



Northern States Power Company
Prairie Island Nuclear Generating Plant
1717 Wakonade Dr. East
Weich, Minnesota 55089

July 15, 1996

10 CFR Part 50
Section 50.90

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

License Amendment Request Dated July 15, 1996
Moveable Incore Detector Thimble Reduction

Attached is a request for a change to the Technical Specifications, Appendix A of the Operating Licenses, for the Prairie Island Nuclear Generating Plant. This request is submitted in accordance with the provisions of 10 CFR Part 50, Section 50.90.

This License Amendment Request proposes one-time only changes for Prairie Island Unit 1 Cycle 18 that would allow the use of the moveable incore detector system for measurement of the core peaking factors with less than 75% and greater than or equal to 50% of the detector thimbles available. This amendment request is being submitted in response to degradation of the Unit 1 moveable incore detector system, which has raised concerns that the number of available detector thimble locations may drop below the 75% requirement of Technical Specification 3.11.A. The proposed changes would allow continued operation of Unit 1 should the degradation worsen through the remainder of Cycle 18.

Exhibit A contains a description of the proposed changes, the reasons for requesting the changes, the supporting safety evaluations and significant hazards determinations. Exhibit B contains current Prairie Island Technical Specification pages marked up to show the proposed changes. Exhibit C contains the revised Technical Specification pages. Exhibits D and E contain proprietary and non-proprietary versions of the Westinghouse Thimble Deletion Study for Prairie Island Unit 1 Cycle 18. Exhibit F contains the Westinghouse authorization letter, CAW-96-987, accompanying affidavit, Proprietary Information Notice, and Copyright Notice.

**ATTACHMENT CONTAINS PROPRIETARY INFORMATION TO BE
WITHHELD FROM PUBLIC DISCLOSURE IN ACCORDANCE
WITH 10 CFR PART 2, SECTION 2.790**

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As Exhibit D contains information proprietary to Westinghouse Electric Corporation, it is supported by an affidavit (Exhibit F) signed by Westinghouse, the owner of the information. The Affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in Paragraph (b)(4) of 10 CFR Section 2.790 of the Commission's regulations.

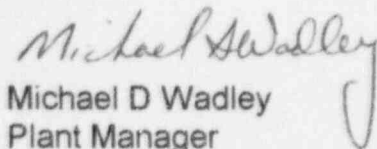
Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Part 2, Section 2.790 of the Commission's regulations.

Correspondence with respect to the copyright or proprietary aspects of the reports attached as Exhibits D and E, or the supporting Westinghouse Affidavit, should reference CAW-96-987 and should be addressed to N.J. Liparulo, Manager of Regulatory and Engineering Networks, Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Note that although the proposed Technical Specification changes apply only to Unit 1 Cycle 18, and there are no technical changes to the Unit 2 specifications, the Unit 2 Technical Specifications are administratively affected since they are combined by Northern States Power into one Technical Specification manual applying to both Prairie Island Units 1 and 2. Therefore, when approved, the proposed changes should be incorporated into both the Unit 1 and Unit 2 Technical Specifications.

It is requested that review and approval of this license amendment request be expedited in view of the recent history regarding availability of detector thimbles during Unit 1 Cycle 18 and the need for the use of the moveable incore detector system for Technical Specification required monitoring/calibration functions in the near future.

Please contact Gene Eckholt (612-388-1121) if you have any questions related to this License Amendment Request.


Michael D Wadley
Plant Manager

Prairie Island Nuclear Generating Plant

c: Regional Administrator-III, NRC
NRR Project Manager, NRC
Senior Resident Inspector, NRC
State of Minnesota (w/o proprietary attachment)
Attn: Kris Sanda
J E Silberg (w/o proprietary attachment)

Attachments:

Affidavit

Exhibit A - Evaluation of Proposed Changes to the Technical Specifications.

Exhibit B - Proposed Changes Marked Up on Existing Technical Specification Pages.

Exhibit C - Revised Technical Specification Pages.

Exhibit D - Proprietary version of Prairie Island Unit 1 Cycle 18 Thimble Deletion Study

Exhibit E - Non-proprietary version of Prairie Island Unit 1 Cycle 18 Thimble Deletion Study

Exhibit F - Westinghouse authorization letter, CAW-96-987, accompanying affidavit, Proprietary Information Notice and Copyright Notice

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

LICENSE AMENDMENT REQUEST DATED JULY 15, 1996
MOVEABLE INCORE DETECTOR THIMBLE REDUCTION

Northern States Power Company, a Minnesota corporation, requests authorization for changes to Appendix A of the Prairie Island Operating License as shown in the attachments labeled Exhibits A, B, C, D, E AND F. Exhibit A contains a description of the proposed changes, the reasons for requesting the changes, the supporting safety evaluations and significant hazards determinations. Exhibit B contains current Prairie Island Technical Specification pages marked up to show the proposed changes. Exhibit C contains the revised Technical Specification pages. Exhibits D and E contain proprietary and non-proprietary versions of the Westinghouse Thimble Deletion Study for Prairie Island Unit 1 Cycle 18. Exhibit F is a Westinghouse Electric Corporation affidavit for withholding of proprietary information.

This letter contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By Michael D Wadley
Michael D Wadley
Plant Manager
Prairie Island Nuclear Generating Plant

On this 15th day of July, 1996 before me a notary public in and for said County, personally appeared Michael D 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

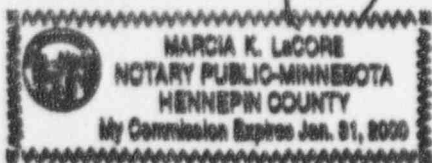


Exhibit A

Prairie Island Nuclear Generating Plant License Amendment Request Dated July 15, 1996

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 and Reasons for Changes

The Moveable Incore Detector System consists of 36 incore flux thimbles to permit measurement of the axial and radial neutron flux distribution within the reactor core. Moveable fission chamber detectors are available to scan the length of the 36 selected core locations. Specification 3.11.A currently requires at least 75% of the detector thimbles to be operable when performing a flux map to ensure compliance with the peaking factor requirements of Technical Specification Section 3.10.B. In accordance with the surveillance requirements in Specification 3.10.B.2 the peaking factors must be determined to be within limits at least once per 31 effective full power days. If the moveable detector system is degraded to the extent that less than 75% of the detector thimbles are available, Technical Specification 3.11.A requires that the measurement error allowance due to incomplete mapping shall be substantiated by the licensee.

The Prairie Island Unit 1 moveable incore detectors have experienced sticking problems which have prevented them from fully inserting into all of the thimble tubes. Due to these recurrent sticking problems, the Unit 1 thimbles were cleaned following Cycle 15 increasing the number of accessible thimbles from 28 to 32. In an attempt to regain the remaining thimbles, 6 thimbles were replaced and the slip clutches on the detector drives were either rebuilt or replaced at the end of Cycle 16. The net effect on the system for the beginning of Cycle 17 was that 34 of the 36 thimbles were accessible. In Cycle 17 three thimbles were lost early in the cycle and 31 of 36 remained accessible through the end of the cycle. Following Cycle 17, 35 of 36 thimbles were eddy current tested successfully.

The following table illustrates the actual number of accessible thimbles to date for Unit 1 Cycle 18:

<u>Flux Map</u>	<u>Date</u>	<u>% Power</u>	<u>Accessible Thimbles</u>
1	03/04/96	30%	30
2	03/04/96	48%	32
3	03/06/96	70%	30

<u>Flux Map</u>	<u>Date</u>	<u>% Power</u>	<u>Accessible Thimbles</u>
4	03/10/96	100%	32
5	03/12/96	100%	32
6	03/12/96	100%	32
7	04/08/96	100%	32
8	05/07/96	100%	31
9	05/23/96	100%	29
10	06/21/96	100%	29

Attachments 2 and 3 to this Exhibit show the thimble locations inaccessible during the performance of flux maps 9 and 10 for Unit 1 Cycle 18. As can be seen from the data above, during the flux map performed on June 21, 1996 only 81% (29 of 36) of the incore thimbles would allow passage of the moveable detectors.

As evidenced by the data above and by Attachments 2 and 3, the location of detector thimbles which are unavailable has changed throughout Unit 1 Cycle 18. However, as can be seen in Attachments 2 and 3, for flux maps 9 and 10 the available detectors were well distributed throughout the core and the thimble coverage was adequate.

Until corrective actions can be taken, in view of the recent decline in the number of detector thimbles available, Northern States Power is concerned about meeting the 75% criterion called for in Technical Specification 3.11.A for future required moveable incore detection system monitoring/calibration uses. Northern States Power believes that this problem has the potential to worsen throughout Unit 1 Cycle 18. Failure to have at least 27 thimbles accessible (75%) could eventually result in a forced Unit 1 shutdown due to the inability to determine the peaking factors per the requirements of Technical Specifications 3.10.B.1, 3.10.B.2 and 3.10.B.3.

In order to be prepared for the possibility that the number of available moveable detector thimbles could fall below 75%, Northern States Power commissioned Westinghouse Electric Corporation to evaluate, per Technical Specification 3.11.A, the measurement error allowance due to flux mapping with less than 75% of the detector thimbles available. As part of their evaluation, Westinghouse assessed the incremental peaking factor measurement uncertainties and excore calibration impact associated with a reduction to a minimum of 18 (i.e. 50%) of the 36 moveable detector thimbles in Prairie Island Unit 1 for Cycle 18. The results of the Westinghouse evaluation is provided as Exhibit D.

Based on the results of the Westinghouse evaluation discussed above, this license amendment request proposes changes to the power distribution limit requirements in Technical Specifications 3.10.B.1, 3.10.B.2, 3.10.B.3.b.2 and 3.10.B.3.d.1 to increase the uncertainty factor applied to the peaking factors when a flux map is performed with less than 75% of the thimbles. Changes are also proposed to Technical Specification 3.11.B to clarify the requirements for the number of detector thimbles required per core

quadrant when the number of available detector thimbles is less than 75%. The proposed changes are one time only changes, applicable only to the remainder of Prairie Island Unit 1 Cycle 18. They would allow continued operation of Unit 1 for the remainder of Cycle 18, at which time the detector thimble sticking problem will be addressed.

Proposed Changes

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

A. Proposed Changes to Technical Specification 3.10.B

Technical Specifications 3.10.B.1, 3.10.B.2, 3.10.B.3.b.1 and 3.10.B.3.d.1 are modified, as shown in Exhibit B, by adding footnotes which address the peaking factor measurement uncertainties. The footnotes, which are applicable only for Prairie Island Unit 1 Cycle 18, instruct that the peaking factor measurement uncertainty be increased linearly, as a function of the number of available detector thimbles, when the number of available detector thimbles is greater than or equal to 50% and less than 75% of the total. For F_{Δ}^N the 5% measurement uncertainty, currently specified in the Technical Specifications, increases linearly to a maximum of 8% for the condition with 50% of the detector thimbles available. For $F_{\Delta H}^N$ the 4% measurement uncertainty, currently specified in the Technical Specifications, increases linearly to a maximum of 6% for the condition with 50% of the detector thimbles available. These additional uncertainties are in accordance with the results of the Westinghouse evaluation for Unit 1 Cycle 18 discussed above.

B. Proposed Changes to Technical Specification 3.11.B

Technical Specification 3.11.B is modified, as shown in Exhibit B, by adding a footnote which states that for Unit 1 Cycle 18 with greater than or equal to 50% and less than 75% detector thimbles available, the 2 thimble per quadrant requirement must be met for each of the four horizontal-vertical quadrants and the four diagonally-bounded quadrants (eight individual quadrants in total). This is consistent with the assumptions in the Westinghouse evaluation for Unit 1 Cycle 18 discussed above and it is being added to Technical Specification 3.11.B to establish the bounds of the applicability of the evaluation. Per the Westinghouse evaluation, detector thimbles located on the boundaries between quadrants can be counted toward each of the adjacent quadrants at the same time.

Bases for Specification 3.11.B

The bases for Specification 3.11.B are revised in accordance with the changes made in the specification as stated above. The changes to the bases are shown in Exhibit B.

Safety Evaluation and Justification of Changes

The moveable incore detector system is used for confirmatory information and is not required for the day to day safe operation of the reactor (daily core power performance is monitored by the excore detectors). The measured power distribution is affected by the "true" power distribution that exists in the core, the predicted power distribution in the core, and the instrument thimble pattern. The thimbles are distributed nearly uniformly over the core with approximately the same number of thimbles in each quadrant. The number and location of these thimbles allows measurement of $\bar{F}_{\Delta H}^N$ to within 4% and \bar{F}_Q^N to within 5% with at least 75% of the detector thimble locations available.

The 75% detector thimble availability requirement in Technical Specification 3.11.A was based on the requirements from Revision 4a of the Westinghouse Standard Technical Specifications. The requirement for maintaining 75% of the detector thimbles available provides for a reasonable amount of failures of the incore detectors while encouraging licensees to strive for maintaining the system as near to 100% available as possible. Technical Specification 3.11.A allows continued use of the moveable incore detector system with less than 75% of the thimbles available if the measurement error allowance due to incomplete flux mapping is substantiated. As shown by the attached Westinghouse evaluation, the reduction of available detector thimbles to 50%, as proposed by this amendment request, does not significantly degrade the ability of the detector system to measure core power distributions. However, use of the moveable incore detector system with less than 75% of the detector thimbles available requires the core peaking factor measurement uncertainties specified in Technical Specification Section 3.10.B be increased to compensate for the reduction in the number of available detector thimble locations.

As noted above, Northern States Power commissioned Westinghouse to assess the incremental peaking factor measurement uncertainties and excore calibration impact associated with a reduction to a minimum of 18 of the 36 moveable detector thimbles for Prairie Island Unit 1 Cycle 18. That evaluation is provided as Exhibit D to this submittal. That evaluation, which is based on a Westinghouse generic thimble deletion analysis, indicates that additional uncertainties of 2% for $\bar{F}_{\Delta H}^N$ and 3% for \bar{F}_Q^N are appropriate when the number of instrumented assemblies is reduced from 36 to 18. The additional uncertainties should be applied linearly from below 75% to greater than or equal to 50% detector thimble locations.

In addition to the uncertainty changes, the Westinghouse evaluation also specifies that whenever greater than or equal to 50% and less than 75% of the detector thimbles are available, there should be a minimum of two thimbles available per quadrant, where quadrant includes both horizontal-vertical quadrants and diagonally bounded quadrants (eight individual quadrants in total). This requirement improves the ability to distinguish between random and systematic thimble deletion events and establishes the bounds of applicability of the peaking factor uncertainties. The peaking factor measurement uncertainty analysis in the Westinghouse evaluation makes the assumption that thimbles were randomly deleted from the core. If the thimbles are somehow systematically deleted from use, then the calculated peaking factor measurement uncertainties will not apply. Technical Specification 3.11.B currently requires a minimum of 2 detector thimbles per quadrant. However, the current requirement in Technical Specification 3.11.B is not sufficient to distinguish between random and systematic deletion events with high confidence. To help insure that thimble deletion is random, a footnote is being added to Technical Specification 3.11.B to provide the more restrictive quadrant requirements necessary for Unit 1 Cycle 18 with greater than or equal to 50% and less than 75% detector thimbles available. This footnote will establish the bounds on the number of detector thimbles per quadrant to be consistent with the Westinghouse evaluation and will significantly enhance the ability to distinguish between random and systematic events.

The Westinghouse evaluation concludes that with the inclusion of the additional peaking factor uncertainties, operation of the moveable incore detector system with a minimum of 50% of the thimbles available is acceptable with the above provisions on the number of detector thimbles per quadrant.

Burnup on Unit 1 Cycle 18 is currently about 4,800 MWD/MTU of a 21,860 MWD/MTU cycle. At this point in cycle operation, the core characteristics have been well established and, specifically, core power distribution is well behaved. All power distribution surveillance parameters ($F_{\Delta H}^N$ and F_Q^N) currently have sufficient margin to their limits after the current Technical Specification required uncertainties are applied. From the flux map taken on June 21, 1996, it is calculated that there is approximately 5.3% margin to $F_{\Delta H}^N$ (i.e., measured $F_{\Delta H}^N$ plus its measurement uncertainty in comparison to its Technical Specification limit) and approximately 9% margin to F_Q^N . See Attachment 1 to this Exhibit for a summary of the results of the flux maps taken to date during Unit 1 Cycle 18. The predicted peaks ($F_{\Delta H}^N$ and F_Q^N) provide 5% to 12% margin to the Technical Specification limits through the remainder of the cycle. It is also expected that the core will continue to behave as designed. Therefore, adequate margin exists for implementation of the additional measurement uncertainties resulting from the Westinghouse evaluation.

Similar requests for relaxation of the 75% requirement have been reviewed and found acceptable by the NRC in the past. Similar license amendments approved by the NRC

include; Beaver Valley Unit 1 Amendment 61 approved on January 19, 1983, McGuire Unit 1 Amendment 101 approved on December 14, 1989 and McGuire Unit 1 Amendment 117 approved on February 27, 1991

Conclusion

This proposed change to the Prairie Island Technical Specifications would allow an increase in plant operating flexibility for Unit 1 Cycle 18, while maintaining sufficient data collection capability to ensure that the operation of the core is within licensed limits. This change would be utilized only if further failures of the Unit 1 detector thimbles occur during the remainder of Cycle 18. Based upon the preceding justification, Northern States Power concludes that the proposed amendments are necessary to avoid an unnecessary potential shutdown of Prairie Island Unit 1 which has real benefits in terms of availability, component lifetime (avoiding an unnecessary thermal cycle on the reactor and associated systems), and safety (the potential for plant upset and challenges to safety systems is increased during a plant shutdown). Based upon the preceding safety analysis and the results of the Westinghouse evaluation (Exhibit D), Northern States Power believes there is reasonable assurance that 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 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 proposed changes do not involve an increase in the probability of an accident previously evaluated. The moveable incore detector system is used only to provide confirmatory information on the neutron flux distribution and is not required for the daily safe operation of the core. The system is not a process variable that is an initial condition in the accident analyses. The only accident that the moveable incore detector system could be involved in is the breaching of the detector thimbles which would be enveloped by the small break loss of coolant accident (LOCA) analysis. As the proposed changes do not involve any changes to the system's equipment and no equipment is operated in a new or more harmful manner, there is no increase in the probability of such an accident.

The proposed amendments would not involve an increase in the consequences of an accident previously evaluated. The moveable incore detector system provides a monitoring function that is not used for accident mitigation (the system is not used in the primary success path for mitigation of a design basis accident). The ability of the reactor protection system or engineered safety features system instrumentation to mitigate the consequences of an accident will not be impaired by the proposed changes. The small break LOCA analysis (and thus its consequences) continues to bound potential breaching of the system's detector thimbles.

With greater than or equal to 50% and less than 75% of the detector thimbles available, core peaking factor measurement uncertainties will be increased, which could impact the core peaking factors and as a result could affect the consequences of certain accidents. However, any changes in the core peaking factors resulting from increased measurement uncertainties will be compensated for by conservative measurement uncertainty adjustments in the Technical Specifications to ensure that pertinent core design parameters are maintained. Sufficient additional penalty is added to the power distribution measurements such that this change will not impact the consequences of any accident previously evaluated.

Therefore, based on the conclusions of the above analysis, the proposed changes will not involve a significant increase in 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.

The proposed amendments would not create the possibility of a new or different kind of accident previously evaluated as they only affect the minimum complement of equipment necessary for operability of the moveable incore detector system. There is no change in plant configuration, equipment or equipment design. No equipment is operated in a new manner. Thus the changes will not create any new or different accident causal mechanisms. The accident analysis in the Updated Safety Analysis Report remains bounding.

Therefore, based on the conclusions of the above analysis, the proposed changes will not create the possibility of a new or different kind of accident.

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

The proposed changes will not involve a significant reduction in a margin of safety. The reduction in the minimum complement of equipment necessary for the operability of the moveable incore detector system could only impact the

monitoring/calibration functions of the system. Reduction of the number of available moveable incore detector thimbles to the 50% level does not significantly degrade the ability of the system to measure core power distributions. With greater than or equal to 50% and less than 75% of the detector thimbles available, core peaking factor measurement uncertainties will be increased, but will be compensated for by conservative measurement uncertainty adjustments in the Technical Specifications to ensure that pertinent core design parameters are maintained. Sufficient additional penalty is added to the power distribution measurements such that this change does not impact the safety margins which currently exist. Also, the reduction of available detector thimbles has negligible impact on the quadrant power tilt and core average axial power shape measurements. Sufficient detector thimbles will be available to ensure that no quadrant will be unmonitored.

Based on these factors, the proposed changes in this license amendment will not result in a significant reduction in the plant's margin of safety, as the core will continue to be adequately monitored.

Conclusion

Based on the evaluation above, and pursuant to 10 CFR 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 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.

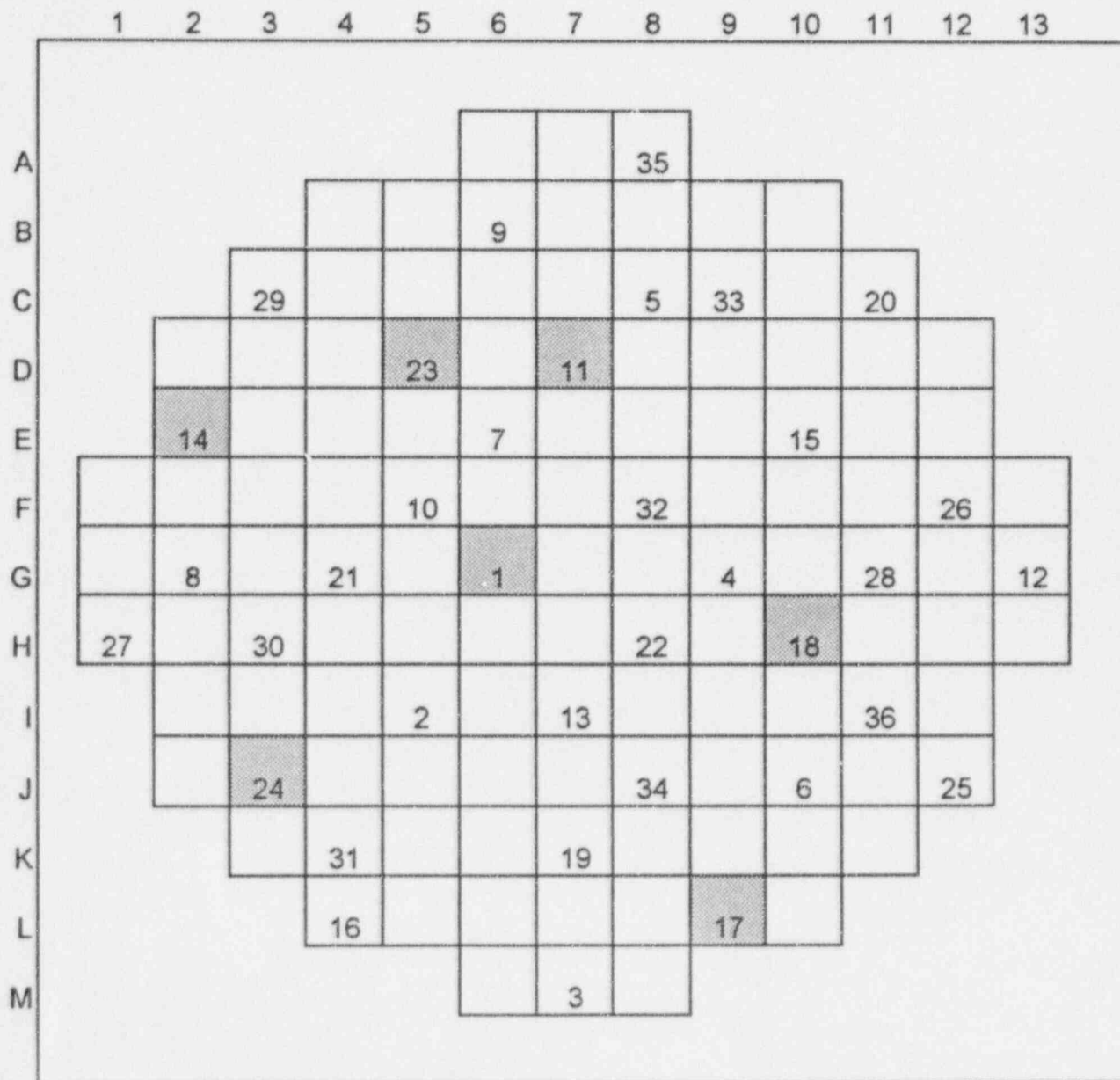
Attachments

1. Summary of Flux Map Peaking Factors
2. Instrument Thimble Location (Map #118-09)
3. Instrument Thimble Location (Map #118-10)

**Prairie Island
Summary of Flux Map Peaking Factors**

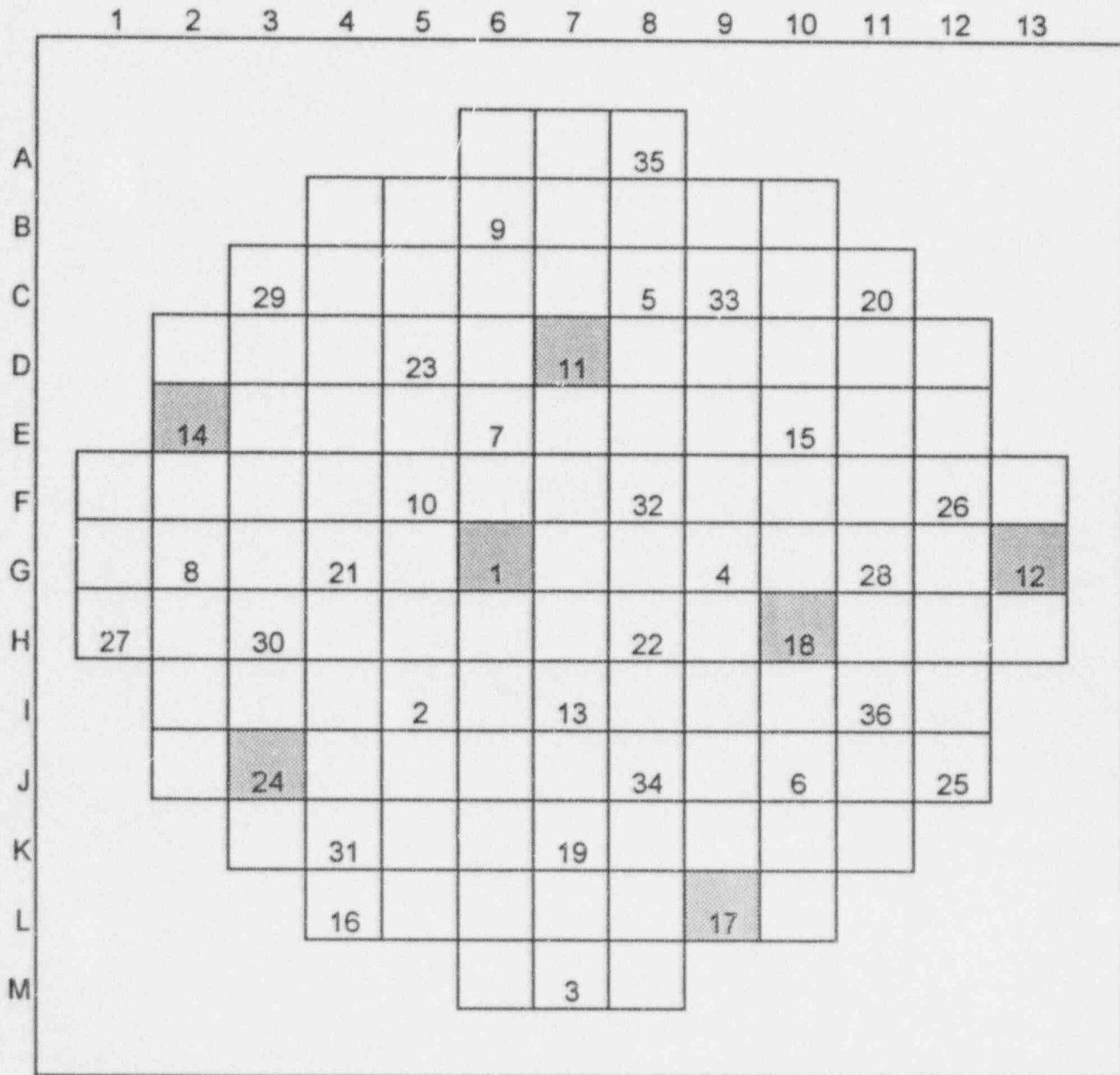
<u>Flux Map Number</u>	<u>Burnup (MWD/MTU)</u>	<u>% Power</u>	<u>FΔH Margin to Limit</u>	<u>FQ Margin to Limit</u>
1	5	30	15.4%	44.3%
2	10	48	12.2%	46.4%
3	35	70	10.6%	34.7%
4	155	100	3.8%	2.8%
5	225	100	4.4%	9.0%
6	235	100	3.5%	9.1%
7	1300	100	4.7%	5.0%
8	2425	100	4.1%	5.3%
9	3035	100	5.2%	7.8%
10	4168	100	5.3%	9.0%

Prairie Island
Instrument Thimble Locations
(Map #118-09)



Inaccessible Thimble

Prairie Island
Instrument Thimble Locations
(IMap #118-10)



Inaccessible Thimble