September 20, 2002

EA-02-090

Mr. A. Cayia
Site Vice President
Point Beach Nuclear Power Plant
Nuclear Management Company, LLC
6610 Nuclear Road
Two Rivers, WI 54241

SUBJECT: POINT BEACH NUCLEAR PLANT
NRC INSPECTION REPORT 50-266/02-12(DRP); 50-301/02-12(DRP)

Dear Mr. Cayia:

On August 23, 2002, the NRC completed a supplemental inspection at your Point Beach Nuclear Plant. The results of this inspection were discussed on August 23, 2002, with you and members of your staff. The enclosed report presents the results of that inspection.

The supplemental inspection was an examination of activities conducted under your license as they relate to safety and to compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of a selective review of procedures and representative records, observations of activities, and interviews with personnel. Specifically, the inspection focused on your root cause evaluation and development of corrective actions for the White inspection finding associated with the February 20, 2002, failure of the Unit 2 B train safety injection pump due to gas binding.

Based upon the results of this inspection, the inspector determined that your root cause evaluation of the White inspection finding identified the primary and contributory causes for the finding. The inspector also determined that your completed and proposed corrective actions for the finding appropriately addressed those causes. Consequently, the White finding will be closed.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records System (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html the Public Electronic Reading Room).

Sincerely,

/RA/

Roger D. Lanksbury, Chief
Branch 5
Division of Reactor Projects

Docket Nos. 50-266; 50-301
License Nos. DPR-24; DPR-27

Enclosure: Inspection Report 50-266/02-12; 50-301/02-12

cc w/encl: R. Grigg, President and Chief
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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-266; 50-301
License Nos:	DPR-24; DPR-27
Report No:	50-266/02-12(DRP); 50-301/02-12(DRP)
Licensee:	Nuclear Management Company, LLC
Facility:	Point Beach Nuclear Plant, Unit 2
Location:	6610 Nuclear Road Two Rivers, WI 54241
Dates:	August 19 - 23, 2002
Inspector:	M. Kunowski, Project Engineer
Approved by:	Roger D. Lanksbury, Chief Branch 5 Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000266-02-12(DRP); 05000301-02-12(DRP), on 8/19-23/2002, Nuclear Management Company, LLC; Point Beach Nuclear Plant, Unit 2. Supplemental Inspection - Mitigating Systems Cornerstone.

Cornerstone: Mitigating Systems

The U. S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess the licensee's evaluation associated with the failure of the Unit 2 "B" safety injection (SI) pump due to gas binding. This performance issue was previously characterized as having low to moderate risk significance (White) in the final significance determination letter from the NRC dated June 13, 2002. During this supplemental inspection, performed in accordance with Inspection Procedure 95001, the inspector determined that the licensee performed a comprehensive evaluation of the failure and its cause. The licensee's evaluation identified that the root cause of the performance issue included organization leadership and human behaviors that had not ensured adequate work prioritization, including timely implementation of corrective actions, especially when the organization was consistently stressed by major operational and business challenges. Contributing causes included industry operating experience having been treated as separate from, and subordinate to, the plant's corrective action process, high personnel turnover, high backlog of high priority corrective action issues, and essentially continuous equipment outages during non-outage periods. A comprehensive extent-of-condition review was completed by the licensee and identified no similar problems in plant systems other than SI, but did identify other industry experience items that had not been appropriately processed. Corrective actions were likewise extensive and included procedure revisions, training on error reduction techniques, repair of valves in and modification of the SI system, and development of a formal equipment troubleshooting process.

Given the licensee's acceptable performance in addressing the failure of the Unit 2 "B" SI pump, the White finding associated with this issue will only be considered in assessing plant performance for a total of four quarters in accordance with the guidance in Inspection Manual Chapter 0305, "Operating Reactor Assessment Program." Implementation of the licensee's corrective actions will be reviewed further during a future inspection.

A. Inspector-Identified Findings

No findings of significance were identified.

B. Licensee-Identified Findings

No findings of significance were identified.

Report Details

01 INSPECTION SCOPE

The U. S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess the licensee's evaluation associated with the failure of the Unit 2 Train B safety injection (SI) pump because of gas binding. This performance issue was previously characterized as "White" in the NRC's final significance determination letter dated June 13, 2002.

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 Problem Identification

a. Determination of who (i.e., licensee, self-revealing, or NRC) identified the issue and under what conditions

As discussed in Inspection Report 50-266/02-05; 50-301/02-05, the issue was self-revealing when the SI pump failed on February 20, 2002, during a monthly lubrication run/bump of the pump. The reactor was at full power at the time of the failure, but was shutdown on February 22, after the licensee concluded that the repairs to the pump would exceed the 72 hours allowed in Technical Specification (TS) Action Condition Requirement 3.5.2. The licensee made the required notifications, took actions to place the plant in a safe shutdown condition, documented the circumstances in corrective action program documents (CAPs), and submitted the appropriate licensee event report (LER).

b. Determination of how long the issue existed, and prior opportunities for identification

As discussed in Inspection Report 50-266/02-05; 50-301/02-05, reoccurring problems with leaky SI accumulators dated back to at least 1996. Problems with the industry operating experience review program were more recent (going back to mid-2000) and appeared to be due to personnel turnover and mis-communication of the duties of the staff who had left to the newly assigned individuals. In April 2000, plant staff had identified the susceptibility of the SI pumps to gas binding after completing a review of Supplement 5 of Information Notice 88-23, "Potential for Gas Binding of High-Pressure Safety Injection Pumps During a Loss-of-Coolant Accident." However, because this review had been done under the auspices of the operating experience program, corrective actions that had been proposed as a result of the review were not given the appropriate priority. The pump failure occurred about a month before the due date of the some of those actions.

c. Determination of the plant-specific risk consequences (as applicable) and compliance concerns associated with the issue

The risk assessments of the pump failure by the NRC and the licensee were in agreement that the issue was of low to moderate increased importance to safety - a White inspection finding. The NRC also concluded that the problem was a violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the failure to promptly identify and correct the leakage from the Unit 2 "A" SI accumulator and to promptly act after the licensee's review identified in April 2000 that the SI system was susceptible to dissolution of nitrogen gas and subsequent gas binding of the SI pumps. A Notice of Violation to this effect was transmitted to the licensee in a letter dated June 13, 2002. This letter also contained the final significance determination for the issue.

02.02 Root Cause and Extent of Condition Evaluation

a. Evaluation of method(s) used to identify root cause(s) and contributing cause(s)

For the root cause evaluation (RCE 000044) of the pump failure, the licensee used the Event and Causal Factor Charting method to describe the event, identify areas for further investigation, and to identify failure modes. The licensee also used Performance Improvement International methodology to identify causes due to human error and organizational, programmatic, or organizational failure modes. Overall, the two methods used were appropriate to identify the root cause and contributing causes.

The inspector reviewed both the original RCE and Revision 1, which was written in response to actions specified by the licensee's Corrective Action Review Board. Reasons for the revision included a need to describe specific procedure/program changes with the operator workaround program; a need to assess changes in the operability determination program; a need to address the questions of why a systematic approach was not used to investigate the accumulator leakage problem and why the daily management action request (AR) screening meeting did not identify the recurrence of CAPs pertaining to leaky accumulators; corrective action due dates were not aggressive enough; and the effectiveness review specified in Revision 0 of the RCE was not prescriptive enough. For the root cause, the licensee identified that "organization leadership and human behaviors had not ensured adequate work prioritization, including timely corrective action implementation, especially when the organization is consistently stressed by major operational and business challenges."

The licensee also identified several contributing causes:

Station work management processes were ineffective in preventing or mitigating the potential for the pump failure or similar event;

industry operating experience evaluators had believed that multiple valve failures were of low probability;

industry operating experience had been treated as separate from and subordinate to the corrective action program; and

timeliness of corrective actions was affected by high personnel turnover, high backlog of high priority corrective action program items, improved Technical Specifications implementation, and reoccurring major equipment outages during non-outage periods.

b. Level of detail of the root cause evaluation

The level of detail in Revision 1 of RCE 000044 and the information provided in other corrective action program documents referenced in the RCE provided sufficient detail to support the conclusions reached. Included in the RCE was a discussion of methodology and scope, event description and timeline, extent of condition assessment, nuclear and personnel safety significance, data and analysis for internal and external operating experience, and opportunities for human performance improvement.

c. Consideration of prior occurrences of the problem and knowledge of prior operating experience

As discussed in Section 4OA2 of Inspection Report 50-266/02-05; 50-301/02-05, the licensee identified that operators and plant management had not properly responded to several repeat instances of decreasing level in the Unit 2 "A" SI accumulator and that the operating experience program had not been effective in ensuring timely implementation of corrective actions taken in response to industry problems with gas binding of emergency core cooling system pumps.

d. Consideration of potential common cause(s) and extent of condition of the problem

For the SI system, there was a potential for a common cause failure, particularly for the Unit 1, B train. The A train pumps for both Units were being used, by design, for periodic addition of water to the accumulators, and thus were run frequently enough to preclude the dissolution and accumulation of enough nitrogen to cause gas binding of the A train pumps. After the pump failure in February 2002, the licensee instituted a periodic venting program for the SI systems of both Units and modified the Unit 2 SI system with the addition of several high-point vents. A similar modification was planned for Unit 1 during the Fall 2002 refueling outage.

For the problem with the operating experience review program, the licensee's extent of condition review identified other operating experience items that had not been entered into the corrective action program or had been entered, but no further action had been taken. Included in this was one industry experience report issued on March 12, 2001, that never made it into the licensee's tracking program for operating experience issues (i.e., the NUTRK system, a mainframe computer-based software platform that formerly was used by the licensee for tracking all of its corrective action program items - the licensee recently transferred most of the corrective action program documents to a web-based system). This particular experience report pertained to a problem with a diesel at another nuclear plant that occurred because that plant had not effectively used important industry operating experience.

Another operating experience was issued to the industry on March 20, 2001, and put into NUTRK on June 29, 2001. This experience report dealt with yet another gas binding event at Turkey Point, the site of the earlier gas binding event that was the focus of Supplement 5 of Information Notice 88-23. However, this event report was not assigned to system engineering for review until March 12, 2002.

The licensee also reviewed the event from the perspective of operator workarounds, in that, operators got used to filling accumulators over the years at relatively increased frequency. The review identified a few other items that might be categorized as a workaround. These items were entered into the workaround program.

02.03 Corrective Actions

a. Appropriateness of corrective action(s)

In a letter dated July 15, 2002, the licensee responded to the Notice of Violation issued for the failure between April 2000 and February 2002 to identify and correct the leakage of the Unit 2 "A" SI accumulator. This leakage resulted in the dissolution of nitrogen gas that eventually bound and failed the 2B SI pump. In that letter, the licensee described five completed corrective actions and four actions that were yet to be taken. The inspector reviewed the corrective actions and determined that they addressed the root and contributing causes identified in the RCE and addressed the Notice of Violation. In addition to these completed and planned corrective actions, additional corrective actions and improvements were identified by the licensee and were being tracked in the corrective action program. Based on the review by the inspector, the following items are CLOSED:

Unresolved Item (URI) 50-301/02-03-01: 2P-15B: Safety Injection Pump Failure During Monthly Preventative Maintenance Lubrication Activity

Violation (VIO): Failure to Promptly Identify and Correct Leakage From Safety Injection Accumulator

b. Prioritization of corrective actions

The corrective actions taken by the licensee in response to the Notice of Violation and in response to other issues identified in the RCE were appropriately prioritized, in accordance with the license's corrective action program, as described in Nuclear Power Business Unit Procedures Manual Procedure (NP) 5.3.1, "Action Request Process."

c. Establishment of schedule for implementing and completing the corrective actions

In the July 15th response to the Notice of Violation, the licensee presented expected completion dates for the four corrective actions yet to be completed. The inspector reviewed the schedule and concluded that it was appropriate. For the completed actions, the inspector verified that the actions had been completed. One of those actions was the development by the licensee of a Human Performance Improvement plan for Point Beach to correct the behaviors that led to the SI pump event. The

inspector verified that a plan had been developed. Revision 0, dated March 22, 2002, of that plan was currently posted on the plant general access website. Section 3.2 of the plan specified that department managers should develop and formalize expectations for department use of the error prevention tools by June 30, and Section 3.3 specified that those expectations were to be implemented by August 1. In discussions with managers and other personnel from system engineering, maintenance, and operations, the inspector found a wide range of success in meeting those due dates. However, this was not significant given that further discussions indicated that information about error reduction and error prevention tools was being well publicized via the website, routine training, staff meetings, and through ongoing special training given by an industry expert.

Another observation by the inspector related to an issue the licensee identified in its RCE: a possible overload of corrective action items for individual plant staff to address and the need for staff to access more than one system to see what corrective action program items had been assigned to them. The observation by the inspector was that operating experience events and the commitments to the Notice of Violation for this event were being tracked in NUTRK, while corrective actions for other issues were being tracked in Ttrack, the licensee's recently instituted, web-based system. This could lead to duplication of effort. For example, there was a NUTRK item for the performance assessment manager to do an effectiveness review of the corrective actions for this event and there was a Ttrack item for the quality assurance group to do one. Another corrective action was for an engineering manager to develop a systematic troubleshooting tool; however, there was both an item in NUTRK and in Ttrack directing that manager to develop that tool. In this case, the duplicate items, one in NUTRK and one in Ttrack, could contribute to a sense of work overload.

d. Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence

In the July 15th letter, the licensee committed to complete an effective review of the completed and proposed corrective actions for the root cause. This review was scheduled beyond the completion date of this inspection but before the end of this year.

03 MANAGEMENT MEETINGS

Exit Meeting Summary

The inspector presented the inspection results to Mr. A. Cayia and other members of licensee management at the conclusion of the inspection on August 23, 2002. The licensee acknowledged the findings presented. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

S. Bach, System Engineer
A. Cayia, Site Vice President
T. Chiles, Supply Chain Manager
B. Day, Site Assessment Manager
F. Flentje, Regulatory Compliance
J. Freels, Engineering Director
D. Hettick, Manager, Performance Assessment
R. Hopkins, Supervisor, Nuclear Oversight
S. Pfaff, Corrective Action Supervisor
C. Krause, Regulatory Compliance
D. Schoon, Operations Manager
J. Strharsky, Assistant Operations Manager
G. Young, General Supervisor-Facilities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

50-301/02-03-01	URI	2P-15B Safety Injection Pump Failure During Monthly Preventative Maintenance Lubrication Activity
	VIO	Failure to Promptly Identify and Correct Leakage From Safety Injection Accumulator

Discussed

None

LIST OF ACRONYMS USED

ACE	Apparent Cause Evaluation
AOP	Abnormal Operating Procedure
AR	Action Request
ARP	Alarm Response Procedure
CAP	Corrective Action Program
CARB	Corrective Action Review Board
CDF	Core Damage Frequency
CR	Condition Report
DRP	Division of Reactor Projects
LER	Licensee Event Report
NP	Nuclear Power Business Unit Procedure
NRC	Nuclear Regulatory Commission
OE	Operating Experience
PI	Performance Indicator
PRA	Probabilistic Risk Assessment
RCE	Root Cause Evaluation
SI	Safety Injection
TS	Technical Specification
WO	Work Order

LIST OF DOCUMENTS REVIEWED

Memo NEPB-88-252	NRC Information Notice No. 88-23: Potential For Gas Binding of High-Pressure Safety Injection Pumps During a Loss-of-Coolant Accident	June 7, 1988
Memo NEM-89-143	NRC Information Notice No. 88-23, Supplement 1: Potential For Gas Binding of High-Pressure Safety Injection Pumps During Loss-of-Coolant Accident	March 6, 1989
Memo NEM-90-368	NRC Information Notice No. 88-23, Supplement 2: Potential For Gas Binding of High-Pressure Safety Injection Pumps During a Loss of Coolant Accident	April 23, 1990
Memo NPM 91-0400	NRC Information Notice No. 88-23, Supplement 3: Potential For Gas Binding of High-Pressure Injection Pumps During a Loss-of-Coolant Accident	June 18, 1991
Memo NPM 93-0092	NRC Information Notice No. 88-23, Supplement 4: Potential For Gas Binding High-Pressure Safety Injection Pumps During a Design Basis Accident	February 5, 1993
Memo NPM 2002-0159	Expectations for Corrective Action Program Improvements	March 28, 2002
Memo NPM 2002-0368	June 2002 Operating Experience Program Performance Indicators	July 18, 2002
Memo NPM 2002-0411	Minutes From the August 6, 2002 CARB [Corrective Action Review Board] Meeting	August 8, 2002
Nuclear Plant Procedures Manual Procedure (NP) 5.3.1	Action Request Process	Revision 19
NP 5.3.2	Industry Operating Experience Review Program	Revision 11
RCE 000044	U2 Safety Injection Pump “Gas Bound” During Routine Preventive Maintenance	Revisions 0 and 1
Licensee Letter NRC 2002-0061	Reply to A Notice of Violation	July 15, 2002
	Human Performance Event Investigation Tool (for Kewaunee/Point Beach)	July 31, 2002

	Kewaunee/Point Beach Human Performance Improvement Plan	March 22, 2002
CAP002245	2P-15B, Safety Injection Pump, Fails During OI-163 Performance	February 20, 2002
CAP002262	Concerns About Gas Binding of SI Pumps and System Leakage	February 21, 2002
CAP002264	Untimely Implementation of Recommendations From IN (NRC Information Notice) 88-023-05	February 21, 2002
CAP002294	Unit One and Two SI Accumulators Require Frequent Filling Due to Check Valve Leak	February 24, 2002
CAP002500	Failure to Obtain and Screen Operating Experience	March 12, 2002
CAP002559	Emergency Diesel Generator Operating Experience	March 15, 2002
CAP002576	OE [Operating Experience] On SI Pump Gas Binding at Turkey Point Not Screened for PBNP Applicability	March 15, 2002
CAP002577	External Operating Experience Not Entered Into NUTRK for Evaluation	March 15, 2002
CA003813	Issue Industry OE For Point Beach SI Pump Problem	February 21, 2002
CA003840	Per CAP002264, Document the Scrub Team Activities and Their Findings	February 25, 2002
CA003853	Submit a Licensee Event Report on the TS Shutdown That Resulted From the SI Pump Not Returned to Service Within the 72-Hour Action Statement	February 26, 2002
CA004306	OEs Identified in Attachment D and E of ACE000638 Are to be Entered into NUTRK and Screened as Required	April 15, 2002
CA004309	Sample Closed Operating Experience Items in NUTRK to Ensure They are Adequately Dispositioned	April 16, 2002
CA025380	Complete a Review of a Sampling of Closed OE Items for Unidentified Potential Conditions Adverse to Quality	May 23, 2002

CA025382	Develop a Human Performance Model	May 23, 2002
CA025389	Provide Engineers Additional Training on the Principles of Gas Separation and Its Potential Effects on Plant Equipment and Operations	May 23, 2002
CA025390	Provide Operators Additional Training on the Principles of Gas Separation and Its Potential Effects on Plant Equipment and Operations	May 23, 2002
CA025392	Expand the Equipment Reliability Initiative to Include a Focus on Reinforcing Behaviors, the Decision-Making Process, and Standards and Principles Needed to Establish the Appropriate Threshold and Response to Equipment Issues	May 23, 2002
CA025393	Implement Periodic System Health Reports and Disseminate Stationwide	May 23, 2002
CA026014	Incorporate the SI Pump Failure Event, the Lessons Learned, and the Behavioral Principles in Place at High Performing Organizations Into a Case Study	August 8, 2002
CA026016	Develop and Implement a Formal “Troubleshooting” (Problem Resolution) Process that Includes Industry Standard Methodology	August 8, 2002
CA026017	Provide Senior Reactor Operators an Improved Tool to Use When Conducting the Prompt Operability Screening of an Equipment Related CAP	August 8, 2002
CA026018	Strengthen the Corrective Action Program to Include Clear Direction for the Conduct of the Plant Manager Led AR Screening	August 8, 2002
CA026020	Strengthen NP 2.1.4, Operator Workarounds, Workaround Definition and Criteria so That Equipment Issues of This Same Nature Are Identified, Captured, Evaluated, and Addressed	August 8, 2002

CA026021	Strengthen the Station “Work Order” Process (NP 10.2.4) With Appropriate Crossties With the New Equipment Issue “Troubleshooting” (Problem Resolution) Process	August 8, 2002
CA026022	Incorporate Lessons Learned From This Event Into Accredited Continuing Training Program, Including Operations and Engineering	August 8, 2002
CA026023	The 2002 Annual Assessment of the Operating Experience Program Will Include Samples of Evaluation Quality, and Due Date/Priority Assignments	August 8, 2002
CA026024	The 2003 Annual Assessment of the Operating Experience Program Will Include Samples of Evaluation Quality, and Due Date/Priority Assignments	August 8, 2002
CA026025	Complete an Independent Effectiveness Review of the Completed and Proposed Corrective Actions From This Root Cause Evaluation	August 8, 2002
CE000232	Perform a Condition Evaluation Per CAP002294 in Accordance With NP 5.3.1	February 27, 2002
ACE000638	Perform an Apparent Cause Evaluation, per CAP002500, in Accordance With NP 5.3.1	March 14, 2002
ACE000643	Perform an Apparent Cause Evaluation, per CAP002559, in Accordance With NP 5.3.1	March 18, 2002
Design Change Request DCR025379	Complete SI System Modification MR 02-011*A for Unit 1 for Installation of Strategically Located High Point Vents	May 23, 2002
License Amendment Request LAR004110	Evaluate Applicability of Including Periodic Venting of SI System as Part of ITS [Improved Technical Specifications]	March 25, 2002
Maintenance Rule Evaluation MRE000009	Perform MPFF (Maintenance Preventable Functional Failure) Evaluation for 2P-15B Failure of 2/20/2002	March 5, 2002
OTH003814 (Other Item in T-Track)	This Item Tracks Presentation and Acceptance of RCE000044 by CARB	February 21, 2002

Operable But Degraded OBD000011	Evaluate Suspected/Confirmed Accumulator Backleakage for Operability Impact on SI System.	February 21, 2002
Operability Determination OPD-OPR-000011	Gas Binding of SI Pumps	Revision 0-5
Procedure Change Request PCR004492	Revise Procedures as Appropriate to Ensure That: 1) Monthly Venting of Unit 2 SI Lines, and 2) Unit 2 SI Accumulator Leak Rates Are Calculated	May 6, 2002
Significant Operating Experience Report (SOER) 97-01	Potential Loss of High Pressure Injection and Charging Capability from Gas Intrusion	December 6, 1997
Significant Event Notification (SEN) 179	Long-Standing Design Weaknesses and Ineffective Corrective Actions Cause Gas Binding Failures of High Head Safety Injection Pumps	January 29, 1998