

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) D. C. COOK NUCLEAR PLANT - UNIT 2	DOCKET NUMBER (2) 0 5 0 0 0 3 1 1 6	PAGE (3) 1 OF 0 4
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TITLE (4)
Personnel Error Results in Operation With Incorrect Rod Insertion Limit

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)
1	0	1 8 6	8	6	0 2 8	1	0	3 1 8 6			0 5 0 0 0
											0 5 0 0 0

OPERATING MODE (9) 1

POWER LEVEL (10) 0 8 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)

20.402(b)	20.408(e)	80.73(a)(2)(iv)	73.71(b)
20.408(a)(1)(i)	80.38(a)(1)	80.73(a)(2)(v)	73.71(e)
20.408(a)(1)(ii)	80.38(a)(2)	80.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 305A)
20.408(a)(1)(iii)	<input checked="" type="checkbox"/> 80.73(a)(2)(i)	80.73(a)(2)(vii)(A)	
20.408(a)(1)(iv)	80.73(a)(2)(ii)	80.73(a)(2)(vii)(B)	
20.408(a)(1)(v)	80.73(a)(2)(iii)	80.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME T. P. Beilman I&C/Planning Superintendent	TELEPHONE NUMBER AREA CODE 6 1 6 4 6 5 - 5 9 0 1
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NCRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NCRDS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

At 0947 hours October 1, 1986 (while operating at 80 percent power), the Unit 2 Rod Insertion Limit Monitor was declared inoperable after determining that the computed rod insertion limits were outside Technical Specification requirements. The appropriate Technical Specification surveillances were promptly initiated.

The event was the result of an error in the calibration procedure for the rod insertion limits. A procedural step incorrectly removed electrical leads, affecting the input to the Insertion Limit Computing Module. Rod Insertion Limit annunciator alarms, recorder and monitor were affected.

The Rod Insertion Limit Calibration procedure was revised and subsequently performed to return the Insertion Limit Monitor to operable status at 1407 hours, October 1.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) D. C. COOK NUCLEAR PLANT - UNIT 2	DOCKET NUMBER (2) 0 5 0 0 0 3 1 6 8 6 - 0 2 8 - 0 0	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
					0 2	OF	0 4

TEXT (If more space is required, use additional NRC Form 365A's) (17)

Conditions Prior To Occurrence

Unit Two - 80 percent Reactor Thermal Power.

Description of Event

On October 1, 1986 while investigating a Unit 2 Control Rod "Bank A-Low" annunciator alarm (EIIS/ANN), it was determined that the output on two of the four Rod Insertion Limit Computing modules (EIIS/IMOD) resulted in rod insertion limits which did not correspond to the required Technical Specification (TS) values. The insertion limit for Control Rod Bank A was found conservatively high. The insertion limits for Control Rod Banks B and C were found to meet TS requirements. The Control Rod Bank D Insertion Limit was discovered non-conservatively low by approximately 20 steps. Through out the event, all rod position indicators depicted actual rod positions.

After a visual inspection of the insertion limit computing modules, the Instrumentation and Control (I and C) Maintenance Supervisor began a review of procedure 2 THP 6030 IMP.225, "Unit 2 Rod Insertion Limit Calibration". A question arose on procedural steps directing the removal of electrical leads (jumpers) from the computing modules.

Consultation with corporate I and C engineers confirmed that the presence of these electrical leads (jumpers) was required during normal operation of the Rod Insertion Limit modules. Each rod bank's insertion limit computing module had the lead removed which negated the effect of the average Reactor Coolant System (EIIS/AB) temperature (Tavg). Additionally, Control Rod Bank A had a lead removed which is required to make the insertion limit alarm a constant, with respect to power.

The consequence of this error was that the computed control rod insertion limits (calculated for the annunciator alarms, the Insertion Limit Recorder, and the Rod Insertion Monitor (EIIS/MON)) were incorrectly dependent on Reactor Coolant average temperature (Tavg).

On October 1, 1986 at 0947 hours, upon reaching the above conclusions, the I and C Supervisor informed the Unit 2 Control Room that the Unit 2 Rod Insertion Limit Monitor was inoperable. The appropriate TS surveillance requirements were initiated.

The subject procedure requiring the removal of these five electrical leads was performed on June 2, 1986, following a procedure revision.

With the exception of the Rod Insertion Limit Monitor, there were no inoperable structures, components or systems that contributed to this event.

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FACILITY NAME (1) D. C. COOK NUCLEAR PLANT - UNIT 2	DOCKET NUMBER (2) 0 5 0 0 0 3 1 6 8 6	LER NUMBER (5)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		8 6	0 2 8	0 0	0 3	OF	0 4

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Cause Of Event

The cause of this event was failure to understand the function of the installed leads and the effect of their removal, as required by the last revision of the insertion limit calibration procedure. This was due to personnel error on the part of the procedure writer and the review process.

Analysis Of Event

It is concluded that this event is reportable per 10 CFR50.73(a)(2)(i)(C). TS 4.1.3.6 requires that the position of each Rod control bank be determined to be within the rod insertion limits at least once per 4 hours when the Rod Insertion Limit Monitor is inoperable. The monitor was out of compliance with Technical Specification requirements from 6/2/86 when the incorrectly revised procedure was performed, until 10/1/86, when the discrepancy was identified/corrected.

The Insertion Limit Computing Module (which provides calculated limits to the Rod Insertion Limit Monitor) utilizes the following formula (in which K_1 , K_2 , and K_3 are pre-determined constants):

$$\text{Insertion Limit} = K_1 (\text{Tavg} - 547) + K_2 \Delta T + K_3$$

During normal operation an electrical lead (jumper) is installed on each Rod Bank's computing module which negates the value of the first term in the summation. By removal of the lead (as incorrectly directed by procedure 2 THP 6030 IMP.225) the first term added a value which deviated the Insertion Limits from TS. Compounding the effect of the error was the fact that the K_1 and the 547 values in each computing module have never been calibrated (calibration is not necessary, for the input is not used in the computation). Additionally, during normal operation a second lead is installed on the Rod Bank A computing module which negates the second term of this equation. Removing this electrical lead also introduced an error into the Rod Bank A Insertion Limit computation. This brought about the differing effect of this error on each Control Bank's computed insertion limit.

During this time the position of each control bank was determined to be within Technical Specification insertion limits at least once per eight hour shift. This verification every shift is done to comply with TS 4.1.3.6 which requires verification of rod insertion limits every twelve hours when the Rod Insertion Limit Monitor is operable.

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		8 6	- 0 2 8	- 0 0	0 4	OF 0 4

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Additional indications are available to the Control Room operators to alert them to possible Rod Insertion Limit violations. During reactor startup, Operations procedures require the generation of an inverse multiplication (1/M) plot which verifies Control Rod withdrawal above the insertion limit for each estimated critical position. At power operation, the Delta Flux Annunicator Alarm (an indication of operation outside the axial flux difference target band) would alert operators to unanticipated Control Rod movement. Actual control rod position with respect to the Rod Insertion Limits would then be examined. In addition, during all operating modes the actual control rod positions are frequently monitored by personnel on shift in the Control Rooms.

Due to the above, it has been concluded that it is virtually impossible that the actual rod position ever exceeded the insertion limits. Therefore, this event did not present a significant risk to the health and safety of the general public.

Corrective Actions

A procedure change sheet was approved for 2 THP 6030 IMP.225, "Unit 2 Rod Insertion Limit Calibration"; which deleted the step removing the electrical jumper associated with the Insertion Limit Computing Module. The procedure was subsequently performed and the Rod Insertion Limit Monitor was returned to operable status on October 1, 1986 at 1407 hours.

Failed Component Identification

There were no component failures related to this incident.

Previous Similar Events

There are no previous events of procedure inadequacy resulting in the miscalibration of the Control Rod Insertion Limit computing module.



INDIANA & MICHIGAN ELECTRIC COMPANY

Donald C. Cook Nuclear Plant
P.O. Box 458, Bridgman, Michigan 49106

October 31, 1986

United States Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Operating License DPR-74
Docket No. 50-316

Document Control Manager:

In accordance with the criteria established by 10CFR50.73
entitled Licensee Event Reporting System, the following
report is being submitted:

86-028-0

Sincerely,

W.G. Smith, Jr.
Plant Manager

/mmj

Attachment

cc: John E. Dolan
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