U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-282/87009(DRP); 50-306/87009(DRP)

Docket Nos. 50-282; 50-306 Licenses No. DPR-42; No. DPR-60

Licensee: Northern States Power Company
414 Nicollet Mall
Minneapolis, MN 55401

Facility Name: Prairie Island Nuclear Generating Plant

Inspection At: Prairie Island Site, Red Wing, Minnesota

Inspection Conducted: May 31 through July 11, 1987

Inspectors: J. E. Hard

M. M. Moser

Approved By: R. Defayette, Chief for
Reactor Projects Section 2B

7/28/87
Date

Inspection Summary

Inspection on May 31 through July 11, 1987 (Reports No. 50-282/87009(DRP); 50-306/87009(DRP))
Areas Inspected: Routine unannounced inspection by resident inspectors of licensee's actions on previous inspection findings, plant operational safety verification, maintenance observations, surveillances, ESF systems walkdowns, refueling outage and restart items, Emergency plan exercise, and followup of Licensee Event Reports.
Results: No violations were identified in the eight areas inspected.

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DETAILS

1. Persons Contacted

**J. Howard, President and Chief Executive Officer
**C. Larson, Vice President Nuclear Generation
**L. Eliason, General Manager Nuclear Plants
**K. Albrecht, Director Power Supply Quality Assurance
**F. Tierney, General Manager, Nuclear Engineering and Construction
**R. Zerban, Manager Corporate Security
**P. Kamman, Superintendent, Nuclear Operations Quality Assurance
**G. Hudson, Administrator, Nuclear Security Services
**P. Hellen, Engineer I
*E. Watzl, Plant Manager
*D. Mendele, General Superintendent, Engineering and Radiation Protection
R. Lindsey, Assistant to the Plant Manager
*M. Sellman, General Superintendent, Operations
D. Schuelke, Superintendent, Radiation Protection
G. Lenertz, General Superintendent, Maintenance
J. Hoffman, Superintendent, Technical Engineering
K. Beadell, Superintendent, Quality Engineering
M. Klee, Superintendent, Nuclear Engineering
R. Conklin, Supervisor, Security and Services
D. Vincent, Project Manager, Nuclear Engineering and Construction
J. Goldsmith, Superintendent, Nuclear Technical Services
*A. Hunstad, Staff Engineer
A. Smith, General Superintendent, Planning and Services
A. Vukmir, Site Services Representative, Westinghouse

The inspectors interviewed other licensee employees, including members of the technical and engineering staffs, shift supervisors, reactor and auxiliary operators, QA personnel, and Shift Technical Advisors.

*Denotes those present at the exit interview of July 14, 1987.

**Denotes Corporate personnel who were visited on July 9, 1987.

2. Licensee Action On Previous Inspection Findings (92701)

IN 87-08 (Closed) Degraded Motor Leads in Limitorque DC Motor Operators. The licensee does not have any limitorque DC motor operators installed.

IN 87-12 (Closed) Potential Problems With Metal Clad Circuit Breakers, General Electric Type AKF-2-25. The licensee does not have any GE AKF type circuit breakers installed in the plant.

3. Operational Safety Verification (71707)

Unit 1 completed a return to 94% power following completion of a refueling outage on June 1, 1987. Near the end of this inspection period on July 10, 1987, Unit 1 was taken off line to inspect the turbine

generator and the reactor tripped while returning to power on July 11, 1987. Unit 2 was base loaded at 100% power except for reductions for surveillance testing.

The inspector observed control room operations, reviewed applicable logs, conducted discussions with control room operators, and observed shift turnovers. The inspector verified operability of selected emergency systems, reviewed equipment control records, and verified the proper return to service of affected components. Tours of the auxiliary building, turbine building and external areas of the plant were conducted to observe plant equipment conditions, including potential fire hazards, and to verify that maintenance work requests had been initiated for equipment in need of maintenance.

On June 8, 1987, with Unit 1 at 92% power and Unit 2 at 100% power, while performing a surveillance test of the No. 22 diesel-driven cooling water pump, the No. 12 diesel driven cooling water pump automatically started on a low cooling water pressure signal. The automatic start was caused when the No. 21 motor-driven cooling water pump failed to develop full flow during the transfer from the No. 22 diesel-driven cooling water pump back to the No. 21 motor driven cooling water pump. The No. 21 motor-driven pump operated normally after venting the pump casing.

At 6:49 p.m. on June 10, 1987, with Unit 1 at 94% power and Unit 2 at 100% power, an earthquake occurred in Southeast Illinois which triggered the plant seismic instrumentation alarm. An unusual event was declared and a thorough survey of plant equipment and structures including inside both containments was performed. No damage was observed, nor was ground motion felt by persons at the plant when the earthquake occurred.

At 2:10 p.m. on June 13, 1987, with Unit 1 at 94% power and Unit 2 at 100% power, the turbine building "A" train steam exclusion system activated during a local heat wave. This activation caused the closure of one of the two steam exclusion dampers in each of the ventilation ducts to the turbine building vital areas. The activation was specifically caused by high temperature in battery room ventilation ducts. The corrective action involved opening the vital area doors and blowing air through the rooms until they were cooled. The affected systems were returned to normal operation at 6:45 p.m.

At 12:54 p.m. on June 19, while Unit 1 was operating at 94% power and Unit 2 was operating at 100% power, emergency diesel generator #1 (DG1) inadvertently started on undervoltage but did not load. The cause appears to have been a personnel error in failure to follow procedures while performing maintenance to replace a malfunctioning undervoltage relay. The undervoltage relay to Bus 26 was removed without the voltage restoration switch being placed in the manual position. DG1 ran for about 15 minutes and then was secured.

At 8:34 p.m. on July 10, 1987, Unit 1 was taken off line to inspect all main generator resistance temperature detectors (RTDs), and to identify the cause of low RTD temperature readings at the #13 stator coil. Repair

was made to a hydrogen cooling tube and the unit was placed on line at 9:45 p.m. on July 11. Shortly after the initial turbine-generator loading, oscillations of feedwater flow, steam generator level, T_{avg} and reactor power occurred, all as a result of the turbine-generator loading. Distractions to the operating crew because of these oscillations caused the crew to neglect to block the power range high flux-low setting trips and the reactor tripped from 25% of full power at 9:59 p.m. All systems responded normally to the trip. The reactor was restarted at 3:33 a.m. on July 12 and the generator was successfully placed on line at 6:19 a.m.

No violations or deviations were identified.

4. Maintenance Observation (62703)

Routine, preventive, and corrective maintenance activities (on safety-related systems and components) listed below were observed/reviewed to ascertain that they were conducted in accordance with approved procedures, regulatory guides, and industry codes or standards, and in conformance with Technical Specifications. The following items were considered during this review: the limiting conditions for operation were met while components or systems were removed from service, approvals were obtained prior to initiating the work, activities were accomplished using approved procedures and were inspected as applicable, functional testing and/or calibrations were performed prior to returning components or systems to service, quality control records were maintained, activities were accomplished by qualified personnel, radiological controls were implemented, and fire prevention controls were implemented.

Portions of the following maintenance activities were observed/reviewed during the inspection period:

- Unit 1 1B Moisture Separator Reheater repair
- No. 2 Emergency Diesel #13 Thrust Bearing Inspection and Replacement

The licensee had recently instituted a program of more frequent bearing inspections on the Fairbanks Morse Emergency Diesel Generators following several preventive maintenance (PM) inspections which found excessive bearing wear. On June 22, 1987, during a bearing inspection on the No. 2 emergency diesel generator, the No. 13 main thrust bearing failed the gap check. Upon disassembly of the bearing the licensee discovered significant degradation and signs of arcing from stray currents. Further investigation found that there was an insulation breakdown on the electrical generator bearing. The #13 diesel bearing had been replaced on March 23, 1987 and had experienced only one fast dry start in addition to normal surveillances prior to the failure. The licensee repaired the electrical generator bearing insulation and replaced the #13 thrust bearing. The No. 2 emergency diesel successfully completed a 24 hour run-in and three hour full load test and was declared operable on June 26, 1987.

No violations or deviations were identified.

5. Surveillance (61726)

The inspector witnessed portions of surveillance testing of safety-related systems and components. The inspection included verifying that the tests were scheduled and performed within Technical Specification requirements, observing that procedures were being followed by qualified operators, that Limiting conditions for Operation (LCOs) were not violated, that system and equipment restoration was completed, and that test results were acceptable to test and Technical Specification requirements.

Portions of the following surveillances were observed/reviewed during the inspection period:

- SP 2186 D2 Diesel Generator Operability Test
- SP 1001 Daily Radiation Monitoring System Check
- SP 1002a Unit 1 Daily Reactor Coolant System Leak Rate Surveillance
- SP 1728 Siren Cancel Test
- SP 2102 Turbine Driven Auxiliary Feedwater Pump (TDAFW) Monthly Test
- SP 1054 Turbine Stop, Governor, and Intercept Valve Test

On June 18, 1987, during a monthly surveillance of the Unit 1 Safety Injection System (SI), with the reactor at 94% power, the 11 SI pump failed to start when the start signal was initiated at the control room. Investigation determined that the SI pump circuit breaker was not fully racked in and that this condition may have existed for approximately 27 days. Plant technical specifications require both SI pumps to be operable with Reactor Coolant System (RCS) temperature greater than 200 degrees F except that one SI pump may be inoperable for up to 24 hours. This violation is the subject of special Inspection Report No. 282/87011(DRP).

On July 2, 1987, during a review of completed surveillances, the licensee discovered that the following monthly surveillances had been performed late:

- SP-1015 4 KV voltage and frequency test
- SP-1218 4.16 KV safeguards bus 15 undervoltage relay test
- SP-1219 4.16 KV safeguards bus 16 undervoltage relay test

Specifically, SP-1015 was due at the very latest on June 25 but was not performed until June 29. SP-1218 and SP-1219 were both due no later than June 23, but were actually performed on June 29. These late surveillances are the only instances of this type of problem in nearly two years. The problem arose during and as a direct result of the transfer of surveillance administration from one member of the technical staff to another, and therefore is not expected to be a persistent problem. No notice of violation will be issued since this item was identified and reported by the licensee, fits in Severity Level V, was

not a violation that could reasonably be expected to have been prevented by the licensee's corrective action for a previous violation, and adequate corrective actions were taken.

6. ESF System Walkdown (71710)

The inspector performed a complete walkdown of the accessible portions of both Emergency Diesel Generator systems. Observations included confirmation of selected portions of the licensee's procedures, checklists, plant drawings, verification of correct valve and power supply breaker positions to insure that plant equipment and instrumentation are properly aligned, and local system indication to insure proper operation within prescribed limits.

No violations ore deviations were identified.

7. Outage and Restart Items (71711)

A licensee sponsored Probability Risk Analysis (PRA) recommendation formed the basis for 11 Turbine Driven Auxiliary Feedwater Pump (TDAFW) Modification 86L898 which involved changes to the TDAFW Lubrication Oil Cooling System. This modification was completed during the Unit 1 refueling outage in May, 1987.

During the course of the Unit 1 outage, routine Preventive Maintenance (PM) was performed on 11 TDAFW pump and in addition, special motor operated valve testing was also performed as required by IE Bulletin 85-03. In order to verify operability of the 11 TDAFW pump following completion of the modification, and also to complete the PM requirement, the pump was tested on May 16, 1987 and was found to develop only 200 PSIG discharge pressure instead of the expected 1,680 PSIG discharge pressure. 11 TDAFW pump was declared inoperable and subsequent disassembly disclosed that the pump suction was plugged by broken clamshells and cooling water sludge. The pump was cleaned, inspected, selected parts replaced, reassembled, lines flushed and successfully tested and declared operable on May 27, 1987. Technical Specification 3.4.A.2.f requires that essential features including system piping, valves, and interlocks directly associated with auxiliary feedwater be operable when the Reactor Coolant System is above 350 degrees F. It appears that the cooling water system which is the ultimate reactor heat sink from the Mississippi River water may not have been available through the 11 TDAFW pump. Pending investigation of this matter, this is an Unresolved Item (282/87009-01(DRP)).

During the Unit 1 startup on May 28, 1987, a power calibration performed at an indicated power of 34.9% showed that the actual reactor power was 45.7%. Licensee investigation of this discrepancy is in progress. On July 10 the resident inspectors were informed that the discrepancy may have caused a violation of Technical Specification Paragraph 2.3.A.1.b; namely, the high flux power range low set point reactor trip may have exceeded 25% of rated power. Pending further investigation, this is an Unresolved Item (282/87009-02(DRP)).

No violations or deviations were identified.

8. Emergency Plan Exercise (82301)

The annual exercise required by the NRC was conducted on July 7, 1987. Selected parts of this exercise were observed by the two resident inspectors. The simulated event was loss of the Residual Heat Removal (RHR) system during spent fuel movement with subsequent dropping and damage to a fuel assembly with simultaneous failure to isolate the containment inservice purge. A postulated offsite release of radioactive material was one consequence of this event. Also, a simulated injury in a contaminated area (the containment) required the mobilization of a search and rescue team. The Emergency Action Levels declared in this exercise were Notification of Unusual Event and Alert. Participants were limited to Northern States Power Company employees although practice notifications were made to state, local, and NRC emergency organizations. Performance of the licensee during the drill was judged to be excellent.

Following are some observations made to the licensee by the resident inspectors during the critique meeting:

1. There was some question as to when the Alert actually was declared, at 8:56 a.m. or 9:00 a.m. Both times were used by different participants.

2. Despite the four minute difference, state and local emergency organizations were notified within 15 minutes and the NRC notified within one hour, as required.

3. Noise levels from the ventilation system are high in the Technical Support Center (TSC). Normal conversations are made difficult, particularly if the conversers are more than a few feet apart.

4. Direct measurement of water temperature in the reactor cavity does not seem to be possible with existing instrumentation. A permanently installed temperature measuring device should be considered.

5. Some problems were experienced with the Emergency Response Computer System (ERCS) in the TSC when attempting to put up certain displays. The cause of the problem should be determined and corrected.

6. Control room participants could have been briefed more frequently by the Shift Supervisor in charge.

7. The Shift Emergency Communicator had difficulty reaching the Shift Supervisor to confirm that the NRC had been notified of the Alert condition. A procedure change may be warranted to assure that the Shift Supervisor is not burdened with this administrative detail.

8. The four phones set aside for the use of NRC representatives in Training Room #7 near the EOF have numbers on three different exchanges, 330, 388, and 839. The procedures to use these phones are different for each of these exchanges. The resident inspectors have suggested specific instructions to be posted near these phones.

9. The Headquarters Emergency Center Recovery Manager was present in the Emergency Operation Facility (EOF). If this practice is to continue, then some permanent location in the EOF with an appropriate telephone should be provided for that individual.

9. Licensee Event Reports Followup (92700)

Through direct observations, discussions with licensee personnel, and review of records, the following event reports were reviewed to determine that reportability requirements were fulfilled. The resident inspectors will continue to follow these to assure that corrective action was accomplished and that corrective action will be taken to prevent recurrence.

(Open)	282/87006-LL	Auto-Start of No. 12 Auxiliary Feedwater Pump
(Open)	282/87007-LL	Failure of No. 11 Turbine Driven Auxiliary Feedwater Pump (Voluntary)
(Open)	282/87008-LL	Auto-Start of No. 12 Diesel Driven Cooling Water Pump
(Open)	282/87009-LL	Failure of the No. 11 Safety Injection Pump to Start
(Open)	282/870010-LL	Auto-Start of the No. 1 Emergency Diesel Generator
(Open)	282/870011-LL	No. 2 Emergency Diesel Generator 13 Thrust Bearing Replacement (Voluntary)

10. Meetings With Corporate Management (30702)

On July 9, 1987 the Senior Resident Inspector met with the NSP officials identified in Paragraph 1. above at the Corporate offices in Minneapolis. The following subjects were discussed:

1. Upcoming Enforcement Conference
2. New NSP Headquarters Emergency Center (including tour of the center).
3. Recent requalification exams
4. Plant organization
5. Auxiliary feedwater pump problems
6. Nuclear plant aging
7. Emergency battery room temperatures
8. Security matters

11. Exit Interview (30703)

The inspectors met the licensee representatives denoted in Paragraph 1 at the conclusion of the inspection on July 14, 1987. The inspectors discussed the purpose and scope of the inspection and the findings.

The inspectors also discussed the likely information content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify any document/processes as proprietary.