



Northern States Power Company

Prairie Island Nuclear Generating Plant

1717 Wakonade Dr. East
Welch, Minnesota 55089

November 10, 1999

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 November 10, 1999
Revision to Elevated F* Steam Generator Tube Repair Criteria**

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 amendment request proposes a change to Technical Specification (TS) 4.12, "Steam Generator Tube Surveillance", to incorporate revised Elevated F-Star (EF*) Distance. The EF* Distance was revised following a correction to a minor error in the calculation of tubesheet bending.

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 Westinghouse Report WCAP-14225, Revision 2, entitled "F* and Elevated F* Tube Plugging Criteria for Tubes with Degradation in the Tubesheet Region of the Prairie Island Units 1 and 2 Steam Generators". Exhibit F contains the Westinghouse authorization letter, CAW-99-1327, accompanying affidavit, Proprietary Information

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

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Notice, and Copyright Notice.

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-99-1327 and should be addressed to Henry A. Sepp, Manager of Regulatory and Licensing Engineering, Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

We request that the proposed license amendment request be issued by April 28, 2000 in order to support the use of the revised EF* criteria during the April 2000 Unit 2 refueling outage.

In this letter we have made no new Nuclear Regulatory Commission commitments.

Please contact Richard Pearson (651-388-1121) if you have any questions related to this letter.



Joel P. Sorensen
Site General Manager
Prairie Island Nuclear Generating Plant

c: Regional Administrator - Region III, NRC
Senior Resident Inspector, NRC
NRR Project Manager, NRC
J E Silberg

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 WCAP-14225, Revision 2

Exhibit E - Non-proprietary version of WCAP-14225, Revision 2

Exhibit F - Westinghouse authorization letter, CAW-99-1327, accompanying affidavit,

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

DOCKET NO. 50-282
50-306

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

LICENSE AMENDMENT REQUEST DATED November 10, 1999
REVISION TO ELEVATED F* STEAM GENERATOR TUBE REPAIR CRITERIA

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, D, E and F. Exhibit A describes the proposed changes, reasons for the changes, safety evaluation and a significant hazards evaluation. Exhibits B and C are copies of the Prairie Island Technical Specifications incorporating the proposed changes. Exhibits D and E are reports supporting the requested changes. 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 Joel P. Sorensen
Joel P. Sorensen
Site General Manager
Prairie Island Nuclear Generating Plant

On this 10th day of November 1999 before me a notary public in and for said County, personally appeared Joel P. Sorensen, Site General 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.

Dale M. Vincent

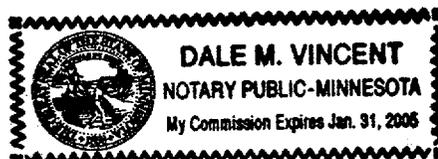


Exhibit A

Prairie Island Nuclear Generating Plant License Amendment Request Dated November 10, 1999

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

This amendment request proposes a change to Technical Specification (TS) 4.12, "Steam Generator Tube Surveillance", to revise the Elevated F-Star (EF*) Distance. Previously, the EF* criterion was authorized for use at Prairie Island by License Amendment 137. There are no changes to the F* Distance.

The EF* Distance (which does not include eddy current uncertainty) is increased from 1.62 inches to 1.67 inches, an increase of 0.05 inches. The change was necessitated by a Westinghouse correction of a minor error in the tubesheet bending calculation. This change of EF* length is documented in WCAP-14225, Revision 2, entitled "F* and Elevated F* Tube Plugging Criteria for Tube with Degradation in the Tubesheet Region of the Prairie Island Units 1 and 2 Steam Generators". This report, prepared by Westinghouse Electric Corporation, is contained in Exhibit D. A non-proprietary version of the report is included in Exhibit E.

The steam generators at Prairie Island are Westinghouse Model 51 steam generators with low temperature mill-annealed Alloy 600 tubing. In the tubesheet region, the tubing has a hard roll expansion only in the lower 2.75 inches.

The EF* Distance is based on determining the length of hardroll engagement necessary to resist tube pullout forces during normal operation, test, upset, and faulted conditions. EF* is implemented at Prairie Island by forming an additional roll expansion joint starting no higher than 2 inches below the top of the tubesheet. The EF* Distance is controlled by process control. For a new additional roll expansion, the requirement is at least 1.8 inches of new hard roll. This is controlled by the length of the rollers (at least 1.8 inch effective length). In actual practice, a 2 inch effective hard roll is installed. There are currently 19 tubes in service using EF* in Unit 1 and none in service in Unit 2.

No significant leakage relative to plant Technical Specification limits is to be expected from application of the EF* criterion at the longer length.

Proposed Changes

Technical Specification 4.12, "Steam Generators Tube Surveillance", describes the inservice inspection program used to demonstrate steam generator operability. The EF* distance in Technical Specification 4.12 must be revised. A brief description of the proposed revision is provided below. The specific wording changes to the Technical Specifications are shown in Exhibits B and C.

1. Proposed Changes to Technical Specification 4.12.D.1(i)

The EF* Distance is increased from 1.62 inches to 1.67 inches.

No changes to the Bases for Specification 4.12 are required.

Justification

The basis for steam generator tube surveillance and plugging/repair is to ensure that the structural integrity of the tubes is maintained. The EF* criterion was developed to allow for an alternative to tube plugging or sleeving for indications which occur in the tubesheet area. The EF* criterion was premised on the fact that the tubesheet provides reinforcement of the expanded portion of the tube, provides resistance to tube rupture and collapse, and limits leakage of through wall cracks. The EF* Distance (of undegraded expanded tube in the tubesheet) has been found by testing to be sufficient to maintain any potential leakage (resulting from tube degradation occurring further down in the tubesheet) to well below the Technical Specification limit and Safety Analysis assumptions.

The proposed change increases the EF* Distance from 1.62 inches to 1.67 inches (not including eddy current uncertainty). This change is the result of a correction to a minor error in the tubesheet bending calculation and is documented in Westinghouse WCAP-14225, Revision 2.

Safety Evaluation

Introduction

The amendment has been proposed to address a correction to the EF* distance in Technical Specification 4.12. The EF* criterion is implemented by forming an additional roll expansion joint up to two inches below the top of the tubesheet. In practice, the additional hard roll expansion is about two inches long. The proposed change increases the EF* Distance (of Technical Specification section 4.12.D.1.(j)) from 1.62 to 1.67 inches (excluding NDE uncertainty) for the Prairie Island steam generators. The revised EF* Distance provides adequate assurance of steam generator tube integrity.

Evaluation

When the tubes have been hardrolled into the tubesheet, any axial loads developed by pressure and/or mechanical forces acting on the tubes are resisted by frictional forces developed by the elastic preload that exists between the tube and the tubesheet. For some specific length of engagement of the hardroll, no significant axial forces will be transmitted further down the tube, and that length of tubing, the EF* distance, will be sufficient to anchor the tube in the tubesheet. In order to determine the EF* Distance for application in Westinghouse Model 51 steam generators, a testing program was conducted to measure the elastic preload of the tubes in the tubesheet.

The revised EF* Distance provides for sufficient engagement of the tube-to-tubesheet hardroll such that pullout forces that could be developed during normal or accident operating conditions would be successfully resisted by the elastic preload between the tube and tubesheet. This revision is due to the treatment of the effect of the secondary side pressure on tubesheet hole enlargement for normal operation. For conservatism it is assumed that the steam generator secondary side pressure penetrates the tube OD/tubesheet hole surface interface axial lengths of the EF* expansion.

In the calculations made to isolate the contribution of primary and secondary side pressure to the tube-to-tubesheet contact pressure, the secondary side pressure was incorrectly applied to the tubesheet hole surface resulting in lower contact pressure. In the calculations for the contact pressures due to pressure, temperature, and tubesheet bow, the secondary side pressure was not applied to the surface of the tubesheet hole. This resulted in contact pressures that were too high. The two errors combined in the EF* calculation to under predict the decrease in contact pressure due to tubesheet bow. The EF* length provided in Table 3-1 of WCAP 14225 Revision 2 for 2.0 inches down from the top of the tubesheet is increased by 0.05 inch. This is an increase of 3.1%, but still satisfies all applicable recommendations of Regulatory Guide 1.121, with regard to tube burst capability.

Conclusions

In conclusion, 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 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 proposed change to the EF* Distance ensures the roll expansion is sufficient to preclude tube pullout from tube degradation located below the EF* Distance, regardless of the extent of the tube degradation. The existing Technical Specification leakage rate requirements and accident analysis assumptions remain unchanged in the unlikely event that significant leakage from this region does occur. Tube rupture and pullout is not expected for tubes using either the proposed or current EF* Distance because, in practice, the roll expanded region exceeds both distances. Any leakage out of the tube from within the tubesheet at any elevation in the tubesheet is still fully bounded by the existing steam generator tube rupture analysis included in the Prairie Island USAR.

Leakage testing of roll expanded tubes indicates that for roll lengths approximately equal to the EF* distance, any postulated faulted condition primary to secondary leakage from EF* tubes would be insignificant. Leakage testing was previously reported for 2 inch effective length hard rolls.

Thus, neither the probability nor consequences of previously evaluated accidents are affected by the proposed increase in the EF* Distance.

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

Implementation of the proposed EF* Distance does not introduce any significant changes to the plant design basis, nor does it change the way any system, structure, or component is operated. Use of EF* (either using the existing or proposed EF* Distance) does not provide a mechanism to initiate an accident outside of the region of the expanded portion of the tube. Any hypothetical accident as a result of any tube degradation in the expanded portion of the tube would be bounded by the existing tube rupture accident analysis.

Thus, no new or different kind of accident is created by the proposed increase in EF* Distance.

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

The proposed increase in EF* Distance will not decrease the integrity of the reactor coolant system boundary. The use of the EF* criterion has been previously demonstrated to maintain the integrity of the tube bundle commensurate with the requirements of Reg. Guide 1.121 (intended for indications in the free span of tubes) and the primary to secondary pressure boundary under normal and postulated accident conditions. Acceptable tube degradation for the EF* criterion is

any degradation indication in the tubesheet region, more than the EF* Distance below the bottom of the transition between the roll expansion and the unexpanded tube. The safety factors used in the verification of the strength of the degraded tube are consistent with the safety factors in the ASME Boiler and Pressure Vessel Code used in steam generator design.

The EF* Distance has been verified by testing to be greater than the length of roll expansion required to preclude both tube pullout and significant leakage during normal and postulated accident conditions. Resistance to tube pullout is based upon the primary to secondary pressure differential as it acts on the surface area of the tube, which includes the tube wall cross-section, in addition to the inner diameter based area of the tube. The leak testing acceptance criteria are based on the primary to secondary leakage limit in the Technical Specifications and the leakage assumptions used in the USAR accident analyses.

Revision of the EF* length does not affect the integrity of the existing EF* tubes which are in service due to the conservative length of the additional reroll.

Based on the above, it is concluded that the proposed change does not result in a significant reduction in margin with respect to plant safety as defined in the USAR or the Technical Specification Bases.

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.

Therefore, the proposed Technical Specification changes would not result in a significant radiological environmental impact.

Exhibit B

Prairie Island Nuclear Generating Plant

License Amendment Request Dated November 10, 1999

**Proposed Changes Marked Up
On Existing Technical Specification Pages**

Exhibit B consists of existing Prairie Island Nuclear Generating Plant Units 1 and 2 Technical Specification pages with the proposed changes highlighted on those pages. The pages affected by this License Amendment Request are listed below:

TS.4.12-5

- (j) F* Distance is the distance from the bottom of the hardroll transition toward the bottom of the tubesheet that has been conservatively determined to be 1.07 inches (not including eddy current uncertainty). The F* distance applies to roll expanded regions below the midplane of the tubesheet
 - (k) F* Tube is a tube with degradation, below the F* distance, equal to or greater than 40%, and not degraded (i.e., no indications of cracking) within the F* distance.
 - (l) EF* Distance is the distance from the bottom of the upper hardroll transition toward the bottom of the tubesheet that has been conservatively determined to be ~~1.62~~ 1.67 inches (not including eddy current uncertainty). EF* distance applies to roll expanded regions when the top of the additional roll expansion is 2.0 inches or greater down from the top of the tubesheet
 - (m) EF* Tube is a tube with degradation, below the EF* distance, equal to or greater than 40%, and not degraded (i.e., no indications of cracking) within the EF* distance.
2. The steam generator shall be determined OPERABLE after completing the corresponding actions (plug or repair by sleeving all tubes exceeding the repair limit and all tubes containing through-wall cracks or classify as F* or EF* tubes) required by Tables TS.4.12-1 and TS.4.12-2.
3. Tube repair, after April 1, 1999, using Combustion Engineering welded sleeves shall be in accordance with the methods described in the following:
- CEN-629-P, Revision 03-P, "Repair of Westinghouse Series 44 and 51 Steam Generator Tubes Using Leak Tight Sleeves";
4. Tube Support Plate Repair Limit is used for the disposition of a steam generator tube for continued service that is experiencing predominantly axially oriented outside diameter stress corrosion cracking confined within the thickness of the tube support plates. At tube support plate intersections, the repair limit is based on maintaining steam generator serviceability as described below:
- a. Steam generator tubes, whose degradation is attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with bobbin voltages less than or equal to 2.0 volts will be allowed to remain in service.
 - b. Steam generator tubes, whose degradation is attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with a bobbin voltage greater than 2.0 volts, will be repaired or plugged, except as noted in Specification 4.12.D.4.c below.

Exhibit C

Prairie Island Nuclear Generating Plant

License Amendment Request Dated November 10, 1999

Revised Technical Specification Pages

Exhibit C consists of revised pages for the Prairie Island Nuclear Generating Plant Units 1 and 2 Technical Specification with the proposed changes incorporated. The revised pages are listed below:

TS.4.12-5

- (j) F* Distance is the distance from the bottom of the hardroll transition toward the bottom of the tubesheet that has been conservatively determined to be 1.07 inches (not including eddy current uncertainty). The F* distance applies to roll expanded regions below the midplane of the tubesheet
 - (k) F* Tube is a tube with degradation, below the F* distance, equal to or greater than 40%, and not degraded (i.e., no indications of cracking) within the F* distance.
 - (l) EF* Distance is the distance from the bottom of the upper hardroll transition toward the bottom of the tubesheet that has been conservatively determined to be 1.67 inches (not including eddy current uncertainty). EF* distance applies to roll expanded regions when the top of the additional roll expansion is 2.0 inches or greater down from the top of the tubesheet
 - (m) EF* Tube is a tube with degradation, below the EF* distance, equal to or greater than 40%, and not degraded (i.e., no indications of cracking) within the EF* distance.
2. The steam generator shall be determined OPERABLE after completing the corresponding actions (plug or repair by sleeving all tubes exceeding the repair limit and all tubes containing through-wall cracks or classify as F* or EF* tubes) required by Tables TS.4.12-1 and TS.4.12-2.
3. Tube repair, after April 1, 1999, using Combustion Engineering welded sleeves shall be in accordance with the methods described in the following:
- CEN-629-P, Revision 03-P, "Repair of Westinghouse Series 44 and 51 Steam Generator Tubes Using Leak Tight Sleeves";
4. Tube Support Plate Repair Limit is used for the disposition of a steam generator tube for continued service that is experiencing predominantly axially oriented outside diameter stress corrosion cracking confined within the thickness of the tube support plates. At tube support plate intersections, the repair limit is based on maintaining steam generator serviceability as described below:
- a. Steam generator tubes, whose degradation is attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with bobbin voltages less than or equal to 2.0 volts will be allowed to remain in service.
 - b. Steam generator tubes, whose degradation is attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with a bobbin voltage greater than 2.0 volts, will be repaired or plugged, except as noted in Specification 4.12.D.4.c below.

Exhibit D

Prairie Island Nuclear Generating Plant

License Amendment Request Dated November 10, 1999

WCAP-14225

Revision 2

F and Elevated F* Tube Plugging Criteria for
Tubes with Degradation in the Tubesheet Region of the
Prairie Island Units 1 and 2 Steam Generators*

PROPRIETARY

Prepared By
Westinghouse Electric Company

March 1999

Exhibit E

Prairie Island Nuclear Generating Plant

License Amendment Request Dated November 10, 1999

WCAP-14225

Revision 2

F and Elevated F* Tube Plugging Criteria for
Tubes with Degradation in the Tubesheet Region of the
Prairie Island Units 1 and 2 Steam Generators*

NON-PROPRIETARY

Prepared By
Westinghouse Electric Company

March 1999