-A SDBD due to the normal feeder breaker remaining closed. The SDBD was re-energized from its alternate power supply. Although this affected the A train ESF system, the B train ESF system was designed and available to provide for the minimum safety functions necessary to shut down the unit and maintain it in a safe shutdown condition.

V. Assessment of Safety Consequences

Based on the above Analysis of Event, no actual safety consequences resulted from this event. Both units remained stable during the event.

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. During the event, B train power was available.

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:

Concerning Unit 2, which was in a refueling outage, B train power was available to perform required safety functions.

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 2A-A 6.9kV SDBD was re-energized within 57 minutes. The 2A-A EDG was returned to operable status within 6 hours.

VI. Corrective Actions

Corrective Actions are being managed by the Tennessee Valley Authority (TVA) corrective action program under Condition Report 1299591.



**LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET**

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Sequoyah Nuclear Plant Unit 1	05000-327	YEAR 2017	SEQUENTIAL NUMBER - 002	REV NO. - 00

A. Immediate Corrective Actions:

The 2A-A 6.9kV SDBD was re-energized from its alternate power supply.

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

The corrective action was to obtain acceptable test results from all equipment in the zone of protection. This included all the cables, current transformers, relays and breakers that were in contact with the associated relay. Based on evidence that equipment degradation has not occurred, the risk of recurrence is low.

Transient monitoring will be performed for 6.9kV SDBD normal and alternate feeder breakers. Data will be captured for each initial transfer. Any identified anomalies will be addressed via the corrective action program.

VII. Previous similar events at the same plant:

There were no previous similar events at SQN occurring within the last three years.

VIII. Additional Information

None.

IX. Commitments:

None.

**LICENSEE EVENT REPORT (LER)
FAILURE CONTINUATION**

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		05000-		YEAR	SEQUENTIAL NUMBER	REV NO.
					-	-

	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX