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VPNPD-92-342
NRC-92-124

November 5, 1992

Document Control Desk
U.S. NUCLEAR REGULATORY COMMI ION
Mail Station P1-137
Washington, DC 20555

Gentlemen:

DOCKET 50-301
SUPPLEMENTAL LICENSEE EVENT REPORT 92-003-01
ONE TRAIN OF SAFETY INJECTION AND CONTAINMENT SPRAY INOPERABLE
DUE TO FOREIGN MATERIAL
POINT BEACH NUCLEAR PLANT, UNIT 2

Enclosed is Supplement 1 to Licensee Event Report 92-003-00 for Point Beach Nuclear Plant, Unit 2. This report describes an event which occurred on September 18, 1992, during the performance of testing to meet the requirements of ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Systems and Components." Train A of the Unit 2 containment spray system was rendered inoperable due to foreign material blocking the containment spray pump suction during testing. We have determined that the foreign material also rendered Train A of the safety injection system inoperable under certain post-accident modes of operation. This condition likely existed for an entire operating cycle. This occurrence is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B), "any operation or condition prohibited by the plant's Technical Specifications."

Please contact us if you have any questions or desire additional information.

Sincerely,

for

Bob Link
Vice President
Nuclear Power

TGM/jg

cc: NRC Regional Administrator, Region III
NRC Resident Inspector

IE22 1/1

NRC FORM 366 (6-89) U.S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT (LER)

APPROVED OMB NO. 3150-0104
EXPIRES 4/30/92
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1): Point Beach Nuclear Plant, Unit 2

DOCKET NUMBER (2): 0 5 0 0 0 3 0 1

PAGE (3): 1 OF 1 0

TITLE (4): One Train of Safety Injection & Containment Spray Inoperable

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)
0 9	1 8	9 2	9 2	0 0 3	0 1	1 1	0 5	9 2		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9): N

POWER LEVEL (10): 1 0 0

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

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify, in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
20.405(a)(1)(iv)	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: N. L. Hoefert, Manager-Operations

TELEPHONE NUMBER: AREA CODE 4 1 4 7 5 5 - 2 3 2 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
E	BIE	P	1 0 7 1 5	Y							

SUPPLEMENTAL REPORT EXPECTED (14)

[ ] YES (If yes, complete EXPECTED SUBMISSION DATE)

[X] NO

EXPECTED SUBMISSION DATE (15): MONTH | DAY | YEAR

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

ABSTRACT

On September 18, 1992, at 0801, quarterly test IT-06, "Containment Spray Pumps And Valves, Unit 2," was commenced on the "A" train of the containment spray system. This test satisfies the testing requirements for the containment spray system as defined in the Technical Specifications or the ASME Boiler and Pressure Vessel Code, Section XI, "Rules For Inservice Inspection Of Nuclear Power Plant Components." Testing determined that the pump was inoperable. The pump was disassembled. A foam rubber plug was discovered blocking the pump suction. The plug was removed and the pump tested satisfactorily. The plug was determined to have most likely been placed in the residual heat removal system, in a location where under certain post-accident modes of operation, Train A of the containment spray or safety injection systems was inoperable. This condition likely existed during the entire operating cycle. Subsequent testing of the residual heat removal, safety injection and containment spray systems in both PBNP units verified that all systems, except the Unit 2 Train A residual heat removal, containment spray system and safety injection systems remained operable.

Attachment QP 16-5.1

EVENT DESCRIPTION

On September 17, 1992, Annual Test IT-545A, "Leakage Reductions and Preventive Maintenance Program Test of Containment Spray System, Unit 2," was performed on the Point Beach Nuclear Plant (PBNP) Unit 2, containment spray system. This test stipulates a series lineup of a residual heat removal (RHR) system train and the containment spray system train, with the containment spray pump (P-14) suction aligned to the same trains' residual heat removal pump (P-10) discharge. During this test, the residual heat removal pump takes suction from the refueling water storage tank (RWST) and the discharge from the containment spray pump recirculates to the RWST. The test was completed satisfactorily on both the "A" and "B" trains of the RHR and containment spray systems.

After completing the "B" train test, the operators reported a significant difference in the discharge pressures of the "A" train (P-14A) and "B" train (P-14B) containment spray pumps. The recorded discharge pressure for P-14A was approximately 270 psig. The recorded discharge pressure for P-14B was approximately 400 psig. No other abnormalities were noted that would indicate an operational problem with Containment Spray Pump P-14A. A maintenance work request (MWR) was issued on September 17, 1992, to check the calibration of the pressure gauges associated with Containment Spray Pump P-14A. Instrumentation and Control technicians performed the calibration check and found the gauges to be indicating accurately. The next shift of Operations personnel followed up by verifying that the gauge sensing lines were clear. ASME Section XI Quarterly Test IT-06, "Containment Spray Pumps and Valves, Unit 2," was previously scheduled to be performed on the morning of September 18, 1992. Further investigation of the difference in the pressure reading was deferred pending performance of this test.

On September 18, 1992, IT-06 was commenced on Unit 2 Containment Spray Pump P-14A at 0804. A 48-hour Limiting Condition of Operation (LCO) was entered for Containment Spray Pump P-14A in accordance with Technical Specification Section 15.3.3, "Emergency Core Cooling System, Auxiliary Cooling Systems, Air Recirculation Fan Coolers, and Containment Spray," Specification B.2.b, at the start of the test. This test consists of testing each train of the containment spray system individually, with the spray pump suction aligned to the RWST and the discharge recirculating back to the RWST. When Pump P-14A was started, an operator stationed at the pump noted the pump suction pressure was oscillating. The operator contacted the control room and directed them to secure the pump so that the pump casing could be vented. Spray Pump P-14A was secured and a small amount of air was removed from the pump during venting. Following completion of the venting, the control

room was contacted and the pump restarted. The operator stationed at Pump P-14A noted that the pump discharge pressure was zero. He again contacted the control room and the pump was secured for venting. No air was removed from the pump casing during this second venting operation. The pump was subsequently started for the third time. The operator noted abnormal noise emanating from the pump. Test IT-06 was aborted at 1130 and system lineups returned to normal. Pump P-14A was secured and declared inoperable effective 0804.

Containment spray pump P-14A was disassembled and a foam rubber plug was found blocking the pump suction. The plug was removed and the pump reassembled. The pump was subsequently tested satisfactorily. Pump P-14A was declared operable at 1923 on September 19, 1992.

An incident investigation team was chartered to investigate this event and determine appropriate corrective action. The team could not conclusively determine the origin of the foam rubber plug. However, the team determined that the plug was most likely utilized as a temporary cleanliness barrier during modifications to the RHR system, performed during the fall 1991 Unit 2 refueling outage. These modifications installed full flow test lines in response to NRC Bulletin 88-04, "Potential Safety-Related Pump Loss." The investigation team concluded that the plug was most likely placed in the portion of the line between the Train A RHR pump discharge to the Train A containment spray pump and safety injection pump suction. In this location the foam rubber plug could have rendered the Train A containment spray pump or safety injection pump inoperable when operated with pump suction aligned to the RHR pump discharge.

EQUIPMENT DESCRIPTION

The purpose of the containment spray system is to provide water spray to the containment atmosphere following a design basis loss of coolant accident. This water spray serves to cool the containment atmosphere, thereby controlling the internal containment pressure, and to remove elemental iodine from the containment atmosphere should it be released to the containment atmosphere from damaged reactor fuel. The system is actuated on a Hi-Hi containment pressure signal. The containment spray system consists of two pumps, one spray additive tank, spray ring headers and nozzles inside containment and the necessary pumps and valves. The spray pumps normally take suction directly from the RWST.

The purpose of the safety injection system is to provide borated water to cool the reactor core and ensure reactor shutdown in response to a loss of coolant accident. The safety injection system consists of two

pumps, concentrated boric acid storage tanks and the necessary piping and valves. The safety injection pumps normally take suction from the RWST.

The spray pumps and safety injection pumps can be aligned to take suction from the discharge of the RHR pumps during the long-term recirculation phase of reactor core and containment cooling. During this phase, the RHR pumps take suction from the containment sump and discharge through the RHR heat exchangers back to the reactor coolant system. A portion of this flow can be directed to the containment spray pump and safety injection pump suctions.

The containment spray pumps are horizontally mounted, single stage, centrifugal pumps designed to provide 1200 gpm at 300 psig. The pumps are manufactured by Ingersoll-Rand.

The safety injection pumps are horizontally mounted, multi-stage, centrifugal pumps manufactured by Byron-Jackson.

CAUSE

The spray pump impeller suction was blocked by a foam rubber plug. The origin of the plug could not be conclusively identified by the incident investigation team formed to investigate and recommend corrective actions following this event. However, the investigation team determined that the plug was most likely installed in a portion of the piping between the Unit 2 RHR Pump P-10A discharge and the Containment Spray Pump P-14A and Safety Injection Pump P-15A suctions as a temporary cleanliness barrier during system modifications performed during the Unit 2 Fall 1991 refueling outage, and subsequently not removed. This modification installed test lines allowing full flow testing of the RHR pumps. We committed to install this modification in response to potential concerns with operating pumps at less than manufacturer's recommended minimum flows identified in NRC Bulletin 88-04, "Potential Safety-Related Pump Loss."

CORRECTIVE ACTION

A. Immediate

1. The pump was declared inoperable. The 48-hour LCO in Technical Specification 15.3.3.B.2.b for Containment Spray Pump P-14A had been entered at the 0804 on September 18, 1992, at the start of Test IT-06.

2. The Duty Shift Superintendent (DSS) and Duty and Call Superintendent (DCS) made a determination that there was reasonable assurance that the containment spray system Train B as well as the safety injection and RHR systems remained operable.

B. Short-Term

1. Maintenance Work Request (MWR) 924946 was initiated to investigate the failure of Containment Spray Pump P-14A. The "B" train containment spray pump, P-14B, was tested in accordance with the requirements of Technical Specification 15.3.3.B.2.b prior to initiating maintenance on P-14A. The test was successful.

2. Containment Spray Pump P-14A was disassembled and a foam rubber plug found in the impeller suction. The plug was removed, and the pump reassembled. A modified IT-545A, with flow through the RHR cross-connect line, and IT-06 were completed satisfactorily and the pump declared operable at 1210 on September 19, 1992.

3. The Unit 2 Train B Containment Spray Pump P-14B was tested utilizing IT-06A on September 18, 1992. The test was successful.

4. Additional tests of Unit 2 Containment Spray Pumps P-14A and P-14B were performed on September 19 and 20, 1992, utilizing a modified test procedure IT-545A and IT-06, to test the ability of the pumps to develop full flow with water supplied to the pump suction from the RHR system. The tests were completed satisfactorily.

5. On September 20, 1992, Test IT-06 was completed on Unit 2 Containment Spray Pumps P-14A and P-14B. The tests were completed satisfactorily.

6. A quorum of the Manager's Supervisory Staff (MSS) met on September 21, 1992, to review the event, the results of system testing, and to define additional necessary actions to ensure the operability of the containment spray, RHR and safety injection systems in both PBNP units. The staff determined that there was reasonable assurance that failure of the Unit 2, Train A containment spray pump did not indicate a common-mode failure problem and that these other systems remained operable. Similar modifications had been performed on the Unit 1 systems during the Unit 1 Spring 1992 refueling outage. Additional controls

were implemented in the installation work plan (IWP) for this modification that were not included in the IWP for the Unit 2 modifications. These controls included additional sign-offs by Wisconsin Electric personnel ensuring system cleanliness.

7. The MSS prescribed a testing plan for the containment spray, RHR and safety injection systems in both units to provide additional assurance of the operability of these systems. The following tests were conducted and results achieved:

   a. Radiography was performed on September 21, 1992, on a section of piping from the Unit 2 Train A RHR pump discharge to the Train A safety injection pump suction. No foreign material was detected.

   b. On September 21 and 22, 1992, Unit 2 Safety Injection Pumps P-15A and P-15B were tested with water supplied to the pump suction from the RHR system. The tests were completed satisfactorily.

   c. On September 23 and 24, 1992, testing was performed on the Unit 1 Containment Spray Pumps P-14A and P-14B with water supplied to the pump suction using the Unit 1 RHR system. The tests were completed satisfactorily.

   d. On September 24, 1992, testing was performed on the Unit 1 Safety Injection Pumps P-15A and P-15B with water supplied to the pump suction using the Unit 1 RHR system. The tests were completed satisfactorily.

8. An incident investigation team was chartered to investigate the event in order to determine the root cause. The team completed its investigation and reported to the MSS on October 5, 1992. The team could not conclusively identify the origin of the foreign material. The foam rubber plug was most likely placed into the piping during modifications performed during the Unit 2 fall refueling outage to install full flow test lines in the RHR, containment spray and safety injection systems.

9. Inspections are being performed during the current Unit 2 refueling outage, which commenced September 26, 1992, of portions of the Unit 2 containment spray, RHR and safety injection systems to identify any additional foreign material in these systems. The inspections include, to the extent practicable, the portions of the systems affected by the full flow test line modifications, as well as piping dead legs and

flow restrictions. The inspections are being performed using a combination of borescopic examinations and radiography of the potentially affected piping sections. As of November 4, 1992, the majority of the planned examinations are complete. Small amounts of foreign material discovered are being removed from the system where practicable. Any material that cannot be recovered will be evaluated to ensure system operability. The inspections will be completed during the presently ongoing refueling outage.

10. The interior of the Unit 2 RWST has been inspected using a remote controlled minisub and video camera and by personnel entry. Minor debris was found. The debris included small pieces of tape, herculite, and other material. The debris will be removed prior to the end of the present refueling outage. The debris has been determined to not be safety significant. The MSS has concurred with this determination.

11. Management has reinforced to engineers and supervisors the importance of foreign material controls and the need for specific instructions in the Installation Work Procedures covering work for which they are responsible.

12. Quality Assurance personnel have reviewed all Unit 2 outage modification packages prior to installation specifically for system cleanliness concerns.

13. Maintenance Planners have been instructed to provide specific steps in work plans delineating the appropriate system and component cleanliness controls for the work. Supervisors are required to ensure the requirements of the work plans are properly implemented and documented.

14. The Manager-Maintenance is stressing foreign material control during his refueling outage related weekly meetings with maintenance personnel.

C. Long-Term

1. To address the root cause of foreign material introduction into a system during modification and maintenance, the incident investigation team recommended corrective actions in the areas of improved foreign material control and cleanliness inspections prior to system closing. These recommendations have been evaluated and upgrades to our foreign material control procedures are being implemented. Upgraded procedures are

expected to be approved by November 13, 1992, with full implementation by December 31, 1992. These upgrades include:

a. Maintenance Instruction MI-32.4, "Guidelines For Exclusion Of Foreign Material From Plant Systems," is being replaced by a PBNP procedure to ensure that the procedural requirements are applied to all maintenance and modification work as appropriate.

b. The above procedure will also be upgraded to include foreign material control provisions based on the guidance in the preliminary draft of INPO Good Practice MA-315, "Exclusion Of Foreign Materials."

2. The maintenance group's job observation checklist will be upgraded to specifically include cleanliness controls as an observation area by November 30, 1992.

SAFETY ASSESSMENT

No design basis accident (DBA) presented in the PBNP Final Safety Analysis Report assumes the operation of the containment spray system during the containment sump recirculation mode of operation of the RHR system. PBNP Emergency Operating Procedures (EOPs) do not require the operation of a containment spray pump during the time that the RHR system is operating in the containment sump recirculation mode of operation. However, the EOPs do require the operators to evaluate the need for containment spray during containment sump recirculation. Testing of the containment spray pump performance in accordance with the Inservice Test Program since Unit 2 fall 1991 outage has not indicated any pump abnormalities with containment spray pump suction aligned to the RWST. Therefore, there is reasonable assurance that both trains of containment spray remained operable to perform their function as analyzed for all design basis accidents and as required by the PBNP EOPs.

Due to the suspected origin of the foam rubber plug, if the RHR system was used to provide suction to the safety injection system, the potential existed for the plug to block flow to the Train A safety injection pump (P-15A), thereby rendering Train A inoperable. Both trains of safety injection could not have been rendered inoperable due to train independence.

The design basis accidents for PBNP that assume operation of a safety injection pump in the boosted injection mode or recirculation mode, in which the suction of a safety injection pump is aligned to the discharge of an RHR pump, are the small break loss of coolant accidents (SBLOCA) as analyzed in the PBNP FSAR. Performance testing of the safety injection pumps in accordance with the Inservice Test Program since the fall 1991 outage has not revealed any degradation in pump performance with pump suction aligned to the RWST. Therefore, there is reasonable assurance that both safety injection pumps would have performed their function as analyzed for all DBAs except a SBLOCA. One train of safety injection remained available and was operable in the event of a SBLOCA.

REPORTABILITY

The most probable scenario, the plug being placed in the RHR system during the Unit 2 fall 1991 refueling outage, results in the conclusion the PBNP Unit 2 was made critical and operated for approximately 10 months with an inoperable safety injection train. This is a violation of Technical Specification Section 15.3.3, "Emergency Core Cooling System, Auxiliary Cooling Systems, Air Recirculation Fan Coolers and Containment Spray," Specification A.1.c, which requires two safety injection pumps to be operable prior to taking a reactor critical. The Train A safety injection pump was also inoperable for greater than the allowed outage time in the limiting condition for operation. Specification A.2.b specifies a 24-hour allowed outage time for a safety injection pump. Therefore, this event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B), "any event or condition prohibited by the plant's Technical Specifications."

GENERIC IMPLICATIONS

Foreign material exclusion from systems which are opened for routine or non-routine maintenance and during modifications of systems is essential to ensure system operability. Foreign material introduced into a system during modification and maintenance must be controlled and the appropriate testing and inspections performed during and following modification and maintenance to ensure system operability.

SIMILAR OCCURRENCES

A review for similar occurrences at PBNP has identified other incidents of foreign material intrusion into systems including the secondary side of the steam generators and the reactor coolant system. Evalu tions which were performed for these previous events concluded that a safety concern did not result. None of the previous occurrences were found to be reportable.