

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

DOCKET NO. 50-282
50-306

REVISED REQUEST FOR AMENDMENT TO
OPERATING LICENSES DPR-42 & DPR-60

JUNE 15, 1994 REVISION TO
LICENSE AMENDMENT REQUEST DATED JANUARY 29, 1993
CORE EXIT THERMOCOUPLE ACTION STATEMENT CHANGES

Northern States Power Company, a Minnesota corporation, requests authorization for changes to Appendix A of the Prairie Island Operating License as shown on the attachments labeled Exhibits A, B, C and D. Exhibit A describes the proposed changes, reasons for the changes, and a significant hazards evaluation. Exhibits B, C and D are copies of the Prairie Island Technical Specifications incorporating the proposed changes.

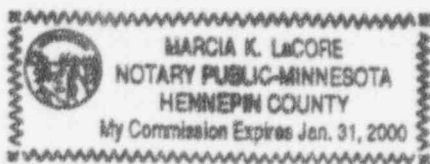
This letter contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By Mike Wadley
Mike Wadley
Plant Manager
Prairie Island Nuclear Generating Plant

On this 15th day of June 1994 before me a notary public in and for said County, personally appeared Mike Wadley, Plant Manager Prairie Island Nuclear Generating Plant, and being first duly sworn acknowledged that he is authorized to execute this document on behalf of Northern States Power Company, that he knows the contents thereof, and that to the best of his knowledge, information, and belief the statements made in it are true and that it is not interposed for delay.

Marcia K. LaCore



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Exhibit A

Prairie Island Nuclear Generating Plant
June 15, 1994 Revision to
License Amendment Request Dated January 29, 1993

Evaluation of Proposed Changes to the
Technical Specifications Appendix A of
Operating License DPR-42 and DPR-60

Pursuant to 10 CFR Part 50, Sections 50.59 and 50.90, the holders of Operating Licenses DPR-42 and DPR-60 hereby propose the following changes to Appendix A, Technical Specifications:

Background

Section 3.15 of the Prairie Island Technical Specifications contains requirements for the operability of core exit thermocouples for use in post accident monitoring. Those requirements were incorporated by License Amendments 78 and 71 dated August 28, 1986 and are consistent with Revision 4a of the Westinghouse Standard Technical Specifications.

Current Section 3.15.A.1 and Table TS.3.15-1 require four core exit thermocouples to be operable per core quadrant. With only two or three core exit thermocouples operable in a core quadrant, the current action statement 3.15.A.2 allows continued operation for seven days. At the end of seven days, if four per core quadrant are not operable, the plant must be taken to hot shutdown.

The Prairie Island core exit thermocouple system consists of 36 thermocouples which monitor 121 fuel assemblies (see attached Figure). Revision 4a of the Westinghouse Standard Technical Specifications is based on Westinghouse four-loop reactors which have 51 core exit thermocouples which monitor 193 fuel assemblies. As can be seen below, the cross-sectional area of the Prairie Island core is approximately half of the area of a four-loop core. Even though the area of the Prairie Island reactor core is approximately half the size of the four-loop plants and thus the number of thermocouples per unit of core area is higher, the smaller number of thermocouples places Prairie Island at a disadvantage with respect to the four per quadrant requirement.

<u>Number of Loops</u>	<u>Number of Fuel Assemblies</u>	<u>Fuel Assembly Pitch (inches)</u>	<u>Core Area (ft²)</u>
2	121	7.803	51
4	193	8.466	96

Until recently the core exit thermocouples have not had significant reliability problems and the existing action statements have not presented a problem. However, thermocouple failures occurred in 1992 on both units. While enough thermocouples remained operable to meet the Technical Specification requirement of four thermocouples per core quadrant, there was a high potential for additional failures which could have reduced the number of thermocouples below the required total number of channels limit in some quadrants. Since repairs could not be completed at power or within seven days, a plant shutdown would have been required per Technical Specification 3.15.A.

This downward trend in thermocouple reliability has raised concerns with respect to the post accident monitoring system action statements in Section 3.15.A of the Prairie Island Technical Specifications. This proposed license amendment request has been initiated in response to this heightened concern with respect to the recent thermocouple failures, and their potential impact on plant operation.

Prior to the dual unit outage in November 1992, all failures were thought to be caused from damage to the reactor head connector and cable connection due to excessive wear during the disconnection/reconnection process. The head connector is very small and fragile and is located in a high radiation area (greater than 200 mrem/hr) and is therefore difficult to work on.

During the November 1992 dual unit outage, ABB/Combustion Engineering (CET system designer) was contracted to assess the condition of the CET head connectors, troubleshoot the entire system (including the cables in containment) and replace the head connectors if necessary. During the troubleshooting, the technicians found low insulation resistance readings on several thermocouples (7-35 k Ω instead of 1-20 Mega Ω). Further investigation found water/moisture inside the thermocouples on Unit 1. Four of the five thermocouples were capped and one had a new head connector installed and is being monitored. There was not enough time during the November 1992 dual unit outage to investigate the condition of the Unit 2 thermocouples.

During the November 1992 dual unit outage the following repairs were made:

- Eight head connectors were replaced on Unit 1
- Four head lift rig cable assemblies were replaced on Unit 1
- One head lift rig cable assembly was replaced on Unit 2

A modification was initiated in 1993 to replace all head connectors with a newer, sturdier model and to install a transition cable to reduce the chance of damaging the head connector. This modification was completed on Unit 2 during the November 1993 refueling outage and will be completed on Unit 1 during the May 1994 refueling outage.

During the November 1993 Unit 2 refueling outage, ABB/Combustion Engineering technicians discovered two thermocouples which had broken lead wires which could not be repaired. One other thermocouple showed indications of possible leakage and is being monitored. Following completion of the modifications to the Unit 2 CET system there were only three inoperable thermocouples on Unit 2.

When shutdown for the May 1994 refueling outage, Unit 1 had a total of eleven rejected thermocouple indications: four failed due to wet thermocouples, two have damaged head connectors/cables, four were reading open signals and one was drifting low. Since there were known leaking thermocouples on Unit 1, NSP contracted with Westinghouse to replace the failed thermocouples during the May 1994 Unit 1 refueling outage. The May 1994 refueling outage is still underway as of the date of this letter. The following repairs are planned for completion during this outage:

- Remove and replace wet incore thermocouples
- Replace all reactor head connectors and associated cables

Proposed Changes and Reasons for Change

The proposed changes to the Prairie Island Technical Specifications are described below, and the specific wording changes to Technical Specifications are shown in Exhibits B and C.

A. Proposed changes to Technical Specification 3.15.A

Current Specification 3.15.A is being revised as shown in Exhibit B. The proposed changes to Specification 3.15.A will incorporate specific action statements for inoperability of core exit thermocouples. The proposed core exit thermocouple action statements are based on the guidance in the Westinghouse Revised Standard Technical Specification. The limiting condition for operation requirement of four core exit thermocouples per core quadrant is not affected by the proposed changes.

Section 3.15.A.2

Existing action statement 3.15.A.2 is being revised to incorporate an exception to the requirements of 3.15.A.2 for the core exit thermocouples. This is required to facilitate the incorporation of the specific core exit thermocouple action statements discussed below.

Section 3.15.A.3

The proposed new action statement 3.15.A.3 specifies the action to be taken if the number of core exit thermocouples is less than the required total number of channels specified in Table TS.3.15-1 (four per quadrant). Continued operation would be allowed provided:

- a. Greater than or equal to four core exit thermocouples are operable in the center core region (The thermocouples in the center region are identified in the attached figure),
- b. Greater than or equal to one core exit thermocouple is operable in each quadrant of the outside core region,
- c. The minimum channels operable requirement (two thermocouples per quadrant) is met, and
- d. The inoperable channels are returned to operable status within 30 days or a special report to the Commission is prepared and submitted pursuant to Technical Specification 6.7.B.2 within the next 14 days outlining the action taken, the cause of the inoperability, and the plans and schedule for restoring the system to OPERABLE status. As a minimum, the required total number of channels will be restored prior to startup following the next refueling outage.

This proposed action statement is based on the guidance in Section 3.3.3 of the Revised Westinghouse Standard Technical Specifications for post accident monitoring instrumentation. The Revised Standard Technical Specifications require the operability of two core exit thermocouple channels per core quadrant. A core exit thermocouple channel is defined as two core exit thermocouples. The bases for Section 3.3.3 of the Revised Standard Technical Specifications further specifies that the two

thermocouples in each channel must meet the additional requirement that one is located near the center of the core and the other near the core perimeter. The action statements associated with the post accident monitoring equipment in Section 3.3.3 would allow continued plant operation with only one channel (two thermocouples) operable per quadrant provided a report is submitted to the Commission within 14 days after the 30 day allowed-out-of-service time is exceeded.

The significant difference between proposed action statement 3.15.A.3 and the guidance in Revised Standard Technical Specification Section 3.3.3 is the use of thermocouple channels with specific thermocouple pairings. The bases to Section 3.3.3 of the Revised Standard Technical Specifications state that the thermocouple pairings utilized in specifying thermocouple channels should have been identified during unit specific evaluations in response to Item II.F.2 of NUREG-0737. These pairings were not identified during the unit specific evaluation for Prairie Island, and due to the smaller number of thermocouples and their distribution above the core, such pairings would be difficult to establish and maintain at Prairie Island.

Because such thermocouple pairings are not feasible for Prairie Island, an alternative requirement is being proposed. The proposed Section 3.15.A.3 action requires at least four thermocouples to be operable in the center region of the core and at least one thermocouple in each quadrant of the outside core region to be operable. The intent of this restriction is to provide radial temperature gradient monitoring similar to that provided by the use of the Revised Standard Technical Specification thermocouple pairings. While the proposed action statement does not specify the location of the thermocouples within the quadrant, because the Prairie Island core is approximately half the size of a four loop core, the requirement for four thermocouples in the center region and one in each quadrant of the outside region will provide adequate indication of the post accident radial temperature distribution.

Section 3.15.A.4

The proposed new action statement 3.15.A.4 specifies the action to be taken if the number of core exit thermocouples is less than the required total number of channels specified in Table TS.3.15-1 (four per quadrant) and there are less than four thermocouples operable in the center region or less than one thermocouple operable in each quadrant of the outside core region. The proposed action statement is consistent with the action required under the current action statement 3.15.A.2 and does not constitute any change in requirements. It is included to provide a clear statement of the action to be taken if the number of core exit thermocouples is less than the required total number of channels and there are less than four thermocouples operable in the center region or less than one thermocouple operable in each quadrant of the outside core region.

Section 3.15.A.5

Existing Specification 3.15.A.3 has been renumbered to 3.15.A.5 to accommodate the proposed core exit thermocouple action statements. This change does not constitute any change in requirements.

B. Proposed changes to the Bases for Technical Specification Section 3.15

The Bases to Technical Specification Section 3.15 are being revised, as shown in Exhibit B, to specify which core exit thermocouples are included in the center core region.

Safety Evaluation

The proposed Technical Specification changes would allow continued plant operation with less than the total required number of core exit thermocouples operable provided a minimum number of thermocouples per core quadrant remain operable, certain thermocouple radial distribution requirements are met and a report is submitted to the Commission outlining the action taken, the cause of the inoperability, and the plans and schedule for restoring the system to OPERABLE status. The proposed actions are consistent with the intent of the Revised Westinghouse Standard Technical Specifications.

Continued plant operation with the core exit thermocouple system in the degraded condition allowed by proposed action statement 3.15.A.3 would not affect the operators ability to monitor for inadequate core cooling following an accident. At least two core exit thermocouples would be operable per core quadrant and a minimum of four thermocouples would be available in the center region of the core and at least one thermocouple would be available in each quadrant of the outside core region. The smaller size of the Prairie Island core, and therefore higher density of thermocouples per unit of core area, provides additional assurance that core exit temperatures can be adequately monitored with a reduced number of core exit thermocouples.

Alternate means of monitoring for inadequate core cooling would also be available. These include the reactor vessel water level indication system, the subcooling margin monitors and wide range reactor coolant system temperature.

The combination of the remaining operable core exit thermocouples and the alternate monitoring capability will ensure that the operators will be able to identify inadequate core cooling in a timely manner and take appropriate corrective action.

Proposed action statement 3.15.A.3 does not allow unrestricted future plant operation with the core exit thermocouple system degraded. Continued plant operation beyond 30 days with less than four core exit thermocouples per quadrant would require the submittal of a report to the NRC outlining the action taken, the cause of the inoperability, and the plans and schedule for restoring the system to OPERABLE status. This action is appropriate in lieu of a shutdown requirement since alternative actions are identified before loss of functional capability, and given the likelihood of unit conditions that would require information provided by this instrumentation.

This report would ensure that the NRC was fully informed of the problems with the core exit thermocouple system and the planned corrective actions. This would afford the NRC the opportunity to assess the adequacy of the actions taken, the proposed corrective actions and the schedule for restoration of the system and make an independent assessment of the safety of continued plant operation.

Proposed action statement 3.15.A.3 also limits future plant operation with a degraded core exit thermocouple system by requiring that, as a minimum, the required total number of channels will be restored prior to startup following the next refueling outage.

In conclusion, the health and safety of the public will not be adversely affected by the proposed Technical Specification changes.

Determination of Significant Hazards Considerations

The proposed changes to the Operating License have been evaluated to determine whether they constitute a significant hazards consideration as required by 10 CFR Part 50, Section 50.91 using the standards provided in Section 50.92. This analysis is provided below:

1. The proposed amendment will not involve a significant increase in the probability or consequences of an accident previously evaluated.

The purpose of the post accident monitoring equipment is to display unit variables that provide information required by the control room operators during accident situations and as such help limit the consequences of an accident. The proposed changes, which will allow continued plant operation with less than four core exit thermocouples per core quadrant, have no impact on the probability of an accident because they are only used in response to accident situations.

Continued plant operation with the core exit thermocouple system in the degraded condition as allowed by the proposed core exit thermocouple action statements would not affect the operators ability to monitor for inadequate core cooling following an accident. At least two core exit thermocouples would be operable per core quadrant, a minimum of four thermocouples would be available in the center region of the core and at least one thermocouple would be available in each quadrant of the outside core region. The smaller size of the Prairie Island core, and therefore higher density of thermocouples per unit of core area, provides additional assurance that core exit temperatures can be adequately monitored with a reduced number of core exit thermocouples.

Alternate means of monitoring for inadequate core cooling would also be available. These include the reactor vessel water level indication system, the subcooling margin monitors and wide range reactor coolant system temperature.

The combination of the remaining operable core exit thermocouples and the alternate monitoring capability will ensure that the operators ability to identify inadequate core cooling in a timely manner and take appropriate corrective action will not be impaired and therefore the proposed changes will have no significant impact on the consequences of an accident.

The core exit thermocouples perform no active role in the mitigation of an accident. Their inoperability will not affect the operability of any engineered safety features equipment or that equipments ability to mitigate the consequences of an accident.

Therefore, for the reasons discussed above, the proposed changes will not significantly affect the probability or consequences of an accident previously evaluated.

2. The proposed amendment will not create the possibility of a new or different kind of accident from any accident previously analyzed.

There are no new failure modes or mechanisms associated with the proposed changes. The proposed changes do not involve any modification of plant equipment or any changes in operational limits. The proposed changes only modify the requirements for instrumentation used to monitor plant parameters during an accident. The core exit thermocouples are passive monitoring devices, their failure or inoperability cannot result in a plant accident of any kind.

Therefore, for the reasons discussed above, the proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated, and the accident analyses presented in the Updated Safety Analysis Report will remain bounding.

3. The proposed amendment will not involve a significant reduction in the margin of safety.

Continued plant operation with the core exit thermocouple system in the degraded condition as allowed by the proposed core exit thermocouple action statements would not affect the operators ability to monitor for inadequate core cooling following an accident. At least two core exit thermocouples would be operable per core quadrant, a minimum of four thermocouples would be available in the center region of the core and at least one thermocouple would be available in each quadrant of the outside core region. The smaller size of the Prairie Island core, and therefore higher density of thermocouples per unit of core area, provides additional assurance that core exit temperatures can be adequately monitored with a reduced number of core exit thermocouples.

Alternate means of monitoring for inadequate core cooling would also be available. These include the reactor vessel water level indication system, the subcooling margin monitors and wide range reactor coolant system temperature.

The combination of the remaining operable core exit thermocouples and the alternate monitoring capability will ensure that the operators ability to identify inadequate core cooling in a timely manner and take appropriate corrective action will not be impaired.

Therefore, for the reasons discussed above, the proposed changes will not result in any reduction in the plant's margin of safety.

Based on the evaluation described above, and pursuant to 10 CFR Part 50, Section 50.91, Northern States Power Company has determined that operation of the Prairie Island Nuclear Generating Plant in accordance with the proposed license amendment request does not involve any significant hazards considerations as defined by NRC regulations in 10 CFR Part 50, Section 50.92.

Environmental Assessment

Northern States Power has evaluated the proposed changes and determined that:

1. The changes do not involve a significant hazards consideration,
2. The changes do not involve a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or
3. The changes do not involve a significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the proposed changes meet the eligibility criterion for categorical exclusion set forth in 10 CFR Part 51 Section 51.22(c)(9). Therefore, pursuant to 10 CFR Part 51 Section 51.22(b), an environmental assessment of the proposed changes is not required.