U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 50-282, 50-306
License Nos: DPR-42, DPR-60

Report No: 50-282/96016, 50-306/96016

Licensee: Northern States Power Company

Facility: Prairie Island Nuclear Generating Plant

Location: 1717 Wakonade Drive East
Welch, MN 55089

Dates: November 20, 1996 - January 7, 1997

Inspectors: S. Ray, Senior Resident Inspector
J. Lara, Resident Inspector, Monticello
E. Plettner, Reactor Engineer
A. Stone, Senior Resident Inspection, Monticello

Approved by: J. Jacobson, Chief
Reactor Projects Branch 4

EXECUTIVE SUMMARY

Prairie Island Nuclear Generating Plant, Units 1 & 2
NRC Inspection Report 50-282/96016, 50-306/96016

This inspection included aspects of licensee operations, maintenance, engineering, and plant support performed by the resident inspectors.

Operations

- The inspectors observed that the conduct of routine plant operations was generally acceptable. Operators were attentive and knowledgeable of plant conditions. Shift turnover meetings were thorough but concise. Prejob briefings were usually good. (Section O1.1)

- Failure of a system engineer and two licensed operators to adequately self-check when specifying a return to service valve position resulted in an inadvertent dilution of the reactor coolant system. (Section O1.2)

- Operators were observant of plant conditions and detected the inadvertent dilution in a timely manner. (Section O1.2)

- The inspectors found examples of administrative weaknesses in the control of temporary instructions. (Section O3.1)

Maintenance

- Inspector observed maintenance and surveillance activities were well conducted with good communications, proper pre-job planning, safe work practices, and excellent coordination between departments. (Section M1.1)

- Failure of an operator to adequately self-check before closing a valve resulted in an unanticipated auto-start of an component cooling water pump. (Section M1.2)

- The inspectors found numerous examples of surveillance procedures which did not conform to the licensee's writer's guide. (Section M3.1)

- The inspectors identified that a Licensee Event Report was missing some required information regarding a previous similar event. (Section M8.1)

- Failure to adequately self-check on the part of several licensee personnel resulted in a required surveillance test being missed. (Section M8.2)

Engineering

- The inspectors identified that the licensee's safety evaluation of a problems with the emergency intake line was inadequate in that it didn't review the seismic capability of the sluice gates. (Section E1.1)

- The licensee reported that the spent fuel storage racks were outside the design basis due to Boraflex degradation. (Section E8.1)

Plant Support

- The licensee reported that an individual's security access should have been revoked following a determination of questionable fitness for duty. (Section S8.1)

Report Details

Summary of Plant Status

Both units operated at or near full power for the entire inspection period except for brief power reductions for various testing and maintenance activities. On January 7, 1997, Unit 2 reached the "all control rods fully withdrawn" condition and began a gradual power coastdown toward a refueling outage. During this inspection period the sixth dry cask was loaded with spent fuel and was being prepared for transport to the Independent Spent Fuel Storage Installation at the end of the inspection.

I. Operations

O1 Conduct of Operations

O1.1 General Comments

a. Inspection Scope (71707)

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of plant operations. These reviews included observations of control room evolutions, shift turnovers, operability decisions, logkeeping, etc. Updated Safety Analysis Report (USAR) Section 13, "Plant Operations," was reviewed as part of the inspection.

b. Observations and Findings

The inspectors noted that control room operators were attentive to their panels and knowledgeable of plant conditions and activities in progress. Communications were consistently clear. Shift turnover briefings were thorough but concise. Prejob briefings for infrequent or complex evolutions were excellent.

c. Conclusions

The inspectors observed that the conduct of routine plant operations was generally acceptable. A problem with an inadvertent boron dilution of the reactor coolant system is discussed in the next section and a problem with operators performing a surveillance activity is discussed in Section M1.2 of this report.

O1.2 Inadvertent Boron Dilution of the Reactor Coolant System

a. Inspection Scope (92901)

On December 31, 1997, the licensee experienced an inadvertent boron dilution of the reactor coolant system while operating Unit 1 at full power. The inspectors conducted a followup inspection of the event.

The inspectors reviewed USAR Sections 10.2.3, "Chemical and Volume Control System," and 14.4.4, "Chemical and Volume Control System Malfunction," as part of this inspection.

b. Observations and Findings

The licensee was in the process of restoring the letdown purification system lineup after completing valve work under work order (WO) 9614859. The system engineer listed the incorrect restoration position (open) for valve VC-11-48, "Letdown Line to 11 & 12 Deboration Demin." The valve was normally closed except when deborating the reactor coolant system. The lead reactor operator and shift supervisor who approved the restoration failed to notice the incorrectly specified position.

Before conducting the restoration procedure, a prejob briefing was held in the control room. Operators discussed that they would expect to see some dilution when the procedure was performed because the mixed bed demineralizer had cooled down and would be more efficient at removing boron until it heated up. When the restoration was completed, reactor power began to increase as expected and the operators added boric acid to compensate. However, after about an hour, it became apparent that more dilution than was expected was occurring.

In addition to restoring normal letdown flow through the mixed bed demineralizer, the fact that VC-11-48 was incorrectly opened allowed a parallel flow path through the deborating demineralizers. After about another hour the operators determined the cause for the dilution and corrected the lineup.

During the entire time, control room operators closely monitored plant conditions and added boric acid as necessary to compensate for the dilution. Reactor power increased slightly due to the dilution. The inspectors verified that peak thermal power during the shift had not exceeded 100.6% and that the average power for the shift was less than 100% of rated thermal power. The inspectors reviewed licensee Technical Specification Interpretation LIC-1, "100% Full Power Operation," Revision 1, and determined that thermal power had been maintained within management expectations.

The licensee issued a employee observation report to document the event and the general superintendent operations ordered an investigation by the Error Reduction Task Force to determine the cause and recommend corrective actions. This event is considered an Unresolved Item pending further NRC review of the cause and safety significance. (282/96016-01)

c. Conclusions

During this event, operators were closely monitoring plant conditions and maintaining reactor thermal power within licensee guidelines. Recognition and correction of the incorrect valve alignment was considered timely. However, a system engineer and two licensed operators failed to notice that the incorrect valve position had been

specified on the restoration lineup. This is an example of inadequate self-checking similar to others discussed later in this report.

03 Operations Procedures and Documentation

03.1 Temporary Instructions

a. Inspection Scope (92901)

The inspectors reviewed the licensee's program for the control of temporary operational information. Included in the inspection was a review of all outstanding temporary instructions in the Master Operations Notebook.

b. Observations and Findings

Operations Section Work Instruction SWI O-19, "Control of Supplemental Information," Revision 23, contained the requirements for maintaining temporary instructions. Section 6.1.3 of SWI O-19 stated, "Temporary instructions **SHALL NOT** be used in place of procedural guidance." The inspectors identified two temporary instructions, numbers 96-72 and 96-105, that appeared to be of a permanent nature and should have been issued as changes to existing plant procedures or as new procedures rather than temporary instructions.

Section 6.1.5 of the SWI O-19 stated, "Temporary instructions **SHALL** be reviewed by the Shift Manager on a monthly cycle to verify the validity and need for each one. Instructions which are obsolete or no longer necessary **SHALL** be withdrawn from the Master Operations Notebook and placed in a historical file for future reference." The inspectors noted that there was no documentation to verify that the monthly review was being accomplished. The inspectors identified one temporary instruction, number 96-81, that was no longer necessary by plant conditions but was still active in the log.

c. Conclusions

SWI O-19 was not a procedure required to be followed by Technical Specification 6.5, "Plant Operating Procedures," nor were the temporary instructions considered "activities affecting quality" in accordance with 10 CFR 50, Appendix B, Criterion V. Thus this failure to follow the section work instruction was not considered a violation of regulatory requirements. However, the inspectors noted administrative weaknesses in the control of supplemental information as discussed above. The weaknesses were discussed with licensee management and appropriate corrective actions were initiated.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (61726, 62707)

The inspectors observed all or portions of the following maintenance and surveillance activities. Included in the inspection was a review of the surveillance procedures (SP) or work orders (WO) listed as well as the appropriate Updated Safety Analysis Report (USAR) sections regarding the activities.

- SP 1035B Reactor Protection Logic Test at Power - Train B, Revision 22
- SP 1089 Residual Heat Removal Pumps and Suction Valves from the Refueling Water Storage Tank, Revision 43
- SP 1106C 121 Cooling Water Pump Test, Revision 8
- SP 1528 Backflush of Emergency Bay Intake Pipe, Revision 19
- SP 2035 Reactor Protection Logic - Train A, Revision 26
- SP 2093 D5 Diesel Generator Slow Start Test, Revision 63
- SP 2219 Monthly 4KV Bus 26 Undervoltage Relay Test, Revision 25
- SP 2305 D6 Diesel Generator Slow Start Test, Revision 8
- WO 9406976 Wire Code Changes at Fan Motors
- WO 9611746 Test Imp In Control System 1EH
- WO 9612115 #11 CC Pump Autostart Pressure Switch Calibration
- WO 9612116 #12 CC Pump Autostart Pressure Switch Calibration
- WO 9612834 Intermediate Block Relay Repair

c. Conclusions

Inspector observed maintenance and surveillance activities were well conducted with good communications, proper pre-job planning, safe work practices, and coordination between departments. The inspectors noted system engineer involvement in all phases of maintenance and surveillance activities.

M1.2 Operator Error During Surveillance Test

a. Inspection Scope (92902)

On December 5, 1996, while performing post maintenance testing on Unit 2 residual heat removal (RHR) pump #22, an operator error caused an unanticipated start of Unit 2 component cooling (CC) water pump #21. The inspectors reviewed the circumstances of the event. The inspectors also reviewed USAR Section 6.2, "Safety Injection System," as part of the inspection.

b. Observations and Findings

The licensee was performing surveillance procedure (SP) 2089, "Residual Heat Removal Pumps and Suction Valves From the Refueling Water Storage Tank," Revision 47, when the operator incorrectly closed the component cooling (CC) heat exchanger cross connect valve, MV-32122. Closing of the valve resulted in an auto start of the #21 CC water pump.

The instructions contained in step 7.3.21 of SP 2089 were, "Return CC pumps to normal as directed by Shift Supervisor. IF stopping a CC pump, THEN record CC Pump No. AND Stop Time." The procedure does NOT contain instructions to secure the CC heat exchanger inlet valve, MV-32160, after the CC pump has been secured but that is a normal operator action. The operator attempted to close valve MV-32160 but inadvertently closed MV-32122 instead. The control switches for the two valves were in close proximity and had similar names.

The licensee determined the cause of the event was primarily the failure of the operator to adequately self-check to verify that he was operating the correct valve. A contributing cause was that procedure 2089 did not contain detailed steps for securing the CC pump after the test. The licensee has completed an Error Reduction Task Force investigation of the event and was addressing those deficiencies.

c. Conclusions

The failure of the operator to adequately self-check the valve manipulation was another example of similar failures discussed elsewhere is this report. The licensee has initiated corrective actions in response to a recent cited violation in this area.

The failure to have an adequate procedure was considered a violation of Technical Specification 6.5.A.4 which required that detailed written procedures for surveillance and testing which could affect nuclear safety be prepared and followed. The licensee has implemented a corrective action to review and correct all of the procedures that contain CC pump action statements.

Although it was an unnecessary challenge to a safety system, the event was not safety significant. All equipment performed as expected. This licensee-identified violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the NRC Enforcement Policy. (306/96016-02)

The Licensee Event Report for this event is discussed in Section M8.1 of this report.

M3 Maintenance Procedures and Documentation

M3.1 Review of Surveillance Procedures

a. Inspection Scope (92902)

In addition to reviewing the surveillance procedures (SPs) listed in Section M1.1 of this report, the inspectors conducted an in-office review of the following SPs:

- SP 1054 Turbine Stop, Governor and Intercept Valve Test, Revision 16
- SP 1090 Containment Spray Pump and Spray Additive Valve Test, Revision 46
- SP 2103 22 Turbine-Driven Auxiliary Feedwater Pump Once Every Refueling Shutdown, Revision 27
- SP 2143 Feedwater Isol And FW Pump Trip Verification, Revision 9
- SP 2250 Test of the Reactor Trip Breakers Using the Main Control Board Switches, Revision 9

b. Observations and Findings

The inspectors noted that all of the SP procedures reviewed had deficiencies when compared to the standards prescribed in the licensee procedures H14, "Procedure Writer's Guide," Revision 6, and H14.4, "Surveillance & Periodic Test Procedure Guideline," Revision 6. Examples of the deficiencies included the following:

- Notes in procedure steps that should have been in the Prerequisites section
- Notes that contained action requirements that should have been steps in the procedure
- Notes that should have been cautions
- Lack of place keeping aids to help track completed steps
- Lack of expected parameters to assist personnel in identifying possible degraded conditions
- Insufficient information to successfully complete the task without assistance from other more experienced personnel
- Insufficient space for data entries required by the procedure
- Lack of required information in Personnel and Special Equipment Requirements section
- Inconsistencies in capitalization, punctuation, bolding, and other format errors

The inspectors discussed the procedural weaknesses with licensee management and provided examples.

c. Conclusions

All of the surveillance procedures that failed to meet licensee's procedure writing guidance had been reviewed by the Operations Committee

and approved by a member of licensee management. The large number of weaknesses observed indicated a significant lack of attention to the format of the procedures. Although the procedures could be performed as written, the inspectors were concerned that surveillance procedures in and incorrect format could lead to operator errors. .

The writer's guide was not a procedure required to be followed by Technical Specification 6.5, "Plant Operating Procedures." Thus the failure to write surveillance procedures in the correct format was not considered a violation of regulatory requirements. However, the inspectors noted weaknesses in the licensee's administrative control and review program as discussed above.

M8 Miscellaneous Maintenance Issues (92700, 92902)

M8.1 (Open) Licensee Event Report (LER) 306/96-03: Auto-start of 21 Component Cooling Water Pump due to Personnel Error. This event was discussed in Section M1.2 of this report and was considered a Non-Cited Violation.

While reviewing the LER, the inspectors noted that "Previous Similar Events" section did not reference LER 282(306)/96-16, "Auto-start of No. 11 Component Cooling Water Pump Due to Personnel Error," which reported a very similar recent event. The inspectors discussed the missing reference with the licensing engineer who stated that it was an oversight.

10 CFR 50.73, Section (b)(5), required that the LER content shall reference any previous similar events at the same plant that are known to the licensee. Failure to include LER 282(306)/96-16 as a previous similar event in LER 306/96-03 was a violation. This failure constitutes a violation of minor significance and is being treated as a Non-Cited Violation, consistent with Section IV of the NRC Enforcement Policy. (306/96016-03)

The LER remains open pending the completion of the corrective actions discussed therein.

M8.2 (Open) Licensee Event Report 306/96-04: Failure to Perform SP-2244, Cycling of Unit 2 Containment Air Sample Valves. This event occurred on April 20, 1996, because operators had inadvertently pulled surveillance procedure SP-2242, "Cycling of Unit 2 Sampling System Valves," from the files to perform instead of the scheduled SP-2244, "Cycling of Unit 2 Containment Air Sample Valves." Thus a quarterly surveillance required by Technical Specification 4.2.A and ASME Section XI was not performed for one quarter.

The licensee discovered the error during a system engineer review of the completed surveillance on December 5, 1996. By that time, SP-2244 had been performed successfully twice in the next two quarters after April 1996, so it was probable that it would have been successful had it been performed on April 20. Thus the event was not considered safety

significant. In addition, the licensee has not had a reportable event involving inadvertently performing the wrong surveillance since 1989 so the event was considered an isolated case. The licensee completed an Error Reduction Task Force investigation of this event and has initiated corrective actions for this and other similar events. This licensee-identified violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the NRC Enforcement Policy. (306/96016-04)

However, licensed operators failed to notice that the wrong surveillance procedure was being performed both when the procedure was pulled from the files and while it was reviewed upon completion. This is another example of inadequate self-checking similar to the events discussed in Sections O1.2 and M1.2 of this report and other recent events referred to in the cover letter for this report. In addition, over seven months elapsed between completion of the surveillance test and the system engineer's review which identified the error. The inspectors discussed this issue with engineering management personnel who stated that the expectation was that successful surveillance tests would be reviewed within one month. That expectation was reinforced with the system engineers as a result of this event.

The LER remains open pending completion of the corrective actions discussed therein.

III. Engineering

E1 Conduct of Engineering

E1.1 Emergency Intake Line Declared Inoperable

a. Inspection Scope (92903)

On November 22, 1996, the inspectors attended an Enforcement Conference between the licensee and NRC associated with Inspection Report 282(306)/96015. The purpose of the conference was to discuss an apparent unreviewed safety question regarding the cooling water emergency intake line.

b. Observations and Findings

During the conference, the inspectors questioned the seismic adequacy of the sluice gates between the circulating water bay and the cooling water bay. Because of the inability of the emergency intake line to the cooling water bay to pass design flow, the licensee had completed Safety Evaluation (SE) 427, Revision 1, which took credit for cooling water suction through the sluice gates for a period of time until the cooling water demand could be reduced to within the capacity of the emergency intake line.

The emergency intake line was designed to remain operable after a seismic event, but it was not clear that the sluice gates were. As a result of the NRC question, the licensee determined that there was no evidence that the sluice gates had been designed to be seismically qualified. The licensee declared the emergency intake line to be inoperable until seismic calculations could be completed.

On November 26, 1996, the calculations were completed and the sluice gates were determined to be able to remain open after a seismic event. The emergency intake line was then declared operable.

c. Conclusions

Licensee engineering personnel failed to consider the seismic adequacy of the sluice gates when they completed the SE which took credit for water flow through the gates after a seismic event. This issue will be evaluated as part of the assessment of the information provided by the licensee in the Enforcement Conference.

E2 Engineering Support of Facilities and Equipment

E2.1 Review of Updated Safety Analysis Report (USAR) Commitments (37551)

While performing the inspections discussed in this report, the inspectors reviewed the applicable portions of the USAR that related to the areas inspected and used the USAR as an engineering/technical support basis document. The inspectors compared plant practices, procedures, and/or parameters to the USAR descriptions as discussed in each section. No new discrepancies were identified.

E8 Miscellaneous Engineering Issues (92700)

E8.1 (Open) Licensee Event Report (LER) 282(306)/96-19: Spent Fuel Storage Racks Outside Design Basis due to Boraflex Degradation.

The licensee reported this event to the NRC via the Emergency Notification System on November 27, 1996, and issued the LER as a followup report on December 20, 1996.

The NRC has been evaluating Boraflex degradation for some time as discussed in Generic Letter 96-04, "Boraflex Degradation in Spent Fuel Storage Racks." The licensee submitted a license amendment request on July 28, 1995, as the lead plant for a proposed Westinghouse methodology to take credit for soluble boron in the spent fuel pool rather than Boraflex. In the interim, administrative controls on the spent fuel pool boron concentration were implemented as discussed in the LER.

The LER will remain open pending further NRC review of the licensee amendment request and responses to Generic Letter 96-04.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls (71750)

During normal resident inspection activities, routine observations were conducted in the areas of radiological protection and chemistry controls using Inspection Procedure 71750. No discrepancies were noted.

P1 Conduct of Emergency Preparedness Activities (71750)

During normal resident inspection activities, routine observations were conducted in the area of emergency preparedness using Inspection Procedure 71750. No discrepancies were noted.

S1 Conduct of Security and Safeguards Activities (71750)

During normal resident inspection activities, routine observations were conducted in the areas of security and safeguards activities using Inspection Procedure 71750. No discrepancies were noted.

S8 Miscellaneous Security and Safeguards Issues (92700)

S8.1 (Open) Licensee Event Report (LER) 282(306)/96-20: An Individual's Security Access Should Have Been Revoked Following Determination of Questionable Fitness. This LER was issued on January 8, 1997, for the licensee's discovery on December 9, 1996, that an employee not assigned to the plant, but who occasionally performed work at the plant, should have had their access suspended in August 1996 when the employee's fitness for duty was questioned.

The error was a result of the issue being handled through the company's employee assistance program but not through the fitness for duty program.

This LER remains open pending a review by an NRC regional security specialist.

F1 Control of Fire Protection Activities (71750)

During normal resident inspection activities, routine observations were conducted in the area of fire protection activities using Inspection Procedure 71750. No discrepancies were noted.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of the licensee management at the conclusion of the inspection on January 9, 1997. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Wadley, Plant Manager
K. Albrecht, General Superintendent Engineering
J. Anderson, Shift Manager
J. Goldsmith, General Superintendent Design Engineering
J. Hill, Manager Quality Services
G. Lenertz, General Superintendent Plant Maintenance
J. Leveille, Licensing Engineer
D. Schuelke, General Superintendent Radiation Protection and Chemistry
M. Sleigh, Superintendent Security
J. Sorensen, General Superintendent Plant Operations

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observations
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 92700:	Onsite Follow-up of Written Reports of Nounroutine Events at Power Reactor Facilities
IP 92901:	Followup - Operations
IP 92902:	Followup - Maintenance
IP 92903:	Followup - Engineering

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

282/96016-01	URI	Inadvertent Boron Dilution of the Reactor Coolant System
306/96016-02	NCV	Operator Error During Surveillance Test
306/96-03	LER	Auto-start of 21 Component Cooling Water Pump due to Personnel Error
306/96016-03	NCV	Failure to Include Previous Similar Event in Licensee Event Report
306/96-04	LER	Failure to Perform SP-2244, Cycling of Unit 2 Containment Air Sample Valves
306/96016-04	NCV	Failure to Perform SP-2244, Cycling of Unit 2 Containment Air Sample Valves
282(306)/96-19	LER	Spent Fuel Storage Racks Outside Design Basis due to Boraflex Degradation
282(306)/96-20	LER	An Individual's Security Asses Should Have Been Revoked Following Determination of Questionable Fitness

Discussed

282(306)/96-16	LER	Auto-start of No. 11 Component Cooling Water Pump due to Personnel Error

LIST OF ACRONYMS USED

ASME	American Society of Mechanical Engineers
CC	Component Cooling
CFR	Code of Federal Regulations
FW	Feedwater
IP	Inspection Procedure
LER	Licensee Event Report
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
PDR	Public Document Room
RHR	Residual Heat Removal
SE	Safety Evaluation
SP	Surveillance Procedure
URI	Unresolved Item
USAR	Updated Safety Analysis Report
WO	Work Order