



Entergy Operations, Inc.  
P. O. Box 756  
Port Gibson, MS 39150

Eric A. Larson  
Site Vice President  
Grand Gulf Nuclear Station  
Tel. (601) 437-7500

10CFR50.73

GNRO-2018-00001

March 26, 2018

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

SUBJECT: Licensee Event Report 2017-009-00, Reactor Core Isolation Cooling  
System Inoperability Due to Lockout Circuit Settings  
Grand Gulf Nuclear Station, Unit 1  
Docket No. 50-416  
License No. NPF-29

Dear Sir or Madam:

Attached is Licensee Event Report 2017-009-00, Reactor Core Isolation Cooling System Inoperability Due to Lockout Circuit Settings. This report is being submitted in accordance with 10CFR50.73(a)(2)(i)(B) for any event or condition that could have prevented the fulfillment of the safety function.

This letter contains no new commitments. If you have any questions or require additional information, please contact Douglas Neve at 601-437-2103.

Sincerely,

A handwritten signature in black ink, appearing to read "E. A. Larson".

Eric A. Larson  
Site Vice President  
Grand Gulf Nuclear Station  
EAL/ram

Attachment: Licensee Event Report 2017-009-00

cc: see next page

U.S. Nuclear Regulatory Commission  
ATTN: Mr. Siva Lingam  
Mail Stop OWFN 8 B1  
Rockville, MD 20852-2738

NRC Senior Resident Inspector  
Grand Gulf Nuclear Station  
Port Gibson, MS 39150

U. S. Nuclear Regulatory Commission  
ATTN: Mr. Kriss Kennedy, NRR/DORL (w/2)  
Mail Stop OWFN 8 B1  
Washington, DC 20555-0001



**LICENSEE EVENT REPORT (LER)**  
(See reverse for required number of digits/characters for each block)

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 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.

<b>1. FACILITY NAME</b> Grand Gulf Nuclear Station, Unit 1	<b>2. DOCKET NUMBER</b> 05000 416	<b>3. PAGE</b> 1 OF 3
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**4. TITLE**  
Reactor Core Isolation Cooling System Inoperability Due to Lockout Circuit Settings

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
12	12	2017		2017-009-00		03	26	2018	N/A	05000 N/A
									N/A	05000 N/A

<b>9. OPERATING MODE</b>  MODE 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>									
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
<b>10. POWER LEVEL</b>  16%	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 73.71(a)(4)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(5)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.77(a)(1)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(2)(i)						
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<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)(ii)						
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> OTHER						
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	Specify in Abstract below or in NRC Form 366A						
	<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)(B)							

**12. LICENSEE CONTACT FOR THIS LER**

FACILITY NAME Douglas Neve / Manager, Regulatory Assurance	TELEPHONE NUMBER (Include Area Code) (601) 437-2103
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**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

<b>14. SUPPLEMENTAL REPORT EXPECTED</b> <input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	<b>15. EXPECTED SUBMISSION DATE</b>		
	MONTH	DAY	YEAR
	N/A	N/A	N/A

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

On December 12, 2017, at approximately 0918 hours, Grand Gulf Nuclear Station (GGNS) was in MODE 1 and increasing power when the unit experienced an essential transformer (ESF-11) lockout. Concurrent with the lockout the Reactor Core Isolation Cooling (RCIC) system received a Division I isolation signal.

The cause of the RCIC isolation is determined to be installation of temperature switches in the RCIC isolation initiation circuits with unrecognized response times.

The power bus monitor time delay relays were adjusted from a one second delay to a 10-second delay to account for the response of the temperature switches. Additionally, a review of engineering change testing involving applicable temperature switch installations was performed to verify the post modification testing requirements of the Entergy testing philosophies are met.

There was no increase to any accident consequences, and no impact on plant safety or the safety of the public.



LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET

1. FACILITY NAME	2. DOCKET	3. LER NUMBER		
Grand Gulf Nuclear Station, Unit 1	05000 416	YEAR	SEQUENTIAL NUMBER	REV. NO.
		2017-009-00		

**NARRATIVE**

**DESCRIPTION**

On December 12, 2017, at approximately 0918 hours, Grand Gulf Nuclear Station (GGNS) experienced an essential transformer (ESF-11) lockout. Concurrent with the ESF-11 transformer lockout, the Reactor Core Isolation Cooling (RCIC) [BN] system received a Division I isolation signal. Leak detection NUS [NUS] temperature switches (NUS switches) for the main steam line tunnel installed in 2007 were discovered to actuate and de-actuate instantaneously upon both loss of power and upon restoration of power. The initialization sequence which occurs upon restoration of power resulted in a RCIC isolation signal. Because the condition persisted for a period of time greater than the existing logic time delay, RCIC isolation occurred.

The RCIC isolation circuits have a one second time delay to prevent spurious isolation of RCIC. Because the sequence duration of 1.58 seconds exceeded the existing logic time delay of one second, RCIC isolation occurred. RCIC was placed back in standby at 1440 hours on December 12, 2017.

Analysis of the RCIC isolation initiation circuits has determined that RCIC received the isolation signal only upon restoration of power. The direct cause of RCIC isolation was the response of temperature switches to power restoration. The response, which testing has confirmed, is that the NUS temperature switches remain in the tripped state for a brief period of time when their power is restored. Because of this response the leak detection circuit begins a one second time delay to prevent spurious isolation of RCIC. Because the described condition persists for approximately 1.58 seconds, the existing one second time delay setpoint is exceeded, thereby permitting RCIC isolation.

Although the event occurred in December 2017, the final reportability was not determined until February 20, 2018, due to the time required to analyze the condition.

**REPORTABILITY STATEMENT**

This event is reportable as a licensee event report in accordance with 10CFR50.73(a)(2)(i)(B) as an operation or condition which was prohibited by the plant Technical Specifications. The plant configuration that could have prevented the RCIC system from being available under all expected plant conditions existed for a time longer than allowed by Technical Specification Completion Time for the system. This event was included in ENS notification 53115.

**CAUSE**

In 2007 the subject RCIC temperature switches were changed from a Riley brand to a NUS brand. Discussion with the vendor determined that the observed response to loss and restoration of power to NUS switches is a design feature.



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1. FACILITY NAME	2. DOCKET	3. LER NUMBER		
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		2017-009-00		

**NARRATIVE**

Testing confirmed that the NUS switches remain in the tripped state for approximately 1.58 seconds after their power is restored. The power bus monitor time delay relay de-energizes while the NUS switch is tripped resulting in the completion of the leak detection circuits. The completion of the leak detection circuit begins a 1-second time delay to prevent spurious isolation of RCIC. Because the tripped condition persists for approximately 1.58 seconds and exceeds the existing 1-second time delay setpoint of power bus monitor time delay relay, a RCIC isolation signal is generated.

Discussion with the vendor has determined that the NUS switches cannot be modified in such a way that would prevent the observed response to loss and restoration of power from occurring

In order to resolve this condition, power bus monitor time delay relays were adjusted from a 1-second delay to a 10-second delay. The relays are capable of a time delay range of 0.55 to 15 seconds, and the total time delay for the main steam tunnel RCIC isolation circuits remains below the analytical value of 30 minutes. A time delay of greater than approximately 1.58 seconds is required to prevent a RCIC isolation signal on loss and restoration of power. The increased time delay was selected to provide sufficient margin.

The cause of this event as determined to be a lack of a rigorous post modification testing plan that included all possible scenarios with the RCIC isolation initiation circuits.

**CORRECTIVE ACTIONS**

The power bus monitor time delay relays were adjusted from a 1-second delay to a 10-second delay. (Completed)

Perform a review of engineering change testing involving NUS switch installations to verify the post modification testing requirements of the Entergy testing philosophies are met. (Scheduled Completion March 2018)

**SAFETY SIGNIFICANCE**

While the latent design condition could have prevented the RCIC system from responding as designed, Grand Gulf analyses do not credit RCIC for mitigation of any transient or accident. In addition, using off normal procedures the operators were able to identify the cause of the isolation and restore RCIC functionality within two and a half hours. Therefore, there was no potential increase to any accident consequences, and no impact on plant safety or the safety of the public.

**PREVIOUS SIMILAR EVENTS**

Entergy conducted a three-year review of the relevant licensee event reports and determined that there were no similar known events.