



Southern Nuclear

Dennis R. Madison
Vice President - Farley

Joseph M. Farley Nuclear Plant
7388 North State Hwy 95
Columbia, Alabama 36319
334 814 4511 tel
334 814 4575 fax

drmado@southernco.com

January 11, 2018

Docket No.: 50-364

NL-18-0024

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

Joseph M. Farley Nuclear Plant – Unit 2
Licensee Event Report 2017-005-00
Power Range Nuclear Instrument Inoperable Due to Poor Connection of High Voltage
Cable Connector

Ladies and Gentlemen:

In accordance with the requirements of 10 CFR 50.73(a)(2)(i)(B), Southern Nuclear Company is submitting the enclosed Licensee Event Report for Unit 2.

This letter contains no NRC commitments. If you have any questions regarding this submittal, please contact Mandy Ludlam at (334) 814-4930.

Respectfully submitted,

A handwritten signature in black ink that reads "Dennis Madison".

D.R. Madison
Vice President - Farley

DRM/rgs/cbg

Enclosure: Unit 2 Licensee Event Report 2017-005-00

Cc: Regional Administrator, Region II
NRR Project Manager – Farley
Senior Resident Inspector – Farley
RTYPE: CFA04.054

**Joseph M. Farley Nuclear Plant – Unit 2
Licensee Event Report 2017-005-00
Power Range Nuclear Instrument Inoperable Due to Poor Connection of
High Voltage Cable Connector**

Enclosure

Unit 2 Licensee Event Report 2017-005-00



LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form)

<http://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 Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to infocoll@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NE08-10202, (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

Joseph M. Farley Nuclear Plant, Unit 2

2. DOCKET NUMBER

05000 364

3. PAGE

1 OF 3

4. TITLE

Power Range Nuclear Instrument Inoperable Due to Poor Connection of High Voltage Cable Connector

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	
11	13	2017	2017	005	00	01	11	2018	FACILITY NAME	DOCKET NUMBER	
										05000	
										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			<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"/> 50.48(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 368A			

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT

Gene Surber, Licensing Supervisor

TELEPHONE NUMBER (Include Area Code)

(334) 814-5448

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
A	IG	JIC	W351	Y					

14. SUPPLEMENTAL REPORT EXPECTED

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

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

During a reactor startup on November 13, 2017 at 0136, while at approximately 1.5% power (MODE 2), an Excore Power Range Nuclear Instrument (N-42) was declared inoperable due to lower than expected detector amps and indicated power. N-42 was reading approximately 0.4% lower power than the other three Power Range instruments. The malfunction was determined to be the result of a failed High Voltage (HV) cable center pin connector to N-42. The HV cable connector was installed during N-42 rescaling on November 10, 2017 in preparation for startup physics testing. N-42 provides an input signal to Channel 2 of the Over Temperature Delta Temperature (OTDT) Reactor Trip Signal. Prior to the discovery of the N-42 failure, Channel 3 of OTDT had also been declared inoperable and associated bistables tripped due to a failed Pressurizer Pressure transmitter. Therefore, it was determined that two channels of OTDT were inoperable longer than allowed by Technical Specification (TS) 3.0.3. This condition is reportable per 10CFR50.73(a)(2)(i)(B).

The HV cable connector was repaired and all channels were OPERABLE on November 14, 2017 at 1000. The installation of the HV cable connector with the faulty center pin was attributed to human error. Corrective actions include procedure changes, training, and departmental communications related to maintenance fundamentals.

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

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

Estimated burden per response to comply with this mandatory collection request: 60 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 Infocollcts.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		
		YEAR	SEQUENTIAL NUMBER	REV NO.
Joseph M. Farley Nuclear Plant, Unit 2	05000- 364	2017	005	00

NARRATIVE**EVENT DESCRIPTION:**

During reactor startup on November 13, 2017 at 0136, while at approximately 1.5% power (MODE 2), an Excore Power Range Nuclear Instrument (N-42) [EIS:IG] was declared inoperable due to lower than expected detector amps and indicated power. N-42 was reading approximately 0.4% lower power than the other three Power Range instruments. The malfunction was determined to be the result of a failed High Voltage (HV) cable center pin connector to N-42. The HV cable connector was installed during N-42 rescaling on November 10, 2017 in preparation for startup physics testing and entry into MODE 2. Entry into MODE 2 occurred on November 12, 2017 at 1138. Technical Specification (TS) 3.3.1, Function 6, requires three operable channels of Over Temperature Delta Temperature (OTDT) during MODES 1 and 2. N-42 provides an input signal to Channel 2 of the OTDT Reactor Trip Signal [EIS:JC], while N-41 (Channel 1) and N-43 (Channel 3) supply the remaining input signals. On November 11, 2017 at 0522 (prior to MODE 2 entry), Channel 3 of OTDT had also been declared inoperable due to a failed Pressurizer Pressure Transmitter (PT-457) [EIS:PIT]. The N-42 failure was identified and declared inoperable as Power Range Nuclear Instruments came on scale on November 13, 2017 at 0136 following completion of startup physics testing. This condition existed until Channel 3 of OTDT was restored on November 13, 2017 at 0115. Therefore, it was determined that when MODE 2 was entered, N-42 was inoperable and that two channels of OTDT were inoperable longer than allowed by TS 3.0.3. This condition is reportable per 10CFR50.73(a)(2)(i)(B).

EVENT CAUSAL ANALYSIS:

The N-42 instrument failure was caused by a bent center conductor that prevented the instrument from making full contact with the N-42 circuit and providing HV power to the instrument. To rescale N-42, the HV connectors on the back of the drawer are disconnected such that the instrument is isolated. During this evolution the center pin on one of the connectors became bent or damaged during reinstallation by the Maintenance journeyman. These HV cable connectors are assembled in place and are not prefabricated. Due to repetitive removal and installation of these connectors over a cycle, it is not uncommon for one to fail or become damaged. Since there is no design test circuit, this condition was not detectable until neutron flux increased to a point where the detectors displayed actual values.

This event was classified as a Maintenance fundamental failure due to the HV power supply center pin being either damaged before or during installation. Verifying the proper alignment and ensuring that the connectors are not damaged prior to installation is a fundamental part of manipulating electrical connections on plant equipment.

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

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

Estimated burden per response to comply with this mandatory collection request: 60 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 InfoCollect.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		
Joseph M. Farley Nuclear Plant, Unit 2	05000-	YEAR	SEQUENTIAL NUMBER	REV NO.
	364	2017	005	00

NARRATIVE**REPORTABILITY AND SAFETY ASSESSMENT:**

N-42 is part of the Nuclear Instrumentation System (NIS) which consists of two Source Range instruments (N-31, N-32), two Intermediate Range instruments (N-35, N-36), and four Power Range instruments (N-41, N-42, N-43, N-44). Per TS 3.3.1, Reactor Trip System (RTS) Instrumentation, three channels of OTDT are required in MODES 1 and 2. OTDT consists of three channels fed by N-41, N-42, and N-43 respectively. Thus, Farley unknowingly operated in a condition prohibited by TS as a result of two channels (Channel 2 and Channel 3) of OTDT being inoperable upon entry into MODE 2. This condition is reportable per 10CFR50.73(a)(2)(i)(B).

The OTDT trip function is provided in a 2 out of 3 trip logic to ensure that the design departure from nucleate boiling ratio (DNBR) is met. During this event Channel 1 of OTDT was fully OPERABLE. Prior to entering MODE 2 the bistables for PT-457 (Channel 3 of OTDT) had been tripped by placing the channel in "Test" which is considered an actuated condition. Even though Channel 2 of OTDT was inoperable, the safety function was met with Channel 1 fully OPERABLE and with Channel 3 bistables tripped. Additionally, the design of the Intermediate Range instruments (2 channels) provide redundant protection to the low setpoint of the Power Range instruments. Therefore, this is not reportable as a loss of safety function under 10CFR50.73(a)(2)(v).

CORRECTIVE ACTIONS:

N-42 HV cable connector was repaired on November 14, 2017.

Revise rescaling procedures for disconnecting and reconnecting signal cables to reinforce the need to take care of the center conductor to preclude damage; include required inspections be performed after removal and prior to reinstallation; and to require caution during reinstallation to ensure connectors thread on smoothly and are fully engaged in the jack.

Communicate lessons learned through the Maintenance organization.

Training related to electrical connection fundamentals to be included in initial and continuing Maintenance training.

PREVIOUS OCCURENCES:

No similar events were identified.

OTHER SYSTEMS AFFECTED:

All systems affected were listed by EISS codes.