



Northern States Power Company

Prairie Island Nuclear Generating Plant

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February 10, 1997

10 CFR Part 2

U S Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Reply to a Notice of Violation, Maintenance Rule Implementation

This letter is in response to the three (3) violations and one (1) unresolved item identified in Inspection Report 50-282/306-96012 (DRS) based on the October 7 through 11, 1997 inspection of implementation of 10 CFR 50.65. "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" at the Prairie Island Nuclear Generating Plant.

Attachments 1, 2, 3a, 3b, and 4 contain the individual responses to the specific issues addressed in the notice of violation and the supporting report.

It was our intent to be in full compliance with 10 CFR 50.65 by July 10, 1996. For this reason, Prairie Island management made a strong commitment to implement the Maintenance Rule requirements starting in 1993. The intent was to verify and validate all related processes and obtain the needed experience and feedback by the July 1996 required implementation date. For this reason, the maintenance rule database, and trending and monitoring were especially well-developed, as noted by the inspectors.

We believe it is important to recognize that although some structures, systems, and components may not have been considered within the scope of the regulation, plant staff did review the maintenance work for all SSCs and consider more significant non-safety equipment performance problems in the periodic trend reporting. We trust that the corrective actions described in the attachments will address the issues identified in the inspection report.

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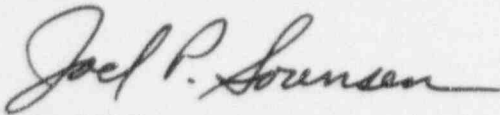
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NORTHERN STATES POWER COMPANY

In this letter we have made one new Nuclear Regulatory Commission commitments, the italicized statement in Section 3 of Attachment 3a.

Please contact Jack Leveille (612-388-1121, Ext. 4662) if you have any questions related to this letter.



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c: Regional Administrator - Region III, NRC
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Attachments:

1	Response to Notice of Violation	VIO 50-282/306-96012-01 (DRS)
2	Response to Notice of Violation	VIO 50-282/306-96012-04 (DRS)
3a	Response to Notice of Violation	VIO 50-282/306-96012-03a (DRS)
3b	Response to Notice of Violation	VIO 50-282/306-96012-03b (DRS)
4	Response to Unresolved Item	URI 50-282/306-96012-05 (DRS)

Violation Description

10 CFR 50.65(b) requires, in part, that "the scope of the monitoring program specified in paragraph (a)(1) of this section shall include safety related and nonsafety related structures, systems, and components, as follows:"

- (2) Non-safety-related structures, systems or components: (i) that are relied upon to mitigate accidents or transients or are used in plant emergency operating procedures (EOPs); or (ii) whose failure could prevent safety-related structures, systems, and components from fulfilling their safety-related function; or (iii) whose failure could cause a reactor scram or actuation of a safety-related system.

Contrary to the above, as of October 7, 1996, the licensee failed to include the Communications system, Electrical Cable Trays, Circulating Water Traveling Screens, and the Circulating Water Bay in the scope of the maintenance rule.

This is a Severity Level IV violation (Supplement I).

Response

- (1) The reason for the violation

Background and Summary

The initial scoping of plant systems, risk significance, and performance trending program was conducted by the Maintenance Rule Coordinator in fall 1992. Starting in January 1993, trending of equipment performance was initiated. In March 1994, the Individual Plant Examination, Levels 1 and 2, was completed and submitted to the NRC.

During the September 1994 through March 1995 period, scoping, risk significance, and performance criteria issues were submitted to and evaluated by the Maintenance Rule Review Group (Expert Committee). The Circulating Water System, including the Circulating Water Bay and Circulating Water Traveling Screens, was considered in scope because of the potential for reactor trip. The Communications System, a non-safety system, was considered out of scope since the system, although discussed in the USAR, was considered to have minimal impact on the likelihood of core damage. The Electrical Distribution System, including the Electrical Cable Trays, was considered out of scope because none of the components were considered to meet the criteria. Also during that time period, the following were defined - functions and functional failures that would be considered in scope, significant non-scope functions, and management objectives with regard to specific system maintenance.

In the fall 1995 through spring 1996 period, the Probabilistic Risk Assessment performed for the Individual Plant Examination was re-analyzed in order that the SAIC EOOS monitor could be used for assessing the risk of taking equipment out of service. Also during that period, the Maintenance Rule Coordinator developed a System Basis Document to more clearly define the specific components and flow paths considered in-scope. This System Basis Document provides a summary for each of the 100 plant systems and 28 major structures. Preparation of the System Basis Document included a review of approximately 12000 safety-related components and related functions and further definition of which non-safety related SSCs would be in-scope from the approximately 150,000 components identified in the Plant Equipment database. Subsequent to completion of that analysis, the Expert committee reconsidered which systems should be in scope, which functions should be in scope, and which specific SSCs should be risk significant.

It should be noted that, although these systems were excluded from the Maintenance Rule Program, the Maintenance Rule Coordinator did, in fact, monitor the performance through the review of closed out work orders, as required by H24, *Maintenance Rule Program*. Additional discussion below summarizes reasoning for exclusion of each of these.

Communications

The Expert Committee had reviewed this system and its components compared to the 10CFR50.65 requirements and determined that the system components did not meet the following non-safety related structure, system, component criteria:

- That are relied upon to mitigate accidents or transients or are used in plant emergency operating procedures (EOPs); or
- Whose failure could prevent safety-related structures, systems, and components from fulfilling their safety-related function; or
- Whose failure could cause a reactor scram or actuation of a safety-related system.

In addition, they considered that the system and its components did not meet the NUMARC 93-01 requirement on page 8, section 8.2.1.3, "...For a nonsafety-related SSC to be considered important, it must add significant value to the mitigation function of an EOP by providing the total or a significant fraction of the total functional ability required to mitigate core damage or radioactive release (e.g. required quantity of water per minute to fulfill the safety function)."

In addition, the system was considered to have sufficient diversity since the system consists of sound-powered phones, standard phones, public address, and radios.

Electrical Cable Trays

Electrical cable trays are designated as components in the Electrical Distribution (ED) system. These were identified as providing a significant, but not in-scope, function on page 128 of Revision 1 of the *Maintenance Rule System Basis Document, Volume 1B, System Specific Bases*. The expert committee had not considered that these SSCs met the criteria of the regulation. Subsequently the decision was made to leave cable trays in the ED system and to consider that system in scope.

Circulating Water Traveling Screens

It was recognized that some nuclear power plants, particularly those exposed to grass and kelp, have experienced reactor scrams or required power reductions due to plugging of similar screens. Plant personnel considered the recommendations on page 12 of NUREG-1526, *Lessons Learned from Early Implementation of the Maintenance Rule at Nine Nuclear Power Plants*, to not apply because the plugging mode had become less likely due to the installation of the intake screenhouse and an additional set of traveling screens in 1982. This configuration reduces

the immediacy of power changes often seen in plants with only 1 screenhouse. Also, by comparison, local water conditions are less likely to result in plugging, based on operating experience.

Circulating Water Bay

The System Basis Document Section 2.0 describes the System Boundaries for in-scope SSCs. The section describes the flow path "from the intake basin . . . the discharge basin." Section 3.0, Maintenance Rule Scope Determination, states the in-scope portion consists of the "Circulating Water Pumps and motors and the flow path into and out of the condenser." Unfortunately, we were not clear enough regarding the intake basin being in scope.

- (2) The corrective steps that have been taken and the results achieved.

The Expert committee met on October 9, 1996 and agreed to place the four (4) SSCs within the scope. Changes to the System Basis Document were completed on October 10, 1996. Further clarifications were completed on December 16, 1996. The System Basis Documents were reviewed to ensure that scope was descriptive and clear.

- (3) The corrective steps that will be taken to avoid further violations.

No further actions are required.

- (4) The date when full compliance was achieved.

Full compliance has been achieved.

Violation Description

10 CFR 50.65(a)(1) requires, in part, that each holder of an operating license under 50.21(b) or 50.22 shall monitor the performance or condition of structures, systems, or components against licensee established goals. Such goals shall be established, commensurate with safety.

Contrary to the above, as of October 7, 1996, the licensee had established a reliability performance goal for the 480 VAC Electrical Distribution system which was not commensurate with plant specific safety considerations.

Response

(1) The reason for the violation

The 480 VAC system includes over 2000 breakers. 141 were determined to have some level of risk significance. As noted in the 1993 Annual Equipment Performance Report, trending of the quarterly Nuclear Plant Reliability Database System (NPRDS) Component Failure Analysis Report (CFAR) data originally identified the circuit breakers as being an industry outlier and provided the basis for originally placing this SSC in the a(1) category. The NPRDS database, in general, trends components with more significant safety or production functions. NPRDS contains about 460 General Electric breakers for both units. There are about 420 safety-related General Electric breakers. The Maintenance Rule Coordinator considered, at the time, that the industry database provided the opportunity to establish a quantitative criteria that could be considered to be commensurate with plant specific safety considerations.

This reasoning appeared to be consistent with the 10CFR50.65 statement - "Such goals shall be established commensurate with safety and, where practical, take into account industry-wide operating experience." Tracking over a several year period showed improvement in the plant failure rates. However, as was noted in the 2nd quarter 1996 report, it was recognized that the auxiliary contact issue had not been eliminated totally, nor was it scheduled to be. At the time of the NRC inspection, consideration was being given by the Maintenance Rule Coordinator to changing the goal to ensure more suitable performance based on current failure rates.

(2) The corrective steps that have been taken and the results achieved.

The 3rd quarter Maintenance Rule report was completed subsequent to the NRC inspection team visit. The goal was changed to no risk-significant SSC failures (due to aux contact lubrication issue) for the EB system 480

VAC breakers during the 1996-1997 period. The expert committee met and approved this goal on December 12, 1996.

- (3) The corrective steps that will be taken to avoid further violations.

No further actions are considered necessary. The Maintenance Rule Coordinator will ensure, during the development of future a(1) goals, that the plant-specific risk significance aspect will be emphasized.

- (4) The date when full compliance was achieved.

Full compliance has been achieved.

Violation Description

10 CFR 50.65(a)(2) requires, in part, that each holder of an operating license under 50.21(b) or 50.22 shall monitor the performance or condition of structures, systems, or components against licensee established goals. Such goals shall be established, commensurate with safety.

Contrary to the above, as of October 7, 1996, the licensee had failed to establish adequate goals or performance criteria and monitoring to demonstrate that the performance or condition for some structures, systems, and components were being effectively controlled through adequate preventive maintenance as follows:

- a. The licensee had not established appropriate reliability monitoring criteria for 30 risk-significant systems.

This is a Severity level IV violation (Supplement I).

Response

- (1) The reason for the violation

Background

During the original development of the program, a number of different criteria were evaluated over a 3 year period. After review of the methods available, it was decided to simplify the criteria used, as described by the following excerpts from the Maintenance Rule System Basis Document, Volume 1A, Overview, as follows:

Section 10.2 General SSC Performance ConceptsReliability-Based

The original reliability-based criterion was generally based on a failure rate in terms of Maintenance Preventable Functional Failure (MPFFs) per 2 year period. In some cases, it has become apparent that this measure may not reflect an adequate correlation to the Prairie Island Individual Plant Examination failure rate assumptions. For all failures determined to be MPFFs after July 1, 1996, the approach to be used regarding MPFFs SHALL be as described in Section 10.4. The general reliability criteria is:

- < 2 MPFFs per 2 years OR
- Demands or Run time < PRA assumptions for the specific failure mode of concern.

Whichever is more conservative.

Section 10.4 Use of Performance Criteria

a(1) - a(2) assignment

The Maintenance Rule Coordinator SHALL review all work orders and NCRs and determine if a system, component, or structure [sic] has exceeded the performance criteria. If a criteria has been exceeded, the Maintenance Rule Coordinator SHALL notify and verify with the System Engineer and the Maintenance Rule Review Committee. In those cases where the criteria have been exceeded, a recommendation should be made to classify the SSC in the a(1) category if review indicates appropriate. Specifically, with regard to the MPFF criteria, the following approach SHALL be used:

If an MPFF occurs, the Maintenance Rule Coordinator SHALL review prior history for the affected SSC and determine the following:

- if there has been a prior failure of the same PRA-based failure mode (e.g. demand or time-based) for the SSC or group of similar SSCs,
- the time between failures or the demands between failures, as appropriate, using similar methodology as the PRA group would use,
- determine if the time or demands are less than what was assumed in the PRA,
- make a recommendation for classifying the SSC in a(1) if the time or demands are less than what was assumed in the PRA.

While we are not contesting the violation, we believed that we were in compliance with the regulation and NUMARC 93-01 guidance, as stated above.

(2) The corrective steps that have been taken and the results achieved.

We considered that the statements in Sections 10.2 and 10.4 required that, effectively, 1 MPFF could force consideration as to whether an SSC should be placed into the a(1) category. A review of those events with high risk significance shows that decision was conservative.

The IPE output tables of high risk significance SSCs, related failure modes, and failure probabilities were reviewed. The failure probabilities were related to expected starts and/or hours of operation per year. We have refined the table of reliability performance criteria to be specific to the risk significant SSCs and failure modes. In many cases, a reliability criterion of 1 MPFF would trigger a(1) consideration. The Maintenance

Rule Review Group (expert committee) considered this information and determined that additional PRA analysis and sensitivity studies should be performed.

- (3) The corrective steps that will be taken to avoid further violations.

Additional PRA analyses and sensitivity studies will be completed by June 1, 1997. These new analyses will be similar to those previously performed for the unavailability criteria and shown to the inspectors. The objective of these sensitivity studies will be to establish new reliability performance criteria (e.g., MPFF per defined time period) that have been proven through the PRA analytical calculations to be appropriate.

- (4) The date when full compliance will be achieved.

Full compliance has been achieved. We believe that the currently refined table of reliability performance criteria specific to the risk significant SSCs and failure modes meets the intent of the regulation. In many cases, 1 MPFF would trigger a(1) consideration.

In the event that the NRC disagrees with this assessment, the forthcoming PRA analyses will provide additional basis for risk-based reliability criteria. These additional analyses will be completed by June 1, 1997.

Description of Violation

10 CFR 50.65(a)(2) requires, in part, that each holder of an operating license under 50.21(b) or 50.22 shall monitor the performance or condition of structures, systems, or components against licensee established goals. Such goals shall be established, commensurate with safety.

Contrary to the above, as of October 7, 1996, the licensee had failed to establish adequate goals or performance criteria and monitoring to demonstrate that the performance or condition for some structures, systems, and components were being effectively controlled through adequate preventive maintenance as follows:

- b. The licensee had not established appropriate unavailability monitoring criteria, commensurate with safety, for four systems.

This is a Severity level IV violation (Supplement I).

M1.6.b.1 (paragraphs 3 and 4 on page 17) identified the 4 systems as:

- safeguard buses 15/16 room coolers
- safeguards chilled water
- reactor protection
- nuclear instruments

Response

- (1) The reason for the violation

With regard to the safeguards buses 15/16 room coolers and safeguards chilled water, the Expert Committee determined that the verification of risk significance was required prior to establishing additional criteria.

With regard to reactor protection and nuclear instruments, the Expert Committee's judgment, not PRA, had provided the basis for classifying these systems as risk-significant. Trains or specific components in these systems are only taken out of service for Technical specification required surveillance testing or for repair of failed components. These two systems can fail in 2 ways - (1) fail resulting in a reactor trip and (2) fail to cause a reactor trip. We considered either type of failure to be of safety importance. For this reason, the following criteria were established for both systems:

- < 2 Reactor trip per year
- < 2 MPFF per 2 year (with the additional requirement described in Attachment 3a).

The Expert Committee had interpreted the rule that, in a case as this, that availability, reliability, or condition monitoring criteria could be used as stated in NUMARC 93-01, Section 9.3.2.

Similarly, the Expert Committee had interpreted that 10 CFR 50.65, section (a) and Inspection Module 62706 Appendix A page A-2, Examples . . . not violations, item 2 appeared to give the licensee discretion in establishing appropriate performance criteria.

- (2) The corrective steps that have been taken and the results achieved.

Appropriate unavailability criteria have been established for the Bus 15/16 unit coolers and safeguards chilled water system. Unavailability criteria have been established for both the reactor protection and nuclear instrument systems on a train basis. These criteria take into account the following factors:

- Nuclear safety considerations and the importance of minimizing out of service time, and
- The out of service time needed to perform Technical Specification required surveillance testing
- Recent experience with the actual Limiting Condition of Operation (LCO)-based times related to the above.

These criteria changes were reviewed and approved by the Maintenance Rule Review Committee on February 5, 1997.

- (3) The corrective steps that will be taken to avoid further violations.

This inspection report, and response, has been included with the Maintenance Rule Program documentation to emphasize the NRC's expectations in this area.

- (4) The date when full compliance was achieved

Full compliance has been achieved.

Description of Unresolved Item

The licensee had adequately scoped buildings and enclosures as structures under the Rule. However, a lack of a defined structure monitoring program resulted in a lack of specific guidance intrinsic to the following areas: 1) No specific performance criteria were established for structures, 2) No acceptance criteria to gauge the condition of structures was developed, 3) no guidance was established for moving structures from the (a)(2) category to the (a)(1) category under the Rule. As a result, several structures (other than buildings or enclosures) were either not properly scoped or, if included within scope, did not have performance criteria or condition monitoring properly established.

Response

(1) The reason for the Unresolved Item

The initial scoping of structures was conducted in December 1993. Additional clarification occurred in November 1994 and May 1995. These structures were identified in tables (12/93, 5/95) and in the document, Performance Criteria - *Plant and Risk Significant Systems* (11/94). During this period, the focus was on buildings. In general, tanks (e.g. Condensate Storage and Fuel Oil Storage Tanks) and the Circulating Water Pump Bay were considered as part of the system that they were in. This is demonstrated by the discussion in the System-Specific section, Volume 1B of the Maintenance Rule System Basis Document.

NUMARC 93-01 endorsed the use of plant level criteria for operating non-risk significant systems, as Circulating Water. We believe that if there were problems with the Circ Water Pump Bay, the plant level criteria, would likely have been applicable.

In the case of risk significant systems and non-risk significant standby systems, system-specific criteria were established - specifically related to MPFFs.

NUMARC 93-01 has very limited discussion of structures, specifically in the area of performance criteria. The document, in section 9.4.1.4, only provides examples of goals - "It is expected that most structures will be addressed as required by (a)(2) of the Maintenance Rule. In those cases where it is determined that a structure must have a goal established, the goal could be based on, for example, limits for cracking, corrosion, erosion, settlement, deflection, or other condition criteria."

Section 03.01.a.4 of the 8/31/95 version of the NRC Inspection Procedure 62706, *Maintenance Rule*, stated licensees should have monitoring programs, predictive in nature.

The Expert Committee considered that the structures monitoring program is a condition monitoring program, since obviously structural failures cannot be tolerated. As noted in Appendix F of H24, Maintenance Rule Program, the condition monitoring criterion was "PECE [Professional Engineer in Civil Engineering] inspection identifies structural failure/significant degradation." Engineering judgment of a state-licensed PECE was considered to meet that requirement. In addition, it was recognized that an interval of 5 years was suitable for detailed structural inspection, however, the quarterly PM 3586 inspections and Employee Observation Reports were added as interim measures to ensure a predictive approach was being used. This addition was noted in System Basis Document Volume 1A, *Overview*, Section 11. It was recognized that system engineers traditionally assist in these inspections in their specialty areas - mechanical, electrical, instrumentation & control. Engineering judgment in their specialty appeared to be appropriate.

An assessment of plant structures was initiated in mid-1995 using a state-registered Professional Engineer specializing in civil engineering. This assessment was intended as a follow-on to a baseline inspection of plant structures conducted in the 1988 to 1990 time frame. Both sets of inspections were documented. During the 1995-1996 period, structures inspected included - Containments, Shield Buildings, Turbine Building, Auxiliary Building, Screenhouse, Diesel Generator Building, Substation. A fundamental reference in that review was NUREG-1522, *Assessment of Inservice Conditions of Safety-Related Nuclear Plant Structures*, published in June 1995. The assessment also included a review of plant structural drawings, where appropriate, to determine whether certain beams might be load-bearing. The professional engineering judgment of the PE was considered to satisfy the performance criteria requirement.

Revision 2 (September 23, 1996) of Maintenance Rule System Basis Document Volume 1A, *Overview*, Section 11.0 described the in-scope structures, including the Condensate Storage Tanks.

The Maintenance Rule System Basis Document Volume 1B, *System-Specific Bases*, Section 3.0 included the Circ Water Bay. Section 3.0 states -

"3.0 Maintenance Rule Scope Determination

In Scope

for the Circulating Water pumps and motors and the flow path into and out of the condenser."

The Circulating Water Bay would be in-scope based on this definition. Only the Circulating Water traveling screens had been excluded based on the reasoning stated in Attachment 1. To clarify this situation, we have added the Circulating Water Bay specifically in the Maintenance Rule System Basis Document Volume 1A, *Overview*, Section 11.0.

(2) The corrective steps that have been taken and the results achieved

At the time of the inspection, NSP Prairie Island had not received the NRC October 1, 1996 letter to the Nuclear Energy Institute authorizing use of NEI 96-03. A copy of the letter was subsequently received at the NEI workshop during the week of October 16, the week following the NRC inspection.

Subsequent to the inspection, the decision was made to separately review structures periodically using a checklist based on the NEI 96-03 guidance, modified to incorporate applicable NRC comments. The checklist defines acceptance criteria and appropriate actions when deficient conditions are identified.

The scope of the Structural Monitoring Program has been better defined by an addition to the System Basis Document - Volume 1C, *Structures Monitoring Program*. This program document incorporates recommendations of NEI 96-03 and the October 1, 1996 response. Volume 1C expands on the scope of the structures monitoring program, previously outlined in Section 11 of Volume 1A. Volume 1C currently addresses the following topics:

- 1.0 Introduction
- 2.0 Purpose and Scope
- 3.0 Structures Monitoring Program
 - 3.1 Identification of Structures
 - 3.1.1 In-Scope Risk Significant Structures (includes function)
 - 3.1.2 In-Scope Low-Risk Significant Structures (includes function)
 - 3.1.3 Out of Scope Structures
 - 3.2 Responsibilities (includes Maintenance Rule Coordinator, state licensed Professional Engineer in Civil Engineering)
 - 3.3 Examination Guidance
 - 3.3.1 Prior Reviews
 - 3.3.2 Examination Objectives (includes types of degradation to consider based on NEI 96-03 and NUREG-1522 and factors to consider for 5 year and periodic inspections)
 - 3.3.3 Method of Inspection (may include visual and other methods, e.g., buried equipment and ultrasonic and others, as appropriate)
 - 3.3.4 Follow-up Actions
 - 3.3.5 Cause Determination

- 3.4 Evaluation of Results (includes Acceptable, Acceptable with deficiencies, Unacceptable with designation of qualification level to make the determination)
- 3.5 Corrective Actions
- 3.6 Frequency, Trending, and Industry Data (includes interim, 5 year, and Employee Observation reports)
- 3.7 Qualification of Personnel
- 3.8 Documentation
- 4.0 References

Volume 1C identifies structures considered in the program with the functions of significance.

The inspection procedure, to be used during the interim period between the 5 year inspections, defines the scope of items for consideration while performing an inspection. The procedure gives examples of common structural deficiencies (as noted in NUREG-1522). This evaluation is conducted by an appropriately qualified individual.

- (3) The corrective steps that will be taken to avoid violation

No future additional steps are needed, except to commence conducting the more clearly defined interim evaluations.

- (4) The date when full compliance will be achieved

It is believed that we were in compliance at the time of the inspection based on NRC accepted industry guidance and information available at the time. It is expected that the new program enhancements should remove any question on this matter. These new program enhancements were effective February 9, 1997.