



October 18, 2000

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

Operating Licenses DPR-58 and DPR-74
Docket Nos. 50-315 and 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 315/1999-031-01, "Valves Required To Operate Post-Acident Could Fail Due To Pressure Locking/Thermal Binding."

The following commitment was identified in the submittal:

- CNP will implement the same modifications in Unit 1 to ensure the corresponding Unit 1 valves will perform their intended safety function.

Should you have any questions regarding this correspondence, please contact Mr. Wayne J. Kropp, Director Regulatory Affairs, at 616/697-5056.

Sincerely,

A handwritten signature in black ink, appearing to read 'A. Christopher Bakken, III', written over a circular stamp or mark.

A. Christopher Bakken, III
Site Vice President

/ram
Attachment

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

JE22

LICENSEE EVENT REPORT (LER)

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

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 (7-6 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

FACILITY NAME (1) Cook Nuclear Plant Unit 1		DOCKET NUMBER (2) 05000-315	PAGE (3) 1 of 4
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TITLE (4)
Valves Required to Operate Post-Accident Could Fail to Open Due to Pressure Locking/Thermal Binding

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	
12	30	1999	1999	-- 031 --	01	10	18	2000	DC Cook - Unit 2	50-316	
OPERATING MODE (9) - POWER LEVEL (10) 00 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)											
			20.2201 (b)		20.2203(a)(2)(v)			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)			X 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 R. Gaston, Manager Regulatory Compliance	TELEPHONE NUMBER (Include Area Code) 616/465-5901, x1366

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 (If Yes, complete EXPECTED SUBMISSION DATE)	X	NO		MONTH	DAY	YEAR

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

On December 30, 1999, with both units defueled, it was determined that the valves which provide a suction path from the containment recirculation sump to the emergency core cooling system (ECCS) pumps were susceptible to pressure locking/thermal-binding (PL/TB) following a loss-of-coolant-accident (LOCA). This could challenge the ability of ECCS to provide long term cooling as required by 10 CFR 50.46. This represents a condition that alone could have prevented fulfillment of a safety function to remove residual heat and to mitigate the consequences of an accident. A 4-hour non-emergency emergency notification system notification was made pursuant to 10 CFR 50.72(b)(2)(iii). The notification also included the Residual Heat Removal (RHR) upper containment spray header isolation valves, which were also identified as susceptible to PL/TB.

The apparent cause of the condition associated with upper containment spray header isolation valves was the failure to consider the effects of PL/TB during the initial design process and the failure to identify and correct the initial design errors during subsequent design review activities. The apparent cause of the condition associated with containment recirculation sump isolation valves was the failure of the design review process to ensure modifications implemented to eliminate the potential for PL/TB were not removed or otherwise effectively eliminated during subsequent plant modification activities. The necessary appropriate plant modifications have been developed.

It has been concluded that the failure of one or more recirculation sump suction valves to open would present a moderate challenge to safety. Existing procedures provide compensatory measures to allow for continued core cooling until recirculation can be initiated. This LER supplement is being submitted based on completion of the cause evaluation, and replaces LER 315/99-031-00 in its entirety.

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		1999	--	031	--	

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

Conditions Prior to Event

Unit 1 was defueled
Unit 2 was defueled

Description of Event

The valve designation 1/2 denotes corresponding valves for unit 1 and unit 2 respectively.

As part of the ongoing motor-operated-valve (MOV) project, new actuator thrust capability calculations were performed for the recirculation sump suction valves 1/2-ICM-305 and 1/2-ICM-306, and for the residual heat removal (RHR) upper containment spray header isolation valves, 1/2-IMO-330, 1/2-IMO-331. These valves were identified as being susceptible to the phenomenon of pressure locking/thermal binding (PL/TB).

Valves 1/2-ICM-305 and 1/2-ICM-306 supply suction flow to the emergency core cooling system (ECCS) and containment spray pumps, RHR, safety injection (SI) and the charging pumps, during the recirculation phase of an accident. The new calculation determined that the valve operators could be incapable of opening the valves under post loss-of-coolant-accident (LOCA) conditions when they are required to open to allow flow from the containment sump to the suction of the RHR pumps.

On December 30, 1999, it was determined that the failure of Valves 1/2-ICM-305 and 1/2-ICM-306 to open would represent a condition that alone could have prevented fulfillment of a safety function to remove residual heat and to mitigate the consequences of an accident. A 4-hour non-emergency emergency notification system notification was made pursuant to 10 CFR 50.72(b)(2)(iii) at 1742 hours the same day. This licensee event report is submitted in accordance with 10 CFR 50.73(a)(2)(v).

During post-LOCA conditions, heat may be transferred from the hot recirculation sump water through the suction piping and into the bonnet of Valves 1/2-ICM-305 and 1/2-ICM-306. The resulting pressure inside of the water-solid bonnet may be sufficient to wedge the valve discs against their seats such that increased friction exceeds the available thrust of the valve operator. Under these conditions, the valve could be incapable of opening until the bonnet pressure could be released. This would require additional manual operator action that violates system design criteria.

Valves 1/2-IMO-330 and 1/2-IMO-331 were also identified as susceptible to PL/TB. These valves are normally maintained in the closed position, and are opened if upper containment supplemental spray is required during the recirculation phase due to a continued rise in containment pressure.

Cause of Event

The apparent cause of the condition associated with Valves 1/2-ICM-305 and 1/2-ICM-306 is the failure of the design review process to prevent the inadvertent elimination of PL/TB design requirements.

The apparent cause of the condition associated with Valves 1/2-IMO-330 and 1/2-IMO-331 is the failure to consider the effects of PL/TB during the initial design process and the failure to identify and correct the initial design errors during subsequent design review activities.

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

Analysis of Event

Valves 1/2-ICM-305 and 1/2-ICM-306 are the recirculation sump ECCS suction valves. Their safety function is to open during the recirculation phase of a LOCA to provide long term cooling to the reactor core once the refueling water storage tank (RWST) inventory is depleted. The swap over from the RWST to the containment recirculation sump is accomplished in the control room through manual operator action. A failure of these valves to open on demand results in a loss of supply flow to the RHR, SI, and charging pumps when operating in the recirculation mode, and has the potential to render a significant portion of ECCS inoperable.

Emergency Operating Procedure 1/2 OHP 4023.ECA- 1.1, "Loss of Emergency Coolant Recirculation," provides instructions for the operator to try to restore at least one train of emergency core cooling upon failure of these valves to open. This is carried out simultaneously with directions to conserve the remaining RWST inventory and to align additional sources of injection to provide continued forced circulation. These actions would permit additional time for compensatory measures to be completed without further challenging the fuel cladding barrier.

As such, the safety significance for the failure of the 1/2-ICM-305 and 1/2-ICM-306 to open on demand has been judged to be moderate.

The RHR pumps can also provide containment spray through a spray ring that is independent from the containment spray system. Valves 1/2-IMO-330 and 1/2-IMO-331 are 8-inch motor-operated gate valves located in the RHR containment spray line. These valves are normally closed and are opened by operator action during the recirculation phase of an accident if containment pressure continues to rise. If Valves 1/2-IMO-330 and 1/2-IMO-331 were unable to open resulting in no RHR containment spray, the results would be bounded by an analysis performed by Westinghouse in support of licensee event report (LER) 315/98-014-03. This LER considered various factors that affect containment integrity. As part of the investigation, Westinghouse performed an analysis that considered the effect on containment pressure with no RHR containment spray. The results of the analysis calculated the peak containment pressure to be 13.85 pounds per square inch gauge (psig), which is above the current design basis of 12 psig, but below its ultimate pressure capability of 36 psig. While 13.85 psig, is above the licensing and technical specification basis of 12 psig, it is less than the 16.1 psig pre-operation containment integrity test that both units were subjected to. Therefore, it can be concluded that the containment would have remained functional even if subjected to pressures as high as 13.85 psig (reference: LER 315/98-014-03, "Response to High-High Containment Pressure").

It can be concluded that these combined effects would not have resulted in a significant increase in radiological consequences to the public or control room personnel. Because the removal of airborne radioactive iodine is proportional to containment spray flow rate, a reduction in spray flow could result in higher thyroid doses both to the public and control room personnel. Analysis determined a potential 3 percent increase in radioactive dose to the thyroid and no increase in dose to whole body dose due to changes in spray flow rates. This results in an increase the Updated Final Safety Analysis Report, Chapter 14, thyroid dose from 154 to 158.6 radiation equivalent man (rem) for the 0-2 hour site boundary dose and from 134 to 138 rem for the 0-30 day low population zone boundary dose. These are both below the 300-rem thyroid dose limit set forth in 10 CFR Part 100.

There was no challenge to the integrity of the Unit 1 and 2 containment pressure boundaries due to the potential increase in containment pressure during an accident.

This LER supplement is being submitted based on completion of the cause evaluation, and replaces LER 315/99-031-00 in its entirety.

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

Corrective Actions

CNP has modified the Unit 2 Valves 2-IMO-330, 2-IMO-331 and 2-ICM-305, 2-ICM-306 to ensure the valves are not susceptible to the effects of PL/TB.

CNP will implement the same modifications in Unit 1 to ensure the corresponding Unit 1 valves will perform their intended safety function.

As part of the Unit 2 Restart effort, system and programmatic assessments were performed during the Expanded System Readiness Reviews to reestablish and document the plant's design and licensing basis. In CNP's March 19, 1999, response to Nuclear Regulatory Commission (NRC) letter, "Enforcement Actions 98-150, 98-151, 98-152 and 98-186 Reply to Notice Of Violation October 13, 1998," which identified programmatic weaknesses in the plant design and licensing basis, and the training and qualification of plant personnel, CNP established an engineering leadership plan to develop a new design control process that encompassed design input and verification, calculations, design document control and vendor technical information. A training and qualification of personnel leadership plan was also established to reinforce a nuclear safety culture for site personnel. This training included human error reduction and conservative decision making during the performance of engineering activities.

Previous Similar Events

The following LERs are similar to this event:

- LER 05000-316/2000-009-00, Common-Cause Ventilation Failure Results In Inoperable Auxiliary Feedwater Pumps
- LER 05000-316/2000-003-00, Containment Internal Concrete Structures Do Not Meet Design Load Margins
- LER 05000-316/2000-002-00, Operation Outside Design Bases And Entry Into Technical Specification (TS) 3.0.3 Due To Non-Conservative TS

The above represent 3 examples of CNP's failure to adequately control its design basis. Additional examples of CNP's failure to control its design basis have been reported. This event and the additional similar events occurred prior to the implementation of corrective actions to correct and prevent recurrence of the breakdown in the CNP design process.