March 18, 1999

Mr. M. Wadley
President, Nuclear Generation
Northern States Power Company
414 Nicollet Mall
Minneapolis, MN 55401

SUBJECT: PRAIRIE ISLAND INSPECTION REPORT 50-282/99001(DRP); 50-306/99001(DRP)

Dear Mr. Wadley:

On February 25, 1999, the NRC completed an inspection at your Prairie Island Nuclear Generating Plant. The enclosed report presents the results of that inspection.

The inspection period was characterized by generally good operations, conservative decision-making, and safe maintenance and surveillance test activities with good interdepartmental coordination and communication. Operators made one error when they failed to ensure that a required surveillance test had been completed before withdrawing control rods. An independent assessment of the readiness for dry fuel cask loading resulted in several useful findings and suggestions that were being appropriately addressed.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

Sincerely,

/s/ R. D. Lanksbury

Roger Lanksbury, Chief
Reactor Projects Branch 5

Docket Nos. 50-282; 50-306
License Nos. DPR-42; DPR-60

Enclosure: Inspection Report 50-282/99001(DRP); 50-306/90001(DRP)

cc w/encl: Plant Manager, Prairie Island
K. Sanda, Commissioner, Minnesota Department of Public Service
State Liaison Officer, State of Wisconsin
Tribal Council, Prairie Island Dakota Community

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos:	50-282, 50-306
License Nos:	DPR-42, DPR-60
Report No:	50-282/99001(DRP); 50-306/99001(DRP)
Licensee:	Northern States Power Company
Facility:	Prairie Island Nuclear Generating Plant
Location:	1717 Wakonade Drive East Welch, MN 55089
Dates:	January 15 through February 25, 1999
Inspectors:	S. Ray, Senior Resident Inspector P. Krohn, Resident Inspector S. Thomas, Resident Inspector P. Lougheed, Reactor Inspector
Approved by:	Roger Lanksbury, Chief Reactor Projects Branch 5 Division of Reactor Projects

EXECUTIVE SUMMARY

Prairie Island Nuclear Generating Plant, Units 1 & 2
Prairie Island Inspection Report 50-282/99001(DRP); 50-306/99001(DRP)

This inspection was performed by the resident inspectors and included aspects of licensee operations, maintenance, engineering, and plant support. A regional engineering inspector also provided some inspection followup support.

Operations

- Conduct of operations was generally good. Licensee management made a conservative decision to shut down Unit 2 to repair a power range nuclear instrument cable and small leaks in secondary-side steam generator manways. During the shutdown, good supervisory oversight and prompt response to increasing turbine vibrations were noted. (Section O1.1)

- Inconsistent control room control board monitoring was illustrated by two opposing examples. Very good monitoring was illustrated by the lead reactor operator noticing, without the benefit of a turbine runback alarm, that turbine power was decreasing because of an actual 2.2-second runback. Weak monitoring occurred when, until pointed out by the inspectors, a number of operators did not notice that an extra reactor protection system control board indication was locked in as the result of removing nuclear instrument system channel 2N44 from service. (Section O1.1)

- Activities of the safety audit (offsite review) committee observed by the inspectors met the requirements of the Technical Specifications. (Section O7.1)

- Licensee management proactively commissioned an independent assessment of its readiness for dry cask loading activities. The assessment resulted in several beneficial findings and suggestions. Management's response to the assessment results was appropriate and actions were initiated to resolve the concerns prior to loading the cask. (Section O7.2)

Maintenance

- The 12 maintenance and surveillance test activities observed by the inspectors were well planned, used approved maintenance or surveillance test procedures, and involved personnel who exhibited safe work practices. Good coordination and communication between different departments was a strength common to all of the activities. (Section M1.1)

- Operators failed to ensure that a required Technical Specification surveillance test of the source range high neutron flux trip function had been completed prior to closing the reactor trip breakers and withdrawing the shutdown banks of control rods. The possibility of just such an error occurring had been identified three months earlier, but a temporary procedure change issued to prevent the problem was not sufficiently clear. The failure to perform the required surveillance test was a non-cited violation. (Section M1.2)

- Based on an inspection of the material condition of about 60 motor-operated valves, the inspectors concluded that adequate preventive maintenance was being accomplished. Some minor oil leakage was noted and was being addressed by the licensee. (Section M2.1)

- The inspectors conducted an extensive common-cause failure review of 20 risk-significant, safety-related components. The review included system/component walkdowns and maintenance history searches. No evidence of common-cause failure modes were identified by the inspectors. (Section M2.2)

Engineering

- The inspectors identified a minor error in the Updated Safety Analysis Report description of refueling water storage tank level instrumentation. The error had no safety significance for actual plant operation and will be corrected by the licensee. (Section E3.1)

- Fuel oil consumption calculations for the D1 and D2 emergency diesel generators had not been updated when anticipated accident loading was changed in the Updated Safety Analysis Report. The licensee determined that the design basis fuel oil storage requirements were still met and initiated actions to update the calculations. (Section E3.2)

Plant Support

- The licensee's evaluation of the Notification of Unusual Event associated with the loss of the 1M transformer was insightful and contained several good recommendations. (Section P1.1)

Report Details

Summary of Plant Status

Unit 1 operated continuously at or near full power for the entire inspection period. Unit 2 operated at or near full power until a voluntary outage on February 6, 1999. The unit was taken to hot shutdown to repair the 2N44 power range nuclear instrument system (NIS) detector cable) and manway cover leaks on the 22 steam generator, and to perform other miscellaneous work. Unit 2 was restarted on February 7, reached full power on February 8, and operated at or near full power for the remainder of the inspection period.

I. Operations

O1 Conduct of Operations

O1.1 General Comments

a. Inspection Scope (71707)

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

b. Observations and Findings

- On January 19, 1999, the inspectors compared the actual annunciator and bistable status lights received as a result of removing the Unit 2 power range NIS channel 2N44 from service with those described in Instrument Failure Guide, 2C51.4, “Power Range Nuclear Instrument N44 - Low,” Revision 12. Power range NIS channel 2N44 had been removed from service on January 13, because of intermittent noise problems associated with the lower uncompensated ion chamber detector. Since no procedure existed which explicitly described removing an NIS channel from service, the procedure for nuclear instrument failure, 2C51.4, was used. Instrument Failure Guide 2C51.4 described the steps necessary to realign the reactor protection system for one-out-of-three coincidence logic vice the normal two-out-of-four logic.

  During the comparison, the inspectors noticed that bistable status light 44512-0404, “PWR RNG HI F RATE NC 44 U/K [Power Range High Flux Rate Instrument Bistables 44U and 44K],” was illuminated but was not discussed in 2C51.4. The inspectors discussed the discrepancy with the Unit 2 reactor operator (RO) who acknowledged the discrepancy and stated that the bistable status light was likely a result of having removed 2N44 from service. Based on the inspectors’ observation, the RO submitted Procedure Change Request 19981586 on January 27, to include the bistable status light 44512-0404 in 2C51.4. The inspectors later interviewed the RO and lead reactor operator (LRO) who were on duty on January 13. Both operators stated that 2C51.4, although not precisely describing the condition of 2N44 at the time, was used to remove the detector from service. When asked explicitly about the extra

bistable status light, 44512-0404, both stated that they did not notice it appearing while executing 2C51.4.

The inspectors reviewed 2C51.4 and discussed its contents with an operations support pool shift manager. The inspectors noted that 2C51.4 was adequate in verifying that reactor protection bistables were placed in the correct state and that the unit was lined up for correct reactor protection coincidence logic with 2N44 removed from service. Even though status light 44512-0404 was not in the procedure, two other annunciators, 47513-0101, "NIS Power Range Positive Flux Rate Channel Alert" and 47513-0201, "NIS Power Range Negative Flux Rate Channel Alert," were included. Those annunciators demonstrated that the bistables associated with the power range flux rate bistables were in the correct state. Status light 44512-0404 was designed to light when either a positive or negative flux rate trip was received and, in terms of bistable states, was a redundant indication to annunciators 47513-0101 and 47513-0201.

Discussions were also held with the system engineer responsible for this system. The inspectors verified that the correct function, operation, and indications associated with bistables 44U and 44K were periodically tested in accordance with surveillance test procedures.

Until pointed out by the inspectors, neither the initiating crew nor subsequent crews noticed that an extra reactor protection system control board indication was lit that was not described in the procedure used to remove power range NIS channel 2N44 from service on January 13. The safety significance of the inspectors' observation was low since the procedure contained other steps and verifications to ensure that bistables were placed in the correct tripped state and that proper reactor protection system coincidence logic was satisfied. Nevertheless, the inspectors' observation demonstrated a lack of operating crew awareness concerning control board reactor protection system indications.

- On January 22, 1999, the inspectors observed the Unit 2 control room crew response to a turbine runback signal. The runback occurred during shift turnover. The runback lasted for 2.2 seconds, decreased turbine output by approximately 12 megawatts or 2 percent reactor power, and occurred with no audible control board annunciators or alarms to alert the operators of the transient.

  Despite the lack of audible indications and despite being in the process of conducting a shift turnover, the LRO immediately noticed the drop in turbine load. The LRO notified the RO and shift supervisor who joined in monitoring plant response to the runback. All equipment responded appropriately, with control rods inserting into the core as expected. Once plant conditions had stabilized, the shift supervisor contacted the system engineer who responded to the control room to review the event.

  Power range NIS channel 2N44 had been taken out-of-service with the associated bistables placed in the trip position. Coincident with 2N44 being out-of-service, the B main feedwater regulating valve was experiencing periodic flow oscillations because of tight valve stem packing. Although not known at the time of the event, it was later determined that the runback signal occurred during one of the feedwater regulating valve oscillations when the two-out-of-four

"over-temperature delta-temperature" turbine runback coincidence logic became satisfied. One runback signal was caused by the feedwater regulating valve oscillations leading to a slightly elevated reactor coolant system average temperature, while the other runback signal was present because of the tripped bistables associated with 2N44 being out-of-service. Since all the annunciators associated with power range protection circuits were already lit and acknowledged because of the 2N44 bistables being tripped, no additional alarm occurred to alert the operators to the runback.

- During the first portion of the inspection period, the licensee was monitoring and investigating two problems with Unit 2. The first problem involved erratic indications on NIS channel 2N44 as discussed above. The second problem involved indications of leakage inside containment. During the first week of February 1999, the licensee determined that the problem with 2N44 was most likely in the cable connected on the top of the detector and that the containment leakage appeared to be coming from secondary-side manways on the 22 steam generator. Neither problem forced a rapid reactor shutdown, but both required an eventual shutdown to repair. Licensee management made a conservative decision to conduct a brief outage during the first convenient time period.

  That convenient time occurred on February 6, 1999, and the inspectors observed the Unit 2 shutdown. The shutdown was performed well with no significant discrepancies noted. Oversight of the evolution by the shift supervisor was excellent. During the turbine coastdown after operators took it offline, increasing vibrations on the number 6 bearing were noted by the operators as the turbine approached a critical speed. Operators promptly responded by breaking vacuum in the condenser to cause the turbine to pass through the critical speed more rapidly.

  Subsequent to entering mode 3, the operators failed to perform a required surveillance test procedure prior to making the rod control system capable of withdrawing rods (see Section M1.2). On February 7, the 2N44 cable and the 22 steam generator manway repairs were completed successfully and the startup of Unit 2 was commenced. Unit 2 returned to full power operation on February 8. The inspectors observed the reactor startup and the placing of the generator online and noted no discrepancies.

  As part of this inspection, the inspectors reviewed the following procedures:

  - Operating Procedure 2C1.4, "Unit-2 Power Operation," Revision 17;
  - Operating Procedure 2C1.3, "Unit 2 Shutdown," Revision 43; and
  - Operating Procedure 2C1.2, "Unit 2 Startup Procedure," Revision 19.

c. Conclusions

Conduct of operations was generally good. Licensee management made a conservative decision to shut down Unit 2 to repair a power range NIS cable and small leaks in secondary-side steam generator manways. During the Unit 2 shutdown, good supervisory oversight and prompt response to increasing turbine vibrations were noted. Inconsistent control room control board monitoring was illustrated by two opposing

examples. Very good monitoring was illustrated by the LRO noticing, without the benefit of a turbine runback alarm, that turbine power was decreasing because of an actual 2.2-second runback. Weak monitoring occurred when, until pointed out by the inspectors, a number of operators did not notice that an extra reactor protection system control board indication was locked in as the result of removing NIS channel 2N44 from service.

O2 Operational Status of Facilities and Equipment

O2.1 Cold Weather Preparations (71714)

The inspectors walked down selected safety-related systems (Section M2.2) during days when the outside ambient temperature was approximately minus 10 degrees Fahrenheit (°F). The intent was to see if inclement weather conditions could contribute to common-cause failure modes of equipment selected for this inspection. All equipment rooms were at normal, 60 to 70°F ambient temperatures. Louvers/dampers connecting to outside areas were visually inspected for evidence of binding/seizing due to the cold temperatures and local ice and snow conditions. No interferences with louver or damper operations were noted. Particular attention was focused on the normal makeup source to the AFW pumps, the condensate storage tanks (CSTs). Three cross-connected CSTs were located outside of the Unit 1 and Unit 2 turbine buildings. Each CST had one large outlet pipe which was exposed to the outside environment prior to joining a common AFW pump suction header located beneath the ground floor of the turbine building. The inspectors looked at specific heat trace systems and indications associated with the CST outlet piping. All were found to be operating normally, preventing any freezing of the CST outlet piping and subsequent loss of the normal AFW pump suction supply.

O7 Quality Assurance in Operations

O7.1 Safety Audit Committee (SAC) Meeting

a. Inspection Scope (71707)

On January 20, 1999, the licensee held its semi-annual SAC (offsite review committee) meeting as required by Technical Specification 6.2.A. The inspectors observed the meeting.

b. Observations and Findings

The inspectors verified that the membership, qualification, and quorum requirements of TS 6.2.A were met. All of the required subjects listed in the TS were discussed in the meeting. Some of the specific comments and items discussed by the SAC members included:

- forming a subcommittee to review the Prairie Island Improved Technical Specifications;
- ways the SAC could improve/increase its role in providing quality assurance oversight;
- significant plant events since the last SAC meeting, including the recent increase in reactor plant trips;

- the fact that there was no formalized process which encompassed all facets of the Prairie Island self-assessment effort and licensee plans for improvements to the self-assessment program including increased management oversight; and

- an update from Nuclear Analysis and Design (the corporate nuclear engineering group), which included discussions on the status on ongoing efforts to reanalyze the small-break loss-of-coolant accident for Prairie Island, the status of the latest main steamline break accident analysis methodology submittal, and the status of the development of adjusted axial flux difference models to be used to aid in predicting axial flux transients late in core life.

c. Conclusions

Activities of the SAC observed by the inspectors met the requirements of the TS.

O7.2 Quality Services Assessment of Readiness for Dry Cask Loading

a. Inspection Scope (71707)

The licensee commissioned the performance of an independent assessment of its readiness to load the eighth dry fuel storage cask. Because it had been over two years since the previous cask load activities, licensee management wanted an assessment of whether the preparations for the next loading were adequate. The inspectors attended the exit meeting for the assessment.

b. Observations and Findings

The assessment was headed by a senior member of the licensee's quality services group and included three experienced employees of other utilities that had recently completed successful dry cask loading activities.

In the exit meeting, the assessment group stated that the licensee could probably safely perform the cask loading operations, but it was their opinion that the preparations for the loading were not adequate and that the loading would not be efficient if performed without additional actions. The assessment group stated that preparations for the current cask loading activities had not received the level of management attention that previous activities had. In addition, the number of personnel providing engineering support for the activities was significantly less than in the past.

The plant manager acknowledged the findings and ordered that the cask loading schedule be delayed until corrective actions for the assessment issues could be taken. Additional personnel were assigned to the project and a formal plan and schedule were developed by the end of the inspection period.

c. Conclusions

Licensee management proactively commissioned an independent assessment of its readiness for dry cask loading activities. The assessment resulted in several beneficial findings and suggestions. Management's response to the assessment results was appropriate and actions were initiated to resolve the concerns prior to loading the cask.

O8 Miscellaneous Operations Issues (92700)

O8.1 (Closed) Licensee Event Report (LER) 50-282/99001; 50-306/99001 (1-99-01): Unit 1 Reactor Trip Following Failure of the Station Auxiliary Transformer. The event was previously discussed in Section O1.5 of Inspection Report 50-282/98023(DRP); 50-306/98023(DRP). Specific corrective actions taken by the licensee to recover from the event and verify that no damage had occurred to other components were extensive and exhaustive. The licensee determined that the cause of the 1M transformer explosion was a phase-to-phase fault on the 20-kilovolt winding. The cause of the fault was still unknown and root cause analysis efforts were to continue for the next several months. The 1M transformer was scheduled to be replaced during the spring 1999 refueling outage for Unit 1. Plant operations were continuing without the transformer for the remainder of the operating cycle. The inspectors had no remaining safety-significant concerns with the event.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (61726, 62707, 92902)

The inspectors observed all or portions of the following maintenance and surveillance test activities. Included in the inspection was a review of the surveillance test procedures (SPs) and work orders (WOs) listed, as well as the appropriate USAR sections regarding the activities. The inspectors verified that the SPs for the activities observed met TS requirements. The following activities and procedures were reviewed by the inspectors:

- SP 2006B, "NIS Power Range Axial Offset Calibration Greater than 50% Power," Revision 34;
- SP 2005, "Unit 2 NIS Power Range Daily Calibration," Revision 27;
- SP 1102, "11 Turbine-Driven AFW [Auxiliary Feedwater] Pump Monthly Test," Revision 64;
- SP 2102, "22 Turbine-Driven AFW Pump Monthly Test," Revision 56;
- SP 1112, "Steam Exclusion Damper Test," Revision 34;
- SP 2091, "Containment Fan Coil Units Surveillance Test," Revision 20;

- SP 1075, “TN-40 Fuel Selection and Identification,” Revision 6;
- SP 1024, “Refueling Water Storage Tank Level Functional Test,” Revision 10;
- SP 2024, “Refueling Water Storage Tank Level Functional Test,” Revision 14;
- WO 9900448, “2N44 Delta I is Reading Erratic”;
- WO 9901103, “D2 Diesel Generator Engine Jacket Coolant Pump Tripped”; and
- WO 9900635, “Bypass 2N44 Trips to Allow Performance of SPs.”

b. Observations and Findings

- On January 13, 1999, power range NIS channel 2N44 was declared inoperable because of spiking on its lower detector. As required by TS Table 3.5-2A, Action 2a, the reactor protection bistables associated with 2N44 were placed in a tripped condition. On January 21, the inspectors observed the licensee perform an axial offset calibration in accordance with SP 2006B. Since that surveillance test included generating trip signals from the other power range NIS channels, the bistables associated with 2N44 first needed to be bypassed. That action was allowed for up to 4 hours in accordance with TS Table 3.5-2A, Action 2b.

  Prior to the test, the system engineer, instrument and controls (I&C) supervisor, and the I&C technicians performing the test, met to go over SP 2006B in detail and develop the temporary procedure changes that would be required to complete the test with an inoperable 2N44 channel. The system engineer then explained the plan to the shift supervisor who approved the temporary changes. The I&C technicians then bypassed the trip bistables per WO 9900635.

  The entire surveillance test, including a post-test calorimetric calibration in accordance with SP 2005, was completed in about 3½ hours with no problems observed. The I&C technicians performed the work in a careful but expeditious manner.

- The inspectors observed surveillance testing of the 11 and 22 turbine-driven AFW pumps in accordance with SP 1102 and SP 2102. During both surveillance tests, the equipment performed as expected and all observed parameters were within specifications. The system engineer was present throughout both surveillance tests and carefully monitored turbine governor response during startup and overall equipment operation. Local operators maintained formal communications with the control room operators during all portions of the tests.

  During SP 1102, Step 7.26, the local operator was required to record the 11 auxiliary feedwater pump suction strainer outlet pressure on gauge PI-11054. This was a compound gauge providing a pressure indication in three units of measurement: inches of mercury vacuum, feet of water pressure, and pounds per square inch - gauge (psig). The operator initially recorded the suction strainer outlet pressure as 18 psig. The system engineer observed the value being recorded and immediately stated that it was unexpected and abnormally high. The operator again checked the indication and noticed that he had read the wrong scale on the gauge.

- The inspectors observed the performance testing of steam exclusion dampers in accordance with SP 1112. Although there was no formal pre-job briefing, there was a thorough discussion between the control room operator and the I&C technician performing the testing, covering the details of the procedure. During the testing, the inspectors noted that the I&C technician used good verification practices when setting up individual circuits for testing and while installing and removing test equipment required for testing.

- The inspectors observed containment fan coil testing in accordance with SP 2091. The purpose of the testing was to obtain nominal current and voltage values for containment fan coil units 21, 22, 23, and 24 while operating in slow speed. The inspectors noted that appropriate electrical precautions were taken by the electrician while working near energized motor control centers. The data obtained was within expected values and the surveillance test was successfully completed.

- The inspectors observed portions of spent fuel operations in accordance with SP 1075. The purpose of the activity was to identify and inspect spent fuel assemblies to be loaded into the next dry fuel storage casks. The nuclear engineer coordinating the activities demonstrated good control of the evolution and provided good insights and training to the RO on the specialized tools used to move thimble plugs and older fuel cells. Good component identification techniques, careful handling of fuel cells, and formal communications were observed throughout the activities.

- The inspectors observed refueling water storage tank level testing in accordance with SP 1024 and SP 2024. The tests were performed by a relatively inexperienced I&C technician under the supervision of an experienced technician. The testing was performed well with no discrepancies noted. Near the beginning of the procedure, the RO reminded the new technician that the operators expected the technicians to use three-way communication techniques when contacting the control room to confirm annunciator status. The technician used acceptable communications techniques from that point forward.

- The inspectors observed both the mechanical and electrical portions of work associated with WO 9901103 for replacement of the D2 emergency diesel generator (EDG) jacket cooling water pump. The work was accomplished in a very safe and careful manner. During the planning for the job, the maintenance supervisor realized that a small amount of chromated water would have to be drained from the system as the piping was disconnected from the pump. The supervisor assigned a second mechanic to the job so that one mechanic could disconnect the piping while the other collected the drainage. The mechanics were careful to follow the appropriate safety precautions for handling and disposal of the chromated water.

c. Conclusions

The 12 maintenance and surveillance test activities observed by the inspectors were well planned, used approved maintenance or surveillance test procedures, and involved personnel who exhibited safe work practices. Good coordination and communications between different departments was a strength common to all of the activities.

M1.2 Failure to Perform Surveillance Test before Withdrawing Control Rods

a. Inspection Scope (92902)

On February 6, 1999, the licensee identified and informed the NRC that it had failed to perform a required Technical Specification surveillance test prior to withdrawing control rods while Unit 2 was in hot shutdown conditions. The inspectors reviewed the circumstances of the event and the licensee's corrective actions.

b. Observations and Findings

In early November 1998, the licensee identified that a deficiency existed in the surveillance testing program in that no test of the source range high flux reactor trip logic was specified by procedure or schedule prior to making the control rod drive system capable of rod withdrawal when the reactor was only taken to hot shutdown or cold shutdown instead of refueling mode. No actual occurrences of a failure to perform the surveillance test was identified. Such a test was required by TS Table 4.1-1A. The licensee reported the finding in LER 50-282/98017; 50-306/98017 (1-98-17) on December 3, 1998. Corrective actions included issuing Temporary Change Notices (TCNs) 1999-0151, "Unit 1 Shutdown," and 1999-0153, "Unit 2 Shutdown," which added a step to each unit's shutdown procedure with instructions to perform the source range test immediately prior to the step that directed the operator to withdraw the shutdown banks of control rods if a cooldown was not planned.

A pen-and-ink change was inserted prior to the appropriate step in each unit's shutdown procedure to indicate the existence of the TCN. However, the pen-and-ink change did not make it exactly clear to which step it applied. On February 6, 1999, when the ROs reached the step in the Unit 2 shutdown procedure which directed them to withdraw the shutdown banks, it appeared to them that the TCN applied to the previous step which discussed actions needed if a cooldown was planned. That step had been marked as not applicable since a cooldown was not planned. The ROs apparently believed that the TCN was also not applicable, closed the reactor trip breakers, and withdrew the shutdown banks of control rods without the source range trip test having been completed.

The ROs soon noted the mistake, reinserted the shutdown banks, and opened the reactor trip breakers to make the rods incapable of being withdrawn. Rods had been withdrawn or capable of being withdrawn for a total of about 30 minutes. The licensee initially reported the event to the NRC under 10 CFR 50.72 but later retracted the notification when they confirmed that an immediate notification was not required. The license intended to issue an LER (2-99-01) within 30 days as required by 10 CFR 50.73.

A surveillance test of the source range trip function was successfully completed about four hours later. Thus, failure to perform the test prior to making the control rods capable of withdrawal had minimal safety significance.

Closure of the reactor trip breakers and withdrawal of the shutdown banks of control rods on February 6, 1999, prior to performing a surveillance test on the source range high neutron flux trip, was a violation of TS Table 4.1-1A, Item 6.b, which required that the trip be verified to be operable prior to entering a condition in hot shutdown, intermediate shutdown, or cold shutdown where the reactor trip breakers were closed and the control rod drive system was capable of rod withdrawal. This nonrepetitive, licensee-identified and corrected violation is being treated as a non-cited violation, consistent with Section VII.B.1 of the NRC Enforcement Policy (NCV 50-306/99001-01(DRP)).

The LER associated with this event (2-99-01) will be considered open when issued pending the inspectors verification that appropriate corrective action commitments have been entered into the licensees corrective action system. Licensee Event Report 1-98-17 is closed in Section M8.2.

c. Conclusions

Operators failed to ensure that a required Technical Specification surveillance test of the source range high neutron flux trip function had been completed prior to closing the reactor trip breakers and withdrawing the shutdown banks of control rods. The possibility of just such an error occurring had been identified three months earlier, but a temporary procedure change issued to prevent the problem was not sufficiently clear. The failure to perform the required surveillance test was a non-cited violation.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Unit 1 Motor-Operated Valve Inspection

a. Inspection Scope (92902)

The inspectors examined the physical condition of a large number of motor-operated valves associated with Unit 1.

b. Observations and Findings

The inspectors examined approximately sixty motor-operated valves. The valves were located in a number of safety and nonsafety-related systems which included cooling water, component cooling, safety injection, main steam, containment spray, auxiliary feedwater, and feedwater.

Generally, the material condition of the valves was good as evidenced by clean and well lubricated valve stems, tight packing glands, no excessive buildup of grime or dirt on the valves or motors, protected electrical connections, and minimal corrosion observed on or near the valves. The following material discrepancies were noted by the inspectors:

- MV32095 had packing leakage as evidenced by a buildup of chromate residue on and around the packing gland follower and a buildup of grime on the valve actuator threads;

- MV32094 had packing leakage as evidenced by a buildup of chromate residue on and around the packing gland follower;

- MV32093 had packing leakage as evidenced by a buildup of chromate residue on and around the packing gland follower; and

- Oil leaks were noted on the operators for MV32058, MV32089, MV32090, MV32091, MV32092, MV32093, MV32378, MV32139, MV32133, MV32034, and MV32036.

The inspectors noted that work request stickers had been placed on MV32091 and MV32093. The inspectors discussed all of the noted deficiencies with the system engineer responsible for the motor-operated valve program at Prairie Island. The system engineer informed the inspectors that each would be evaluated and repaired as required.

c. Conclusions

Based on an inspection of the material condition of about 60 motor-operated valves, the inspectors concluded that adequate preventive maintenance was being accomplished. Some minor oil leakage was noted and was being addressed by the licensee.

M2.2 Review of Selected Systems/Components Based on Probabilistic Risk Assessment Common-Cause Failure Analysis

a. Inspection Scope (92902)

Based on common cause failure information obtained from the licensee's probabilistic risk assessment team leader, the inspectors performed walkdowns and maintenance history reviews of the following systems/components:

- 11, 12, 21, and 22 AFW pumps;

- 15, 16, 25, and 26 safeguards bus sequencer programmable logic controllers;

- 11 and 21 safeguards screenhouse roof exhaust fans;

- 121 and 122 fuel oil transfer pumps;

- 12 and 22 diesel-driven cooling water pumps (DDCLPs);

- 15 and 16 safeguards bus switchgear room unit coolers;

- D1 and D2 EDGs; and

- D5 and D6 EDGs.

The systems/components were chosen based on a combination of risk achievement worth and Fussel-Vesely rankings obtained from the Prairie Island Nuclear Generating Plant Individual Plant Examination, NSPLMI-94001, Revision 0. Risk achievement worth measures the factor by which core damage frequency increased if the equipment was removed from service. Fussel-Vesely measured the overall contribution of an event towards the core damage frequency. The combination of both rankings allowed the inspectors to examine systems/components that had both large risk effects when removed from service and were significant contributors to overall core damage frequency.

b. Observations and Findings

Walkdowns of AFW pumps and associated critical piping noted no abnormalities. Suction and discharge valve lineups, trip mechanism settings, cooling water supplies, and governor, motor, and pump oil levels were correct. Local and remote selector switches were aligned to ensure required automatic safeguards functions. Safeguards programmable logic controller equipment was also found to be operating correctly as evidenced by the absence of error messages and the periodic illumination of status lights on the front of the load sequencers. Safeguards screenhouse roof exhaust fan electrical lineups, louver/damper condition and position, safety train separation, and louver/damper actuators and associated air supplies were visually inspected. No abnormalities were noted.

Fuel oil transfer pump disconnect switches and circuit breaker electrical lineups, local and remote selector switch positions, and principal valve lineups for the EDGs were verified. During the walkdown, the inspectors noticed that there was little discernable difference between the ON and TRIPPED positions of 480-volt General Electric 8000 model circuit breakers associated with the D5 and D6 EDG fuel oil transfer pumps on motor control centers 2TA1 and 2TA2. This made it difficult to determine if the breaker was in the tripped status, which would have rendered the associated pump inoperable. The inspectors contacted the system engineer and questioned the status of the fuel oil transfer pump circuit breakers. The engineer stated that this difficulty had been previously noted by the operators and declared as operator work around 19960857 in July 1996. The inspectors verified that the observation was included in the current list of open work around issues and was targeted for correction by July 1999. During the D1 and D2 EDG fuel oil transfer system walkdown, the inspectors noticed that the engine fuel oil suction lines exited from the top of the day tank rather than the bottom. This prompted the inspectors to further examine the D1 and D2 fuel oil day tank configurations. Results of that investigation are discussed in Section E3.2.

The D1 and D2 EDGs, D5 and D6 EDGs, and 12 and 22 DDCLPs were inspected for satisfactory standby air, lubricating oil, fuel oil, jacket cooling water, and raw cooling water levels, temperatures and pressures. Room ventilation configurations, control panel switch positions and indications, and electrical lineups of support equipment and output power were also reviewed. No discrepancies were noted. A visual inspection of the 15 and 16 safeguards bus switchgear room unit coolers noted no abnormalities. Both coolers were running satisfactorily, maintaining the bus rooms at approximately 70°F.

The inspectors reviewed the maintenance histories of the risk significant systems/components identified above. A total of 315 WOs and 50 nonconformance reports (NCRs) associated with the system/components were screened of which

31 WOs and 25 NCRs were selected for a detailed review. Emphasis was placed on identifying any commonalities in equipment problems or failures over the life of the systems/components to date. System engineers were contacted to better understand the root cause of several equipment failures and problems. The inspectors' investigations revealed no instances where prior maintenance histories indicated common-cause failures that had been overlooked by licensee maintenance, engineering, or operating personnel.

c. Conclusions

The inspectors conducted an extensive common-cause failure review of 20 risk-significant, safety-related components. The review included system/component walkdowns and maintenance history searches. No evidence of common-cause failure modes were identified by the inspectors.

M8 Miscellaneous Maintenance Issues (92700)

M8.1 (Closed) LER 50-306/98006 (2-98-06): Unplanned Actuation of Unit 2 Engineered Safety Feature Equipment During Performance of a Surveillance Test Procedure Due to Personnel Error. This event was originally discussed in Section M1.2 of Inspection Report 50-282/98023(DRP); 50-306/98023(DRP) and was considered a minor violation. The licensee identified the main causes of the event were an inadequate pre-job brief and inadequate self-checking techniques used by the electrician operating the relays. Two commitments have been entered into the licensee corrective action program which addressed those issues. Per commitment 19990132, the licensee will conduct refresher pre-job brief training for personnel tasked with conducting pre-job briefs. Per commitment 19990133, the licensee will conduct self-checking simulator training for appropriate work groups.

M8.2 (Closed) LER 50-282/98017; 50-306/98017 (1-98-17): Failure to Test Source Range High Flux Trip Functions During Non-Refueling Outages as Required by Technical Specification 4.1-1A. This licensee finding was discussed in Section M1.2 of this report. The inspectors verified that commitment 19983344 had been entered into the licensee's corrective action system to develop the appropriate test procedures. As discussed in Section M1.2, the licensee issued TCNs as an interim measure. The licensee was unable to find an actual case where they had failed to perform the required testing in the past, so the issue was not considered a violation of regulatory requirements. However, during this inspection period, the licensee failed to perform the test and the event was considered a non-cited violation, as discussed in Section M1.2. The LER for that event was pending and will be reviewed when issued.

M8.3 (Closed) LER 50-282/98004 (1-98-04): Engineered Safety Feature Equipment in Alternate Train Inoperable During Diesel Generator Monthly Surveillance Test Run. This event was previously discussed in Inspection Report 50-282/98005(DRP); 50-306/98005(DRP), Section M3.1, and was considered an NCV, 50-282/98005-03(DRP). The inspectors verified that all corrective actions discussed in the LER had been completed or entered into the licensee's corrective action program as commitments 19980600, 19980601, and 19980602.

III. Engineering

E3 Engineering Procedures and Documentation

E3.1 USAR Discrepancy for Refueling Water Storage Tank (RWST) Level Instrumentation

a. Inspection Scope (92903)

During surveillance test observations, the inspectors reviewed the applicable USAR sections to verify that the USAR descriptions of the instrumentation involved in the tests were accurate.

b. Observations and Findings

During a review of USAR Section 7.4.2.2.2, "Refueling Water Storage Tank Level," Revision 14, associated with a surveillance test observation for the RWST instrumentation, the inspectors identified a USAR discrepancy. Section 7.4.2.2.2 of the USAR stated that only one of the two channels of RWST level provided remote indication on the control board and a low-low level alarm. Actually, both RWST channels on each unit provided a control board indication and low and low-low level alarms. The instrumentation was installed as designed and the USAR error had no safety significance for actual plant operation.

The inspectors checked with the licensee's USAR review group and were informed that the licensee had not yet identified the discrepancy. However, the licensee had not completed the Phase II portion of the USAR review project. Part of Phase II was to be a physical comparison of the USAR descriptions to the physical plant. The inspectors determined, based on the relatively obvious nature of the discrepancy and the thoroughness of the review project to date, that the licensee probably would have identified the discrepancy during Phase II. When informed of the discrepancy by the inspectors, a member of the USAR review team provided the information to the individual assigned to the Phase II review of the applicable USAR section so that the discrepancy would be corrected.

c. Conclusions

The inspectors identified a minor error in the USAR description of RWST level instrumentation. The error had no safety significance for actual plant operation and will be corrected by the licensee.

E3.2 Investigation Into EDG Fuel Oil Day Tank Configurations, Design Basis Information, and Associated Calculations

a. Inspection Scope (92903)

The inspectors reviewed the physical configuration, design basis information, and engineering calculations associated with Unit 1 and Unit 2 safety-related diesel engine fuel oil day tanks. The review included the day tanks associated with the D1, D2, D5, and D6 EDGs as well as 12 and 22 DDCLPs. The following documents were reviewed as part of this inspection:

- Design Basis Document SYS-38A, "Emergency Diesel Generator System," Revision 2;

- USAR Section 2.4.3.5, "Floods," Revision 14;

- USAR Section 8.4.2, “Plant Standby Diesel Generator Systems/Description,” Revision 14;
- USAR Section 10.4.1.2, “Plant Cooling System/Description,” Revision 14;
- NCR 19990307, “D1/D2 Fuel Oil Day Tank Setpoint Calculation Versus the USAR”;
- Calculation Number ENG-ME-020, “D1/D2 and DDCLP Fuel Oil Storage Capacity,” dated April 3, 1993;
- Calculation Number SPC-EG-0011, “D1/D2 Emergency Diesel Generators' Fuel Oil Day Tank Level Switch Setpoints,” Revision 0;
- Preventative Maintenance Procedure ICPM 1-031-D1, “D1 Diesel Generator Fuel Oil Day Tank Level Switch Calibration,” Revision 2;
- Preventative Maintenance Procedure ICPM 1-031-D2, “D2 Diesel Generator Fuel Oil Day Tank Level Switch Calibration,” Revision 2;
- Procedure H12, “Plant Check Valve Program,” Revision 3;
- Tank Book, “Diesel Generator Fuel Oil Day Tank (D1 & D2),” dated July 1, 1993;
- Design Change 98EB02, “Repower Cooling Water System Common Unit Motor Valves,” Revision 0;
- Drawing X-HIAW-28-15, “Tank - Fuel Oil - 500 Gallon Nominal - Above Ground,” Revision A;
- Drawing X-HIAW-48-12, “500 Gallon Fuel Oil Day Tank for #2 Diesel Fuel,” Revision 3;
- Drawing NF-39255-1, “Diesel Generators D1 & D2 Units 1 and 2 Flow Diagram,” Revision X;
- Drawing NF-39232, “Flow Diagram Units 1 & 2 Fuel & Diesel Oil System,” Revision AC;
- Drawing NF-40323-1, “Interlock Logic Diagram Fuel & Diesel Oil System - Units 1 and 2,” Revision J;
- Drawing NF-4032533-1, “Interlock Logic Diagram Diesel Generator System Unit 1 and 2,” Revision V; and
- Drawing X-HIAW-106-1158, “Isometric Engine Fuel Pump Suction,” Revision 74.

b. Observations and Findings

After reviewing the actual installation of the fuel oil systems for the EDGs and diesel driven cooling pumps and comparing the as-found installation to plant drawings and USAR descriptions, the inspectors noted the following;

- Check valves that were located at the bottom of the fuel oil suction lines from the D1 and D2 fuel oil day were not included in the check valve program as described in procedure H12, "Plant Check Valve Program." Discussions between the inspectors and the superintendent of mechanical systems revealed that the valves did not meet the requirements for inclusion in program per procedure H12. He also stated that, although the valves were not specifically tested, they were exercised and verified operable by performing the monthly emergency diesel generator testing.

- The USAR description of the day tank for D1 and D2 EDGs stated that they held enough fuel oil for the engine to run up to two hours. The inspectors noted that the special consideration section of preventative maintenance procedure ICPM 1-031-D2 stated that there was approximately four hours of engine operating time available.

- The inspectors noted that the fuel oil consumption calculation for the D1 and D2 EDG day tanks (SPC-EG-0011) did not use the latest EDG loading numbers found in the USAR. When the D1 and D2 EDG loads were changed in the past, the calculation was not updated to ensure the design value for available fuel oil was still met. The licensee issued NCR 19990307 to record its evaluation of the finding. The licensee determined that the design basis of the day tanks was still met but that the calculations and USAR would need to be revised. As part of Design Change 98EB02, the diesel loading calculations, the D1and D2 fuel oil storage calculation (ENG-ME-020), and the fuel oil day tank calculation (SPC-EG-011) were to be revised based on changes to the diesel loading. The design change was scheduled to be completed during the Unit 1 Spring 1999 refueling outage.

- The inspectors also looked at 12 and 22 DDCLP and D5 and D6 EDG fuel oil day tank configurations and did not note any issues.

c. Conclusions

Fuel oil consumption calculations for the D1 and D2 EDGs had not been updated when anticipated accident loading was changed in the USAR. The licensee determined that the design basis fuel oil storage requirements were still met and initiated actions to update the calculations.

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) Violation (VIO) 50-282/96015-01(DRS); 50-306/96015-01(DRS) (EA 96-402): Unreviewed Safety Question Regarding Emergency Intake Line. On November 8, 1998, the NRC Office of Nuclear Reactor Regulation issued License Amendment 140/131 crediting the use of the intake canal during seismic events to ensure adequate suction for the cooling water pumps. This resolved the concern in the violation.

E8.2 (Closed) VIO 50-282/98098-01(DRS); 50-306/98098-01(DRS) (Office of Investigation 3-97-034): Inaccurate Information in Amendment Request. This violation was written following an investigation by the NRC Office of Investigation which found that a licensee amendment request submittal contained inaccurate information. The licensee trained its staff on the importance of ensuring that information submitted to the NRC was complete

and accurate. An improvement in the quality of license submittal has been noted by the Office of Nuclear Reactor Regulation.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls (71750, 92904)

During the normal resident inspection activities, routine observations were conducted in the area of radiological protection and chemistry controls. No discrepancies were noted.

P1 Conduct of Emergency Preparedness Activities

P1.1 Review of Licensee Evaluation of Emergency Response Activities

a. Inspection Scope (92904)

During this inspection period, the inspectors reviewed licensee evaluations of the emergency response associated with the Notice of Unusual Event (NUE) for the explosion of the 1M transformer on January 5, 1999. Evaluations were contained in Error Reduction Task Force Report 99-01, "Unit 1 Turbine Trip/Reactor Trip Following Failure of Unit 1 Main Transformer," and "E-Plan Activation Evaluation - January 5, 1999 NUE," dated January 19, 1999 (and reviewed by the operations committee on February 2).

b. Observations and Findings

The evaluations were insightful and contained several good recommendations. One evaluation noted that the plant manager decided to use the Technical Support Center to coordinate the support group responses during the NUE. The evaluation contained a suggestion that the licensee consider revising the emergency plan implementing procedures to direct the person in command to consider using the Technical Support Center at the NUE level. Presently, it is not directed to be activated below the Alert level. Another example of a good recommendation was that during the NUE the licensee noted that the radiation monitor multiplexer in the control room was powered from a nonsafeguards power supply so that the data was not available after the transformer loss. The evaluation contained a recommendation to establish a noninterruptible power source for the multiplexer.

c. Conclusions

The licensee's evaluation of the NUE associated with the loss of the 1M transformer was insightful and contained several good recommendations.

S1 Conduct of Security and Safeguards Activities (71750, 92904)

During normal resident inspection activities, routine observations were conducted in the areas of security and safeguards activities. 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 February 25, 1999. 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

K. Albrecht, General Superintendent Engineering, Electrical/Instrumentation & Controls
T. Amundson, General Superintendent Engineering, Mechanical
J. Goldsmith, General Superintendent Engineering, Generation Services
J. Hill, Nuclear Performance Assessment Manager
G. Lenertz, General Superintendent Plant Maintenance
J. Maki, Outage Manager
D. Schuelke, General Superintendent Radiation Protection and Chemistry
T. Silverberg, General Superintendent Plant Operations
M. Sleigh, Superintendent Security
J. Sorensen, Plant Manager

INSPECTION PROCEDURES USED

IP 37551:	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 Nonroutine Events at Power Reactor Facilities
IP 92901:	Follow up - Operations
IP 92902:	Follow up - Maintenance
IP 92903:	Follow up - Engineering
IP 92904:	Follow up - Plant Support

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-282/99001-01(DRP)	NCV	Failure to Perform Surveillance Test Before Withdrawing Control Rods

Closed

50-282/99001-01(DRP)	NCV	Failure to Perform Surveillance Test Before Withdrawing Control Rods
50-282/99001; 50-306/99001 (1-99-01)	LER	Reactor Trip Following Failure of the Station Auxiliary Transformer
50-306/98006 (2-98-06)	LER	Unplanned Actuation of Unit 2 ESF Equipment During Performance of a Surveillance Test Procedure Due to Personnel Error
50-282/98017; 50-306/98017 (1-98-17)	LER	Failure to Test Source Range High Flux Trip Functions During Non-Refueling Outages as Required by Technical Specification 4.1-1A
50-282/98004 (1-98-04)	LER	Engineered Safety Feature Equipment in Alternate Train Inoperable During Diesel Generator Monthly Surveillance Test Run
50-282/96015-01(DRS); 50-306/96015-01(DRS) (EA 96-402)	VIO	Unreviewed Safety Question Regarding Emergency Intake Line
50-282/98098-01(DRS); 50-306/98098-01(DRS) (Office of Investigation 3-97-034)	VIO	Inaccurate Information in Amendment Request

Discussed

None.

LIST OF ACRONYMS USED

AFW	Auxiliary Feedwater
CFR	Code of Federal Regulations
CST	Condensate Storage Tank
DDCLP	Diesel-Driven Cooling Water Pump
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
EA	Enforcement Action
EDG	Emergency Diesel Generator
ESF	Engineered Safety Feature
°F	Degrees Fahrenheit
I & C	Instrument and Controls
IP	Inspection Procedure
LER	Licensee Event Report
LRO	Lead Reactor Operator
NCR	Nonconformance Report
NCV	Noncited Violation
NIS	Nuclear Instrument System
NRC	Nuclear Regulatory Commission
NUE	Notice of Unusual Event
psig	pounds per square inch - gauge
PDR	Public Document Room
RO	Reactor Operator
RWST	Refueling Water Storage Tank
SAC	Safety Audit Committee
SP	Surveillance Procedure
TCN	Temporary Change Notice
TS	Technical Specification
USAR	Updated Safety Analysis Report
VIO	Violation
WO	Work Order