



NOV 13 2017

L-2017-196
10 CFR 50.73

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Re: St. Lucie Unit 1
Docket No. 50-335
Reportable Event: 2017-003-00
Date of Event: September 12, 2017
Inadequate Reactor Protection System Trip Process for Inoperable Channel Results in Operation in a
Condition Prohibited by Technical Specifications

Licensee Event Report 2017-003-00 is being submitted pursuant to the requirements of 10 CFR 50.73 to
provide notification of the subject event.

Respectfully,

A handwritten signature in cursive script that reads "Daniel DeBoer".

Daniel DeBoer
Site Director
St. Lucie Plant

DD/KWF

Attachment

cc: USNRC Regional Administrator, Region II
USNRC Senior Resident Inspector, St. Lucie Nuclear Plant



LICENSEE EVENT REPORT (LER)

(See Page 2 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.

1. FACILITY NAME St. Lucie Unit 1	2. DOCKET NUMBER 05000335	3. PAGE 1 Of 3
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4. TITLE
Inadequate Reactor Protection System Trip Process for Inoperable Channel Results in Operation in a Condition Prohibited by Technical Specifications

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
9	12	2017	2017	003	0	11	13	2017	FACILITY NAME	DOCKET NUMBER 05000
									FACILITY NAME	DOCKET NUMBER 05000

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

2	<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)
	<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 3	<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 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 K. W. Frehafer, Licensing Engineer	TELEPHONE NUMBER (Include Area Code) (772) 467-7748
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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
D	JC	NA	NA	NA	X	IG	DET	S185	Y

14. SUPPLEMENTAL REPORT EXPECTED **15. EXPECTED SUBMISSION DATE**

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

MONTH	DAY	YEAR

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

During a reactor startup performed on September 12, 2017, the operators noted that the inoperable 'B' channel reactor protection system (RPS) high startup rate (HSUR) trip did not occur as expected when reactor power exceeded the HSUR bypass removal setpoint. The 'B' RPS HSUR channel was then manually tripped via the bistable removal method and plant startup continued.

Investigation revealed that the setpoint reduction method process used to implement the RPS HSUR channel trip did not account for subsequent nuclear instrumentation (NI) detector failures. Therefore the 'B' RPS HSUR channel was not in the required tripped condition since the February 2017 failure of its wide range NI detector.

The setpoint reduction method was subsequently revised to ensure inoperable RPS HSUR channels tripped by the setpoint reduction method generate a trip with reactor power less than 15 percent reactor power. A procedure revision is in progress to implement these new rule-based instructions.

This event had no significant impact on the health and safety of the public based on system channel redundancy and procedural controls.



**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 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.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER		
St. Lucie Unit 1	05000335	YEAR	SEQUENTIAL NUMBER	REV NO.
		2017	- 003 -	0

NARRATIVE

Description

On September 12, 2017, St. Lucie Unit 1 was in a reactor startup in Mode 2 operation. The 'B' channel reactor protection system (RPS) high startup rate (HSUR) [EIS:JC] channel was thought to be in the reduced setpoint tripped condition in response to earlier unpredictable operation of the 'B' channel nuclear instrumentation (NI) detector [EIS:IG:DET]. At 1522 hours during the startup, the operators noted that the 'B' channel RPS HSUR bistable [EIS:JC] did not automatically trip as expected for the existing plant conditions. The operators placed the 'B' channel of RPS HSUR in a tripped condition in accordance with procedures by removing the bistable from the trip unit assembly and entered Technical Specification (TS) 3.3.1.1, Table 3.3-1, Functional Unit 11, Action 2 with the 'B' channel HSUR bistable in trip. The reactor startup continued with the channel in trip as allowed by the Technical Specifications (TSs).

Cause of the Event

This event was caused by inadequate processes used to implement the HSUR reduced setpoint trip method. The instruction used did not evaluate all potential failure conditions when setting the HSUR bistable. Investigation showed that the bistable did not trip because the setpoint reduction method (initially) internally tripped the bistable in the presence of an active NI signal. When the 'B' wide range NI detector subsequently failed low in February 2017, the input signal to the Hi Rate bistable from the rate circuit changed and the bistable trip conditions were no longer satisfied. During power operation this latent condition was partially masked by the greater than 15 percent power automatic bypass signal applied downstream of the comparator output circuitry. Additionally, the automatic bypass of the bistable trip signal below 10-4 percent power was never automatically removed during the startup due to the NI detector being failed low.

Following this investigation, maintenance and engineering personnel determined that the correct method to internally trip the bistable was to set the setpoint to the maximum negative value. This would ensure a trip would occur regardless of NI detector health whenever reactor power was less than 15 percent. The HSUR bypass for affected channels would also continue to be bypassed above 15 percent reactor power. A procedure revision is in progress to implement these new rule-based instructions.

Analysis of the Event

This event is reportable under 10 CR 50.73(a)(2)(i)(B) as any operation or condition that was prohibited by TSs.

The RPS HSUR trip is developed from the nuclear instrumentation (NI) wide range channels, and the trip signal may be automatically bypassed below 10 E-4 percent and above 15 percent power. When the trip is not bypassed, a reactor trip is initiated prior to the reactor power rate-of-change exceeding 2.49 decades per minute as measured by any two of the four wide-range NI channels.

Plant procedures provide two methods for placing an RPS HSUR channel in the trip condition. The first method pulls the Hi Rate bistable from the trip unit assembly. This method can be implemented quickly by control room operators, but has the disadvantage of sealing in a channel trip signal above 15 percent power. The second method has maintenance personnel reduce the bistable setpoint such that the channel would be expected to generate a trip signal with the automatic removal of the bypass between 10 E-4 percent and 15 percent power. This method has the advantage of preserving the automatic RPS HSUR bypass below 10 E-4 and greater than 15 percent power.

Prior to this event, the 'B' channel wide range NI detector signal had been experiencing unpredictable operation, and the 'B' RPS HSUR channel was placed in trip using the setpoint reduction method in October of 2016. During the



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NARRATIVE

September 2017 plant startup, the 'B' RPS HSUR channel did not trip as expected when reactor power exceeded the bypass removal setpoint of 10 E-4 percent power. The 'B' wide range NI detector failed low on February 10, 2017. The setpoint reduction method (used before the detector failed) was predicated on a baseline NI detector signal not a failed low detector signal; the setpoint reduction method did not account for the static failed detector voltage and its effect on the trip. Additionally, the failed low detector signal did not remove the bypass.

Safety Significance

The high rate-of-change of power trip is not credited in any of the Chapter 15 accident analyses. However, the trip is considered in the safety analysis, in that the presence of this trip function precluded the need for specific analyses of other events initiated from subcritical conditions (e.g., events not discussed in Chapter 15).

Subsequent to the 'B' wide range detector failure on February 10, 2017, Unit 1 was within the HSUR bypass conditions with power greater than 15 percent. On September 11, 2017, Unit 1 was shutdown due to degrading switchyard environmental conditions caused by Hurricane Irma. The inadequately implemented reduced trip setpoint method had no effect during the evolution because the operating procedure used during this shutdown required that the reactor be tripped above 15 percent reactor power while the HSUR bypass was still in effect. In addition, the inoperative channel trip was detected in the subsequent September 12, 2017 startup and actions were taken as directed by the TSs; therefore the inoperative trip had no effect on the subsequent startup.

As previously stated, the HSUR bistable is required for operation during the reactor power ranges of 10 E-4 percent to 15 percent power. Per the design basis, the RPS has four independent measurement channels that monitor parameters and trip at TS prescribed setpoints. In addition, each RPS channel is required to be demonstrated operable by the performance of a successful monthly functional test. The RPS is designed to initiate a reactor trip when the two out of four coincidence logic is satisfied (i.e. high startup rate). Therefore, even with the 'B' RPS HSUR channel in a nonconforming condition, there is reasonable assurance that the three remaining healthy HSUR channels would have performed the function of the RPS system to trip if TS prescribed setpoints were exceeded.

Based on the discussion above, this event had no significant impact on the health and safety of the public.

Corrective Actions

1. The 'B' RPS HSUR channel was recalibrated, placed in trip using the new setpoint reduction method, and the bistable was re-inserted into the cabinet.
2. A procedure revision is in progress to implement the new rule-based setpoint reduction method.

Failed Components

Component: wide range nuclear instrumentation detector JI-002
 Manufacturer: Sigma
 Model: 9222-00ED

Additional Information

None.