

CHARLES H. CRUSE
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February 2, 1995

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit No. 2; Docket No. 50-318; License No. DPR 69
Licensee Event Report 95-001
Axial Shape Index Channel Error Due to Inadequate Self-Checking

The attached report is being sent to you as required under 10 CFR 50.73 guidelines. Should you have any questions regarding this report, we will be pleased to discuss them with you.

Very truly yours,

for
C. H. Cruse
Plant General Manager

CHC/MDM/bjd

Attachment

cc: D. A. Brune, Esquire
J. E. Silberg, Esquire
L. B. Marsh, NRC
D. G. McDonald, Jr., NRC
T. T. Martin, NRC
P. R. Wilson, NRC
R. I. McLean, DNR
J. H. Walter, PSC
Director, Office of Management Information
and Program Control

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PDR ADDCK 05000318
S PDR

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION
COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING
BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT
BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION,
WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT
(3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

FACILITY NAME (1) Calvert Cliffs, Unit 2	DOCKET NUMBER (2) 05000 318	PAGE (3) 1 OF 05
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TITLE (4)
Axial Shape Index Channel Error Due to Inadequate Self-Checking

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
01	03	95	95	-- 001 --	00	02	02	95		05000
										05000

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more) (11)			
		20.402(b)	20.405(a)(1)(i)	20.405(c)	50.73(a)(2)(iv)
POWER LEVEL (10)	100	20.405(a)(1)(ii)	50.36(c)(1)	50.73(a)(2)(v)	73.71(b)
		20.405(a)(1)(iii)	50.36(c)(2)	50.73(a)(2)(vii)	73.71(c)
		20.405(a)(1)(iv)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(v)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME M. D. Milbradt, Compliance Engineer	TELEPHONE NUMBER (include Area Code) 410-260-4352
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDs

SUPPLEMENTAL REPORT EXPECTED (14)

X	YES	NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	(If yes, complete EXPECTED SUBMISSION DATE)					
				06	01	95

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-space typewritten lines) (16)

On Tuesday, January 3, 1995, at approximately 1848 hours, two of the four Reactor Protective System channels measuring Axial Shape Index were determined to be inoperable on Calvert Cliffs Unit 2. Instrument Maintenance (IM) technicians were in the process of calibrating the power range nuclear instrumentation when the problem was discovered. Both channels were calibrated properly and returned to service.

The immediate cause of this event was a number transposition error made by an IM technician due to inadequate self-checking. A second cause was a failure to understand management's expectations with respect to verifying a channel is properly calibrated prior to returning it to service.

Corrective actions include holding training sessions with technicians to emphasize management's expectations for self-checking and verifying channel operability. Long-term improvements to the self-checking program are also being implemented.

NRC FORM 366A (5-92)		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED BY OMB NO. 3150-0104 EXPIRES 5/31/95	
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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

I. Description of Event

On Tuesday, January 3, 1995, at approximately 1848 hours, two of the four Reactor Protective System (RPS) channels measuring Axial Shape Index (ASI) were determined to be inoperable on Unit 2. Instrument Maintenance (IM) technicians were in the process of calibrating the power range nuclear instrumentation when the problem was discovered. The condition existed for approximately 40 minutes before one of the channels was returned to service and declared OPERABLE per the Technical Specifications. At the time of the event, Unit 2 was operating at 100 percent power with normal operating temperature and pressure.

In the early evening of January 3, 1995, three IM technicians, one of whom was a lead technician, proceeded to perform Surveillance Test Procedure (STP) M-213-2, "Calibration of Power Range Nuclear Instrumentation by Comparison With Incore Nuclear Instrumentation." This Unit 2 STP is used to calibrate the four channels of Excore Nuclear Instrumentation (NI) that provide input to the RPS.

Power Range Safety NI at Calvert Cliffs consists of four detector assemblies each consisting of two uncompensated ion chambers (upper and lower) and an associated signal processing drawer. Each detector assembly and signal processing drawer make up a single NI channel. For each NI channel, signals from the upper and lower detectors (subchannels B and A, respectively) arrive at the signal processing drawer and are amplified and displayed separately. A subchannel deviation signal is generated for calculating ASI. A power summer generates an average subchannel signal which is sent to the RPS Calibration and Indication Panel as Nuclear Power input to various RPS functions.

At 1758 the technicians removed the Channel A NI and its associated RPS functions from service to begin calibrating it. In accordance with the STP, one of the technicians generated the core monitoring program (CECOR) printout from the plant computer to obtain the reactor core peripheral ASI. The computer printout indicated ASI was 0.0117. The technician then incorrectly entered the value of 0.117 into the STP. Using the incorrectly recorded ASI value, the technician calculated both Lower and Upper Subchannel voltages. Additionally, the second technician and lead technicians made independent calculations using the incorrect value for ASI, arriving at the same values as the first technician. The Subchannel voltage calculations were then used to calibrate Power Range Channel A. Calibration of Channel A was completed around 1845 and the equipment was returned to service.

At approximately 1848, the technicians removed Channel B from service for calibration. While the technicians were calibrating Channel B a licensed utility Reactor Operator noticed that Channel A ASI indication was

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significantly different than the other channels. The technicians stopped work on Channel B and after reviewing the STP determined ASI was incorrectly recorded in the STP for Channel A. Because they had partially calibrated Channel B, both the technicians and the Control Room operators decided to finish Channel B before returning to Channel A. At around 1931, Channel B was returned to service and Channel A was recalibrated. Channel A was returned to service at 1945.

After consulting the Control Room Operator's log sheet, at 1940 the operators determined Channel A's ASI was greater than 0.035 from the CECOR ASI, and thus Channel A was inoperable. Technical Specification 3.3.1.1 requires as a minimum 2 out of 4 channels be OPERABLE and allows the other 2 channels to be inoperable as long as one of the inoperable channels is placed in the tripped position. Because Channel A was inoperable and Channel B was made inoperable, but was not placed in the tripped condition, the requirements of Technical Specification 3.3.1.1 were not satisfied between 1848 and 1931. During this period Technical Specification 3.0.3 was applicable.

II. Cause of Event

The immediate cause of the event was the transposition error made by the technician when he recorded the wrong ASI value. The technician failed to apply adequate self-checking techniques after recording the number. Over the past several years Calvert Cliffs has conducted extensive initial and follow-up training on self-checking and verification practices designed to ensure work is completed in an event-free fashion. These practices include STAR (Stop, Think, Act, Review) and verification techniques or tools which support the STAR concept.

A second cause associated with this event is that the technician failed to verify Channel A was satisfactorily calibrated before returning it to service and moving on to Channel B. Section 6.3.E.12 contains a signature block for the technician, that states the channel has been calibrated satisfactory. The technician did not fully understand management's expectations regarding the verification needed to ensure his actions were correct and the channel was properly calibrated prior to returning it to service.

III. Analysis of Event

During this event, Unit 2 remained at 100 percent power. In accordance with Technical Specification 2.2.1 and the Calvert Cliffs setpoint log, the upper

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and lower limiting ASI values and trip setpoints at this power level are:

	Lower	Upper
Technical Specification Limit	-0.18	0.20
Trip Setpoint	-0.14	0.16
Allowable Margin	0.04	0.04

As a result of the erroneous calibration, Channel A ASI contained an error of 0.1 ASI units, which is greater than that allowed for by the trip setpoints. Because of the error, RPS Channel A Axial Flux Offset would not have tripped inside of the Technical Specification Limits for some negative ASI oscillations. Additionally, as described above, Channel B was out-of-service for approximately 40 minutes. However, ASI Channels C and D were available during the event and were working properly. These two channels would have tripped Unit 2 before Technical Specifications were exceeded. During the entire event, a steady state ASI value of 0.013 was maintained. This is well within the Technical Specification and trip setpoint limits. Also, the Updated Final Safety Analysis Report does not credit Axial Flux Offset as an initial trip in the accident analysis, thus there were no safety consequences associated with this event.

This event is considered reportable in 50.73(a)(2)(i)(B), "Any event or condition prohibited by the plant's Technical Specification." The forty minute period that the plant was in 3.0.3 constituted a condition prohibited by the plants Technical Specification.

IV. Corrective Actions

- A. After discovering the error on Channel A, the technicians completed the calibration of Channel B and then recalibrated Channel A. Both channels were within specification.
- B. Appropriate personnel actions were taken.
- C. Following the event, training sessions were held with E&C personnel to discuss the details of the event and management's expectations with respect to adequate self-checking. Expectations for performing STP M-213-2 were also emphasized including verification of channel operability.
- D. In response to previous events in the fall of 1994, the E&C Section has begun the implementation of a STAR improvement action plan. This plan includes development of training and laboratory exercises to challenge the proper selection and use of available self-checking and other STAR

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techniques and tools during troubleshooting and maintenance activities. Activities in progress include: management reinforcement of expectations; reformatting the pre-job brief to emphasize application of self-checking principles; providing as part of the supervisor coaching/observation sessions, more individualized coaching on the supervisor's safety and STAR assessment techniques. An internal self-assessment of work performance is also in progress.

- E. A Root Cause Analysis Report is being written to address this event. This analysis will compare the causal factors associated with this event to the fall 1994 events involving the use of STAR. Additional corrective actions generated from the root cause analysis associated with the cause(s) of this event will be supplied in a supplemental LER.

V. Additional Information

A. Affected Component Identification

Component	EIIS Funct Code	EIIS System Code
RPS Channel	CHA	JC
Uncompensated IOW Chamber	DET	JC

B. Previous Similar Events

A similar event involving the removal of a NI channel for testing and its subsequent return to service without verifying operability, is described in LER 318/93-004. In this event IM technicians were performing troubleshooting on Channel A of the Power Range Safety Nuclear Instrumentation. The technicians returned the channel to service after completing their work without sufficiently reviewing the effects of their troubleshooting. A malfunction in the circuit was introduced during their efforts due to an equipment malfunction, but was not identified when the channel was declared operable. The error was later identified and corrected. The channel was determined to be inoperable for around two and a half hours. The corrective actions for this event included reinforcing the need for verification that plant status is not affected following troubleshooting. In light of the event that occurred on January 3, 1995, and the events in 1994, the corrective action noted above from the 1993 event was determined to be insufficient. This prompted the decision to implement Corrective Actions C, D, and E as stated above.