

Indiana Michigan
Power Company
Cook Nuclear Plant
One Cook Place
Bridgman, MI 49106
616-465-5901



July 27, 2000

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Operating License DPR-74
Docket No. 50-316

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73 entitled Licensee Event Report System, the following report is being submitted:

LER 315/2000-007-00, "Technical Specification 3.0.3 Shutdown Initiated Due to Inoperable Rod Position Indications."

The following commitments were identified in this submittal:

- Prior to Unit 1 restart, the error in the Unit 1 Rod Position Deviation Monitor software will be corrected.
- A review of the issues identified in this LER will be performed in the upcoming cycle of continuing Operator Training, starting in August 2000.
- A training course will be provided to operators to reinforce conservative decision-making principles by November 30, 2000.

Should you have any questions regarding this correspondence, please contact Mr. Brian A. McIntyre, Acting Director, Regulatory Affairs, at 616/697-5806.

Sincerely,

A handwritten signature in black ink, appearing to read 'A. Christopher Bakken, III'.

A. Christopher Bakken, III
Site Vice President

/srd
Attachment

c: J. E. Dyer, Region III
B. A. McIntyre
D. Hahn
W. J. Kropp
R. P. Powers
R. Whale
NRC Resident Inspector
Records Center, INPO

IE22

NRC Form 366 (6-1998)	U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001
LICENSEE EVENT REPORT (LER)		ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-8 F33), 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) <p style="text-align: center;">Donald C. Cook Nuclear Plant Unit 2</p>	DOCKET NUMBER (2) <p style="text-align: center;">05000-316</p>	PAGE (3) <p style="text-align: center;">1 of 3</p>
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TITLE (4)

Technical Specification 3.0.3 Shutdown Initiated Due to Inoperable Rod Position Indications

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 NAME	DOCKET NUMBER	
06	28	2000	2000	-- 007	-- 00	07	27	2000	Cook Plant Unit 1	05000-315	
OPERATING MODE (9) 1 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)											
POWER LEVEL (10)		80%		20.2201 (b)		20.2203(a)(2)(v)		<input checked="" type="checkbox"/> 50.73(a)(2)(i)		50.73(a)(2)(viii)	
				20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)	
				20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71	
				20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER	
				20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A	
				20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)			

LICENSEE CONTACT FOR THIS LER (12)

NAME <p style="text-align: center;">M. B. Depuydt, Regulatory Affairs</p>	TELEPHONE NUMBER (Include Area Code) <p style="text-align: center;">616 / 465-5901, x1589</p>
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)		
YES	<input checked="" type="checkbox"/>	NO	<input type="checkbox"/>	MONTH	DAY	YEAR
(If Yes, complete EXPECTED SUBMISSION DATE).						

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

On June 28, 2000, at 2224 hours, with Unit 2 at 79.6 percent rated thermal power (RTP), a Technical Specification (TS) 3.0.3 shutdown was initiated due to failure to meet the requirements of TS Limiting Condition for Operation (LCO) 3.1.3.2, and the associated LCO action statements. Two Individual Rod Position Indicators (IRPIs) for control rods in control bank D, group 2, deviated from the group step counter demand by 18.5 steps, which exceeded the 18-step deviation limit of TS 3.1.3.1 (rod group height). The two IRPIs were declared inoperable, and TS LCO 3.1.3.2 (rod position indication) was entered. The action statements for TS 3.1.3.2 allow for a maximum of one rod position indicator channel per group to be inoperable; therefore, a TS 3.0.3 shutdown was initiated. Additionally, the Rod Position Deviation Monitor alarm failed to announce when the 18-step limit was reached due to a software error, subsequently found to exist on both units. The monitor should therefore have been historically inoperable. Failure to perform 4-hour rod position deviation readings throughout this period constitutes a violation of TS surveillance requirement 4.1.3.2. A non-emergency 1-hour NRC notification was made in accordance with 10CFR50.72(b)(1)(i)(A), for the initiation of a plant shutdown required by the plant's TS. This LER is submitted in accordance with 10CFR50.73(a)(2)(i)(B) for a condition prohibited by TS.

The cause of the event was human error, a non-conservative decision to delay adjustment of the IRPI circuits. The IRPI channels were readjusted to within TS limits in accordance with plant procedures and declared operable, TS 3.0.3 was exited, and, at 2250 hours, the shutdown was terminated at 78.9 percent RTP. Prior to Unit 1 restart, the error in the Unit 1 Rod Position Deviation Monitor software will be corrected. A review of the issues identified in this LER will be performed in the upcoming cycle of continuing Operator Training, and a training course will be provided to operators to reinforce conservative decision-making principles.

The condition was limited to temperature-related drift of the rod position indication system only; therefore, there was no safety significance to this event. There was also no safety significance to the missed 4-hour rod deviation surveillances.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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

Conditions Prior to Event

Unit 2 was in Mode 1, Power Operation, at 79.6 percent rated thermal power

Description of Event

On June 28, 2000, at 2224 hours, with Unit 2 at 79.6 percent rated thermal power (RTP), a Technical Specification (TS) 3.0.3 shutdown was initiated due to failure to meet the requirements of TS Limiting Condition for Operation (LCO) 3.1.3.2, "Position Indicator Channels – Operating," and the associated LCO action statements. Two Individual Rod Position Indicators (IRPIs) (EIS: ZI) for control rods (EIS: JC) in control bank D, group 2, deviated from the group step counter (EIS: CTR) demand by 18.5 steps, which exceeds the 18-step deviation limit of TS 3.1.3.1, "Moveable Control Assemblies – Group Height." Control room operators verified that no control rod movement had occurred, and determined that the source of the deviation in the rod position indications was due to temperature drift in the IRPI circuitry. The two IRPIs were declared inoperable, and TS LCO 3.1.3.2 entered. The action statements for TS 3.1.3.2 allow for a maximum of one rod position indicator channel per group to be inoperable. Since there were two inoperable IRPIs in control bank D, group 2, this condition was beyond the TS LCO and specified action requirements, and a TS 3.0.3 shutdown was initiated. The IRPI channels were readjusted to within TS limits in accordance with plant procedures and declared operable, TS 3.0.3 was exited, and, at 2250 hours, the shutdown was terminated at 78.9 percent RTP.

During the event, the associated Rod Position Deviation Monitor (EIS: MON) alarm (EIS: XA) failed to annunciate when the 18-step limit was reached, as would have been expected for the condition. A non-conservative Plant Process Computer system (EIS: ID) software error was identified that had gone unnoticed since installation of the software in the early 1990s. The Rod Position Deviation Monitor should therefore have been historically inoperable, and 4-hour rod deviation readings should have been taken in accordance with TS surveillance requirement 4.1.3.2. Since the error in the Rod Position Deviation Monitor alarm had existed from installation of the software, failure to perform the 4-hour deviation readings throughout this period constitutes a violation of TS surveillance requirement 4.1.3.2. The software error has subsequently been found to exist on Unit 1 also.

At 2231 hours, a non-emergency 1-hour NRC notification was made in accordance with 10CFR50.72(b)(1)(i)(A), for the initiation of a plant shutdown required by the plant's TS. This LER is submitted in accordance with 10CFR50.73(a)(2)(i)(B) for a condition prohibited by TS.

Cause of Event

The root cause was determined to be human error. A non-conservative decision was made to delay adjustment of the IRPIs even though the deviation between the two IRPIs and the group step counter demand was known and trending upward. Plans were made to perform the necessary adjustments, and the maintenance department was notified that an adjustment was needed. However, due to power escalation and numerous testing activities, the adjustment activities were repeatedly delayed and not completed in time to prevent the two IRPI channels from becoming inoperable.

The cause for the failure of the Rod Position Deviation Monitor alarm during this event was due to a non-conservative error in the Plant Process Computer software. The software that was installed in the early 1990s contained an error at installation such that the alarm was generated from a 'greater than' setpoint rather than a 'greater than or equal to' setpoint.

Analysis of Event

The rod position indication system is an Analog Rod Position Indication (ARPI) system that determines rod position from a variable voltage signal sensed by the position indicator coil stack (EIS: XE) on the control rod drive mechanism (EIS: DRIV). The voltage signal passes through a signal conditioning module (EIS: XM) and outputs to devices such as the control board IRPIs and the Plant Process Computer. The ARPI system is temperature sensitive and contains other minor inaccuracies. To compensate for temperature and individual control rod effects, ARPI has two manual adjustments; one for overall RCS hot leg temperature (T-hot) and a second adjustment on each signal conditioning module to

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compensate for individual rod effects (TC SET). The ARPI system requires periodic manual T-hot adjustments as power levels change, and periodic TC SET adjustments to compensate for individual control rod differences. Additionally, since ARPI is temperature sensitive, IRPI for rods at a fixed position may change as plant temperature changes.

The basis for allowable rod misalignments is to ensure that (1) acceptable power distribution limits are maintained, (2) the minimum shutdown margin is maintained, and (3) the potential effects of rod misalignment on associated accident analyses are limited. Control rod positions and operability of the rod position indicators are required to be verified on a nominal basis of once per 12 hours with more frequent verifications required if the Rod Position Deviation Monitor alarm is inoperable. Flux maps were performed at approximately 50 percent, 90 percent and 100 percent RTP. These flux maps confirmed that rods were not out of alignment from their group demand counters beyond TS limits. Additionally, the indicated misalignments were above control bank D group demand with control bank D nearly fully withdrawn, so the resulting indications were above the fully withdrawn position. The IRPI deviation existed for less than one hour prior to identification, and other plant indications related to flux distribution were normal at that time. Since the condition was limited to temperature-related drift of the rod position indication system only, there was no safety significance to this event.

There is no safety significance to the failure to perform the TS surveillance 4-hour rod position deviation readings due to the historical inoperability of the Rod Position Deviation Monitor. Daily and shiftly surveillances recorded rod position deviations, and deviations have been historically maintained less than 18 steps. The Rod Position Deviation Monitor would have alarmed when rods reached -18/+19 steps out of alignment with demand, which is only one step different than the TS limit. Since rods move in one-step increments, the added deviation beyond the TS limit would have been limited to one step before the alarm was received, allowing a rapid return of the misaligned rod to within TS limits.

Corrective Actions

Immediate corrective actions were to adjust the two IRPIs to restore the rod indication misalignment to within TS limits and declare the IRPIs operable, TS 3.0.3 was exited, and, at 2250 hours on June 28, 2000, the shutdown was terminated.

On July 1, 2000, the Unit 2 Rod Position Deviation Monitor alarm software was corrected to generate an alarm when rod position deviation from demand is greater than or equal to the TS limit above demand, and one step less than the TS limit for rods positioned below demand. Prior to Unit 1 restart, the error in the Unit 1 Rod Position Deviation Monitor software will be corrected.

A review of the issues identified in this LER will be performed in the upcoming cycle of continuing Operator Training, starting in August 2000.

A training course will be provided to operators to reinforce conservative decision-making principles by November 30, 2000.

Previous Similar Events

None