



May 29, 2007

U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 2; Docket Nos. 50-318; License Nos. DPR 69
Licensee Event Report 2007-001-00
Channel C Linear Range Nuclear Instrument Inoperable During Startup

The attached report is being sent to you as required by 10 CFR 50.73. Should you have questions regarding this report, please contact Mr. Jay S. Gaines at (410) 495-5219.

Very truly yours,

A handwritten signature in black ink, appearing to be "J. E. Pollock", written in a cursive style.

for
Joseph E. Pollock
Plant General Manager

JEP/MJY/bjd

Attachment: As stated

cc: D. V. Pickett, NRC
S. J. Collins, NRC

Resident Inspector, NRC
R. I. McLean, DNR

IE22

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: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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

Calvert Cliffs Nuclear Power Plant

2. DOCKET NUMBER

05000 318

3. PAGE

1 OF 005

4. TITLE

Channel C Linear Range Nuclear Instrument Inoperable During Startup

5. EVENT DATE

MONTH	DAY	YEAR
04	02	2007

6. LER NUMBER

YEAR	SEQUENTIAL NUMBER	REV NO.
2007	- 001 -	00

7. REPORT DATE

MONTH	DAY	YEAR
05	29	2007

8. OTHER FACILITIES INVOLVED

FACILITY NAME	DOCKET NUMBER
	05000

9. OPERATING MODE

1

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

- ☐ 20.2201(b)
☐ 20.2201(d)
☐ 20.2203(a)(1)
☐ 20.2203(a)(2)(i)
☐ 20.2203(a)(2)(ii)
☐ 20.2203(a)(2)(iii)
☐ 20.2203(a)(2)(iv)
☐ 20.2203(a)(2)(v)
☐ 20.2203(a)(2)(vi)

- ☐ 20.2203(a)(3)(i)
☐ 20.2203(a)(3)(ii)
☐ 20.2203(a)(4)
☐ 50.36(c)(1)(i)(A)
☐ 50.36(c)(1)(ii)(A)
☐ 50.36(c)(2)
☐ 50.46(a)(3)(ii)
☐ 50.73(a)(2)(i)(A)
☒ 50.73(a)(2)(i)(B)

- ☐ 50.73(a)(2)(i)(C)
☐ 50.73(a)(2)(ii)(A)
☐ 50.73(a)(2)(ii)(B)
☐ 50.73(a)(2)(iii)
☐ 50.73(a)(2)(iv)(A)
☐ 50.73(a)(2)(v)(A)
☐ 50.73(a)(2)(v)(B)
☐ 50.73(a)(2)(v)(C)
☐ 50.73(a)(2)(v)(D)

- ☐ 50.73(a)(2)(vii)
☐ 50.73(a)(2)(viii)(A)
☐ 50.73(a)(2)(viii)(B)
☐ 50.73(a)(2)(ix)(A)
☐ 50.73(a)(2)(x)
☐ 73.71(a)(4)
☐ 73.71(a)(5)
☐ OTHER

Specify in Abstract below
or in NRC Form 366A

10. POWER LEVEL

006.7

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME

M. J. Yox, Principal Engineering Analyst

TELEPHONE NUMBER (Include Area Code)

410-495-6652

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
A	JD	EB	Gamma Metrics	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO15. EXPECTED
SUBMISSION
DATE

MONTH	DAY	YEAR

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

On April 2, 2007, while in Mode 1 during a Unit 2 startup, Operations staff determined that Channel C Linear Range Nuclear Instrument (LRNI) did not provide indication on the Reactor Protective System Calibration and Indication Panel. Troubleshooting determined that a circuit card was in the wrong slot on the circuit board, resulting in an inoperable condition for Channel C LRNI. This condition was created during the 2007 Unit 2 Refueling Outage while the plant was shutdown and the LRNI channels were not required to be operable. The inoperability of Channel C LRNI was related to human performance. Technician error led to the incorrect installation of the circuit card which resulted in a Reactor Protective System channel out-of-service. Additionally, post-maintenance testing failed to find the mis-located A3 circuit card prior to the mode of applicability for the affected channel. Operations personnel bypassed the inoperable channel until the problem was corrected. Maintenance, operations, and surveillance test procedure revisions are planned to prevent recurrence of this condition.

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		2007	- 001	- 00	

17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

I. DESCRIPTION OF EVENT

On April 2, 2007, during a startup of Unit 2, Control Room Operations staff determined that Channel C Linear Range Nuclear Instrument (LRNI) did not provide indication on the Reactor Protective System (RPS) Calibration and Indication Panel - 2C15C (RPSCIP) Drawer. Further troubleshooting determined that the A3 Quad Isolator Card was in the wrong slot on the circuit board. The mispositioning of the A3 Card resulted in an inoperable condition for Channel C LRNI. This condition was created during the 2007 Unit 2 Refueling Outage while the plant was shutdown and the LRNI channels were not required to be operable.

Technical Specification 3.3.1 requires that four RPS bistable trip units, associated measurement channels, and applicable automatic bypass removal features for each Function in Table 3.3.1-1 shall be OPERABLE in Operating Modes 1 and 2, with the exception of the Loss of Load and Axial Power Distribution-High Trip Functions. These are allowed to be bypassed when less than 15 percent RTP.

Unit 1 was operating at 100 percent Rated Thermal Power (RTP) and Unit 2 was operating at 6.7 percent RTP at the time this condition was discovered. No other inoperable systems, structures, or components contributed to or influenced the condition at the time of discovery.

The condition that rendered Unit 2 Channel C LRNI inoperable was created on March 16, 2007 during the refueling outage when Instrumentation and Controls (I&C) Maintenance personnel replaced the Channel C LRNI power supply. Unit 2 initiated a routine post-refueling startup and entered Mode 2 on April 1, 2007 at 2115 hours. Startup continued and Mode 1 was reached on April 2, 2007 at 0910 hours. Discovery of the condition occurred on April 2, 2007 at 0930 hours. Operations Control Room staff immediately bypassed RPS trip Units 1, 2, 7, 8, and 10 upon discovering the condition. Channel C LRNI operability was restored on April 2, 2007 at 1500 hours, following identification and resolution of the mispositioned component and the successful completion of a partial Surveillance Test Procedure (STP) M-310-2 and channel check.

The inoperability of Channel C LRNI was a self revealing condition that was discovered by Control Room personnel as a result of routine monitoring of plant parameter indications during startup after a refueling outage. Condition Report IRE-021-855 was initiated to capture the issue in the corrective action program. This condition is only applicable to Unit 2 because the power supply replacement was only performed on the shutdown unit. Operability of Unit 1 LRNI channels can be satisfactorily demonstrated by monthly STP results.

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II. CAUSE OF EVENT

The root cause for the inoperability of Channel C LRNI during Modes 1 and 2 was related to human performance. Technician error (failure to utilize the "Lifted Wire, Jumper, Termination, Slidelink Record" in Attachment 2 from MN-1-314, "Conduct of Electrical and Controls Maintenance") led to the incorrect installation of the LRNI drawer circuit card for the quad isolator which resulted in an RPS channel out-of-service. Additionally, post-maintenance testing (PMT) was not adequate to find the mis-located A3 circuit card prior to the mode of applicability for the affected channel.

The lack of operational verification of the LRNI quad isolator card by either operations or maintenance tests while in lower modes of operation contributed to the condition. Less than adequate oversight of the contractor worker by the lead in-house technician also contributed to the condition.

III. ANALYSIS OF EVENT

Operation in Modes 1 and/or 2 for more than one hour with one RPS bistable trip unit inoperable without placing the trip unit in Bypass or Trip exceeds Technical Specification Limiting Condition for Operation (LCO) 3.3.1.A. This condition is reportable under 10 CFR 50.73(a)(2)(i)(B).

Technical Specification 3.0.4 prohibits entry into an operating mode or other specified condition when an LCO is not met except under specific conditions. The failure to meet LCO 3.3.1.A when transitioning from Mode 3 to 2 on April 1, 2007 and from Mode 2 to 1 on April 2, 2007, without meeting the additional conditions of LCO 3.0.4, was prohibited by LCO 3.0.4. This condition is also reportable under 10 CFR 50.73(a)(2)(i)(B).

Channel C LRNI was inoperable during Operating Modes 1 and 2 for 17 hours and 45 minutes. The condition existed for 11 hours and 15 minutes prior to discovery and subsequent compensatory actions by control room staff. Prior to discovery, Channels A, B, and D effectively provided 2 out of 3 trip logic. After discovery, 2 out of 3 trip logic was in place with Channel C in Bypass.

There were no actual safety consequences as a result of this condition because a trip condition did not exist. The potential safety consequences of this condition are low because an effective 2 out of 3 logic existed at all times and Technical Specification LCO 3.3.1.A.2.1 allows operation with one RPS bistable trip unit in bypass for up to 48 hours. This condition existed for a total duration of 17 hours and 45 minutes, which is bounded by LCO 3.3.1.A.2.1. The contribution to the plant risk analysis from this condition represents 0.01% of the Unit 2 annual core damage frequency and is well below the 1E-06 threshold for significance.

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No Nuclear Regulatory Commission Performance Indicators were affected by this condition.

IV. CORRECTIVE ACTIONS

A. Compensatory actions taken include:

1. Identification of incorrectly installed A3 quad isolator card, restoration, and verification of safety function
2. The establishment of an expectation for supervisors to review each Technical Specification maintenance order to ensure an adequate PMT has been identified.
3. The establishment of an expectation that planners will include a focus on identifying the functions impacted during performance of maintenance orders to identify the appropriate PMT.
4. Placement of a hold on STP-O-6-1 and STP-O-6-2, "RPS Startup Test," until revisions are made to improve the LRNI quad isolator card functional test.
5. The human performance violation for not using known and established configuration control tools has been addressed under the individual performance review and Human Resources corrective action processes.

B. Revise the maintenance department PMT guideline to implement the immediate compensatory actions for PMT guidance as well as industry best practice gaps identified via benchmarking. Train maintenance on the changes.

C. Brief maintenance craft and supervision on the lessons learned from the event. (Complete)

D. Revise surveillance test procedures to ensure the quad isolator card in the LRNI drawer is functionally tested while in operating mode 3 prior to entry into mode 2.

E. Revise nuclear operations procedures to ensure the appropriate post-maintenance operational test is determined based upon all job activities and not just the stated job scope.

F. Develop, in each maintenance discipline training program, stand alone qualification tasks for configuration management, PMT determination, and contractor oversight.

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V. ADDITIONAL INFORMATION

A. Component Identification

Component	IEEE 803 EHIS Function	IEEE 805 System ID
Reactor Protection System (RPS)		
Linear Range Nuclear Instrument Channel	CHA	JD
RPS LRNI Quad Isolator Card	EB	JD
RPS LRNI Power Supply	RJX	JD

B. Previous Occurrences

A review of Calvert Cliffs' licensee event reports and other events over the past three years was performed. The review identified the following similar events:

1. LER 2006-01: 1A Diesel Generator Feeder Breaker Tripped Due to Low Design Setpoint
The causal analysis performed to address this event identified system post-modification testing as a potential barrier that could have identified the inadequate short-time setting of the 1A Diesel Generator Amptector. However, the post-modification test did not verify operation under all design bases conditions. Specifically, the system was not tested with all four ventilation fans starting simultaneously simulating a maximum temperature condition. Had the post-modification test simulated a maximum temperature condition, the breaker would have tripped and the error would have been detected and corrected.

Corrective actions for this event included additional training for engineering personnel on adequacy of post-modification test procedures; however maintenance personnel were not included in the target population.

2. LER 2005-001: Main Feedwater Isolation Valve Inoperability Due to Handswitch Wiring
The initial error in the wiring was not detected because the Post-Maintenance Operational Test did not verify the containment spray actuation signal/steam generator isolation signal isolation function prior to returning the valve to service after the 2002 refueling outage.

Corrective actions included a site wide initiative to improve human performance through specific procedures with tools and verification practices to reverse the declining trend. Although site performance has improved in this area, the current condition is an example where continued focus is needed.