



Sequoyah Nuclear Plant, Post Office Box 2000, Soddy Daisy, Tennessee 37384

July 21, 2021

10 CFR 50.73

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

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

Subject: Licensee Event Report 50-327/2021-001-00, Reactor Trip on High Neutron Flux Rate Due to Dropped Control Rods

The enclosed licensee event report provides details concerning an automatic reactor trip on high neutron flux rate as a result of Control Bank B inserting into the core. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv) as an event that resulted in an automatic actuation of the reactor protection system and the auxiliary feedwater system.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact Mr. Jeffrey Sowa, Site Licensing Manager, at (423) 843-8129.

Respectfully,

Marshall,
Thomas B.

Digitally signed by Marshall,
Thomas B.
Date: 2021.07.21 14:45:05 -04'00'

Thomas Marshall
Site Vice President
Sequoyah Nuclear Plant

Enclosure: Licensee Event Report 50-327/2021-001-00

cc: NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Sequoyah Nuclear Plant



LICENSEE EVENT REPORT (LER)

(See Page 3 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form <https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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, Library, and Information Collections Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollcts.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk all: oir_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

1. Facility Name Sequoyah Nuclear Plant Unit 1	2. Docket Number 05000327	3. Page 1 OF 5
---	------------------------------	-------------------

4. Title
Reactor Trip on High Neutron Flux Rate Due to Dropped Control Rods

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	24	2021	2021	- 001 -	00	07	21	2021	NA	05000
									Facility Name	Docket Number
									NA	05000

9. Operating Mode

1

10. Power Level

100

11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)

10 CFR Part 20	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.36(c)(2)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	10 CFR Part 73
<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.69(g)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(4)
<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<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)(i)	10 CFR Part 21	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(1)(i)
<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 21.2(c)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(i)
<input type="checkbox"/> 20.2203(a)(2)(iii)	10 CFR Part 50	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 73.77(a)(2)(ii)
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	
<input type="checkbox"/> Other (Specify here, in Abstract, or in NRC 366A).				

12. Licensee Contact for this LER

Licensee Contact

Scott Bowman

Phone Number (Include Area Code)

423.843.6910

13. Complete One Line for each Component Failure Described in this Report

Cause	System	Component	Manufacturer	Reportable To IRIS	Cause	System	Component	Manufacturer	Reportable To IRIS
X	AA	CON	W120	Y	X	AA	ECBD	W120	Y

14. Supplemental Report Expected

☒ No ☐ Yes (If yes, complete 15. Expected Submission Date)

15. Expected Submission Date

Month

Day

Year

16. Abstract (Limit to 1560 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 24, 2021, at 0915 eastern daylight time (EDT), SQN Unit 1 experienced an automatic reactor trip. Approximately 0.5 seconds before the reactor trip, an unexpected Rod Control Urgent Failure alarm annunciated and Control Bank B, Group 2 rods began to lower. The reactor trip first out alarm indicated the trip was from a Power Range High Neutron Flux Rate detected by the Power Range Nuclear Instruments.

During troubleshooting, it was discovered that there were bad pin connections on the backplane of the phase card associated with Control Bank B (the card connection between the Control Bank B, Group 2 stationary gripper phase control card and the backplane of its card cage).

All plant safety systems responded as designed. All rods fully inserted as required.

The direct cause of the failure has been attributed to the card connection between Control Bank B Group 2 stationary gripper phase control card and the backplane of the card cage. Periodic instruction procedure, PI-674 Periodic Calibration of the Full Length Rod Control Power, directs activities to remove phase control cards during calibration which can result in pin deformation. Therefore, the corrective action for this event is to revise the procedure to modify how calibration activities are performed based on learnings obtained from the equipment failure evaluation.

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

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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, Library, and Information Collections Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk ail: oir_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

1. FACILITY NAME		2. DOCKET NUMBER		3. LER NUMBER		
Sequoyah Nuclear Plant Unit 1		05000-327		YEAR	SEQUENTIAL NUMBER	REV NO.
				2021	- 001	- 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 approximately 100 percent rated thermal power (RTP).

II. Description of Event**A. Event Summary:**

On May 24, 2021, at 0915 eastern daylight time (EDT), SQN Unit 1 experienced an automatic reactor trip. Approximately 0.5 seconds before the reactor trip, an unexpected Rod Control Urgent Failure alarm annunciated and Control Bank B, Group 2 rods [EIS: AA] began to lower. The reactor trip first out alarm indicated the trip was from a Power Range High Neutron Flux Rate detected by the Power Range Nuclear Instruments. No rod testing was in progress. No work was in progress in the rod control power or logic cabinets.

During troubleshooting, it was discovered that there were bad pin connections [EIS: CON] on the backplane of the phase control card [EIS: ECBD] associated with Control Bank B (the card connection between the Control Bank B, Group 2 stationary gripper phase control card and the backplane of its card cage). The phase card was replaced and tested. Pin reformation (the scope of pin reformation consisted of all five rod control power cabinets and the logic cabinet) and system functional testing was performed by the vendor.

All plant safety systems responded as designed. All rods fully inserted as required.

The event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A), as an event that resulted in an automatic actuation of the Reactor Protection System [EIS: JC] and the Auxiliary Feedwater (AFW) System [EIS: BA].

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.



LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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, Library, and Information Collections Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk ail: oir_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
Sequoyah Nuclear Plant Unit 1	05000-327	YEAR	SEQUENTIAL NUMBER	REV NO.
		2021	- 001	- 00

C. Dates and approximate times of occurrences:

Date/Time (EDT)	Description
05/24/21, 0900	Unit 1 was at approximately 100 percent RTP, Control Bank D at 217 steps withdrawn, and all other banks at 228 steps withdrawn.
09:15:27.261	Unit 1 received a Rod Control Urgent Failure annunciator.
09:15:27.790	Unit 1 received a High Neutron Flux Rate Channel IV alarm.
09:15:27.811	Unit 1 simultaneously received a High Neutron Flux Rate Channel III alarm and a High Neutron Range Reactor Trip signal. Unit 1 automatically tripped and entered Mode 3.

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

The components that failed were a Westinghouse Phase Control Card model number 6050A11G01 and Westinghouse Backplane Connector Pins for AMP manufactured connections part number 67168-2.

E. Other systems or secondary functions affected:

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

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

Main control room (MCR) alarms and annunciators provided indication to the operators during the reactor trip.

G. Failure mode, mechanism, and effect of each failed component:

The failure mode was attributed to poor pin connection on the phase control card associated with Control Bank B and the backplane of its card cage.

H. Operator actions:

MCR operators responded to the reactor trip, as required, and then transitioned to post-trip response procedures.

I. Automatically and manually initiated safety system responses:

The reactor protection system, including feedwater isolation and AFW start, responded to the trip, as designed.

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

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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, Library, and Information Collections Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk ail: oir_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Sequoyah Nuclear Plant Unit 1	05000-327	2021	- 001	- 00

III. Cause of the Event**A. Cause of each component or system failure or personnel error:**

The direct cause of the failure has been attributed to the card connection between Control Bank B Group 2 stationary gripper phase control card and the backplane of its card cage.

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 plant safety system responses during and after the reactor trip were bounded by the responses described in the Updated Final Safety Analysis Report (UFSAR). The UFSAR Chapter 15 event that most closely matches the reactor trip is the Rod Cluster Control Assembly Misalignment. Therefore, this event did not adversely affect the health and safety of plant personnel or the general public.

V. Assessment of Safety Consequences

There were no actual safety consequences as a result of the reactor trip.

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

None.

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 shut down.

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:

There was no failure that rendered a train of a safety system inoperable.

VI. Corrective Actions

The event was entered into the Tennessee Valley Authority Corrective Action Program (CAP) under condition report number 1696187.

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

(See NUREG-1022, R.3 for instruction and guidance for completing this form
<https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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, Library, and Information Collections Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov, and the OMB reviewer at: OMB Office of Information and Regulatory Affairs, (3150-0104), Attn: Desk ail: oir_submission@omb.eop.gov. The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Sequoyah Nuclear Plant Unit 1	05000-327	2021	- 001	- 00

A. Immediate Corrective Actions:

Troubleshooting was performed. It was discovered that there were bad pin connections on the backplane of the phase card associated with Control Bank B. The phase card was replaced and tested. Pin reformation (the scope of pin reformation consisted of all five rod control power cabinets and the logic cabinet) and system functional testing was performed by the vendor.

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

Periodic instruction procedure, PI-674 Periodic Calibration of the Full Length Rod Control Power, directs activities to remove phase control cards during calibration which can result in pin deformation. Therefore, the corrective action for this event is to revise the procedure to modify how calibration activities are performed based on learnings obtained from the equipment failure evaluation.

VII. Previous Similar Events at the Same Site:

A review of previous similar events at SQN, identified LERs 1-2015-001 and 1-2019-003. Both LERs identified an automatic reactor trip due to a control rod, H-8, dropping into the core. For LER 1-2015-001, the cause of the event was failure of a maintenance procedure to provide inspection guidance and acceptance criteria on control rod drive mechanism vertical panel connections. The associated corrective action was revising the maintenance procedure and periodic preventive maintenance of CRDM connections. For LER 1-2019-003, the cause of the event was determined to be that excessive wear to the control rod stationary gripper latch mechanism resulted in the inability to maintain the control rod in the fully, or nearly fully, withdrawn position for an extended period of time. The corrective action was to submit a license amendment request and develop an engineering design change to permanently remove Control Rod H-8.

VIII. Additional Information

There is no additional information.

IX. Commitments:

There are no commitments.