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

April 8, 1996

Generic Letter 95-03

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

Response to Request for Additional Information, Prairie Island Nuclear Generating Plant, Units 1 and 2, Generic Letter 95-03, "Circumferential Cracking of Steam GeneratorTubes" (TAC Nos. M92266 and M92267)

Attachment 3 to this letter provides our response to the Request for Additional Information Regarding Generic Letter 95-03 for the Prairie Island Nuclear Generating Plant Units 1 & 2 included in the January 16, 1996 letter from Beth A Wetzel, NRC to Roger O Anderson, NSP. Additionally, this letter noted that we had not submitted our previous response under oath and requested submittal of the oath with this response. It is included as Attachment 1.

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

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

Michael D Wadley

Michael D Wadley
Plant Manager
Prairie Island Nuclear Generating Plant

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

Attachments:

1. Affidavit for June 27, 1995 response to Generic Letter 95-03
2. Affidavit for this submittal
3. Response to Request for Additional Information, Prairie Island Nuclear Generating Plant, Units 1 and 2, Generic Letter 95-03, "Circumferential Cracking of Steam Generator Tubes"

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT DOCKET NO. 50-282
50-306

GENERIC LETTER 95-03, CIRCUMFERENTIAL CRACKING OF STEAM GENERATOR TUBES

Northern States Power Company, a Minnesota corporation, with a letter dated June 27, 1995, entitled "Response to Generic Letter 95-03, Generic Letter 95-03, Circumferential Cracking of Steam Generator Tubes" submitted information requested by NRC Generic Letter 95-03. This affidavit affirms the contents of that submittal.

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 8th day of April 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 was not interposed for delay.

Marcia K LaCore

MARCIA K. LaCORE
NOTARY PUBLIC-MINNESOTA
HENNEPIN COUNTY
My Commission Expires Jan. 31, 2000

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT DOCKET NO. 50-282
50-306

GENERIC LETTER 95-03, CIRCUMFERENTIAL CRACKING OF STEAM GENERATOR TUBES

Northern States Power Company, a Minnesota corporation, with this letter is submitting information requested by a Request for Additional Information related to NRC Generic Letter 95-03.

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 8th day of April 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

MARCIA K. LaCORE
NOTARY PUBLIC-MINNESOTA
HENNEPIN COUNTY
My Commission Expires Jan. 31, 2000

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2
GENERIC LETTER 95-03, "CIRCUMFERENTIAL CRACKING OF STEAM GENERATOR TUBES"

FIRST PART OF QUESTION 1:

1. **The following areas have been identified as being susceptible to circumferential cracking:**

    a. **Expansion transition circumferential cracking**
    b. **Small radius U-bend circumferential cracking**
    c. **Dented location (including dented TSP) circumferential cracking**
    d. **Sleeve joint circumferential cracking**

    In your response, area c was not specifically addressed except for dented locations at the top of the tubesheet. Please submit the information requested in Generic letter (GL) 95-03 per the guidance contained in the GL for this area (and any other area susceptible to circumferential cracking). The staff realizes that some of the above areas may not have been addressed since they may not be applicable to your plant; however, the staff requests that you clarify this (e.g., no sleeves are installed; therefore, the plant is not susceptible to sleeve joint circumferential cracking).

ANSWER TO FIRST PART OF QUESTION 1:

The current status of identified dents at Prairie Island is shown in the table below:

Dents in Prairie Island Steam Generators

Description	SG 11	SG 12	SG 21	SG 22
# in Free Span	92	40	18	8
# at Top of Tubesheet	16	16	35	45
# at 07H	14	0	1	2
# at 07C	21	17	0	0
# at Other TSP's	6	2	0	1
Total No of Dents	149	75	54	56
Minimum Voltage	5.0	5.0	5.0	5.0
Maximum Voltage	48.1	31.9	35.8	16.2
Median Voltage	6.8	7.3	9.6	7.9

All dents greater than 5 volts were examined by the +Point™ rotating coil technology in the Unit 1 9601 inspection. No circumferential indications were found in dents. All dents greater than 5 volts will be examined by the +Point™ in the Unit 2 9701 inspection. In the future, a 20% sample will be done. If one circumferential or axial crack-like indication is found in the 20% sample, then the remaining dents will also be examined by rotating coil technology.

SECOND PART OF QUESTION 1:

If a voltage threshold is used for determining the severity of dented locations (if applicable), provide the calibration procedure used (e.g., 2.75 volts peak-to-peak on 4-20% through-wall ASME holes at 550/130 mix).

ANSWER TO SECOND PART OF QUESTION 1:

The threshold for dent identification is 5.0 volts. The voltage normalization for channel P1 (400/100 differential support plate suppression mix) is set on the four 20 percent flat bottom holes in accordance with the following table. The voltages in the table are based on the Alternate Plugging Criteria Program and were transferred from the laboratory standard S/N AD-014-89 to the Kewaunee transfer standard S/N AS-002-93 to these standards.

STD. #	Z-13809	Z-13810	Z-13812	Z-13813	Z-13814	Z-13815
P1	2.36v	2.44v	2.00v	2.20v	2.02v	2.14v

STD. #	Z-13817	Z-13824	Z-13825	Z-13826	Z-13827	
P1	2.08v	1.84	2.37	1.77	1.95	

FIRST PART OF QUESTION 2:

2. In section 1.2 of your response, a sentence detailing the past inspection scope of tubes with small radius U-bends (i.e., Rows 1 and 2) appears to have been inadvertently deleted. Please clarify the past inspection scope and results for the tubes with small radius U-bends in both Units 1 and 2 (e.g., x% of the tubes in Row 1 and 2 were examined with a rotating pancake coil probe. No circumferential cracks have ever been detected in these tubes.).

ANSWER TO FIRST PART OF QUESTION 2:

In the 9405 Unit 1 Steam Generator inspection, 100% of Rows 1 and 2 tubes were examined with the rotating pancake coil probe. No circumferential crack-like indications were found. One tube was plugged due to a single axial indication in the U-bend region.

In the 9505 Unit 2 Steam Generator inspection, most of the Rows 1 and 2 tubes were examined with the rotating +Point™ coil. The 0.680 inch 2-Coil (0.115" pancake / +Point™) dual motion MRPC technique was used to examine the majority (339 tubes) of the U-Bend region of rows 1 and 2. The balance of rows 1 and 2 were examined with a single 0.650 inch +Point™ (7 tubes) due to restrictions and a single 0.680 inch x 0.115" pancake (1 row 1 and 21 row 2 tubes,) due to lack of immediately available +Point™ probes. No circumferential crack-like indications were found.

In the 9601 Unit 1 Steam Generator inspection, 100% of Rows 1 and 2 tubes were examined with the rotating +Point™ coil. No circumferential crack-like indications were found.

SECOND PART OF QUESTION 2:

Please provide your future inspection plans at Units 1 and 2 per the guidance in GL 95-03 for small radius U-bend tubes (e.g., Rows 1 and 2).

ANSWER TO SECOND PART OF QUESTION 2:

The standard Steam Generator Refueling inspection plan at Prairie Island includes 100% rotating coil examination of Rows 1 and 2 U-bends.

The Prairie Island steam generator services specification and contracts for the period 1995 through 1998 require:

> "Eddy current data analysts shall be qualified to Appendix G of the EPRI PWR Steam Generator Examination Guidelines, EPRI-NP-6201, Rev. 3"

"The Supplier shall use digital multifrequency multiparameter eddy current equipment and techniques qualified in accordance with Appendix H of EPRI Report NP-6201: PWR Steam Generator Examination Guidelines, Revision 3. The Supplier shall demonstrate equivalency when variations in equipment, probes and essential variable ranges exist between qualified techniques and proposed techniques. All available qualification data for specialty exams/probes not qualified per Appendix H shall be presented to the Owner one month prior to the outage for review/acceptance."

FIRST PART OF QUESTION 3:

3. It was indicated that in May 1994, 319 sleeved tubes were examined with the "I"-coil probe in Unit 1. Discuss the inspection results from these examinations. Discuss the number and types (e.g., CE TIG welded) of sleeves installed at Unit 1.

ANSWER TO FIRST PART OF QUESTION 3:

The following information was included in NSP's Steam Generator Inspection Reports to the USNRC dated June 17, 1994:

When using rotating I-coil and pancake eddy current probes, volumetric indications were found in the upper weld of 27 Combustion Engineering welded tubesheet sleeves. These indications were characterized as shallow and on the inside surface. The visual examination showed the welds to be acceptable. There were some weld artifacts on the weld surface which could explain the eddy current indications. All of the welds were examined this outage by ultrasonic testing and found to be acceptable. The indications are not due to corrosion since they were found in sleeves from 3 different outages, 1987, 1992, and 1994. All sleeves with these indications were left in service.

Details of Sleeve Examination

A new type of eddy current examination was conducted on the Combustion Engineering welded tubesheet sleeves installed in 12 Steam Generator using a new probe called the "I"-coil RPC probe. In the past, only a cross-wound bobbin coil had been used to examine the sleeves. The I-coil probe was a Zetec Model 610ZR with 2 coils, one axially wound and one circumferentially wound. The coils are a slightly larger diameter than normal which enhances the ability to see degradation in the parent tube. Twenty of the 319 installed sleeves contained indications in the region of the upper sleeve weld. The new sleeves installed this outage were also examined with the I-coil RPC probe. Seven of the new sleeves had similar indications. None of these indications were identified by this year's cross-wound bobbin coil examination.

The sleeve material is Alloy 690.

The attached Table 4 [attached to the quoted report, not attached here] provides the list of sleeves with indications at the weld. The attached Figure 1 [attached to the quoted report, not attached here] is a drawing of the Combustion Engineering Tubesheet Sleeve installed at Prairie Island.

The ECT indications identified in the sleeve weld region by the I-coil probe were classified as PWA (possible weld anomaly) or SWI (sleeve weld indication).

Each sleeve which had an I-coil indication was also examined by a conventional 3-coil RPC probe, designated as Zetec 620ZR. This probe provides better resolution than the I-coil. All of the indications were classified as VOL (volumetric) by the 3-coil RPC. The indications were also characterized as shallow and located on the inside surface.

The indications were all located at the sleeve upper weld. Four of these sleeves were installed in the April 1987 outage and sixteen were installed in October 1992 outage. Seven were installed this outage.

A. The sleeves with the welding artifacts, as identified by eddy current RPC probes, are acceptable based on acceptable visual examination, ultrasonic examination, and indication location. There is currently no known primary side degradation which is volumetric in nature. In addition, since these indications are found in the both the oldest and newest sleeve welds, they are not a result of corrosion.

There were 436 Combustion Engineering TIG welded tubesheet sleeves installed in 12 steam generator prior to the Unit 1 9601 outage. There are now 680 total Combustion Engineering TIG welded tubesheet sleeves installed in 12 steam generator. There are no sleeves installed in 11 steam generator.

SECOND PART OF QUESTION 3:

For Unit 2, discuss the past inspection scope and results for any sleeved tube examinations performed. Discuss the number and types of sleeves installed at Unit 2, if applicable.

ANSWER TO SECOND PART OF QUESTION 3:

No sleeve inspections have been done in Unit 2 because there are no sleeves in the Unit 2 steam generators,

THIRD PART OF QUESTION 3:

Please provide your future inspection plans at Units 1 and 2 per the guidance in GL 95-03 for sleeve joints.

ANSWER TO THIRD PART OF QUESTION 3:

The Prairie Island inspection plan included inspection of all sleeves with rotating +Point™ coil during the 9601 Unit 1 Steam Generator inspection.

Circumferential indications were found in 4 old sleeves and 6 new sleeves, all of which were plugged or removed for metallurgical examination. The source of these indications were weld oxide inclusions and lack of fusion caused by inadequate cleaning of the parent tube prior to welding.

Future inspections will be similar, but may be reduced to a 20% sample size with 100% inspection expansion if one pluggable indication is found.

The Prairie Island steam generator services specification and contracts for the period 1995 through 1998 require:

> "Eddy current data analysts shall be qualified to Appendix G of the EPRI PWR Steam Generator Examination Guidelines, EPRI-NP-6201, Rev. 3"
>
> "The Supplier shall use digital multifrequency multiparameter eddy current equipment and techniques qualified in accordance with Appendix H of EPRI Report NP-6201: PWR Steam Generator Examination Guidelines, Revision 3. The Supplier shall demonstrate equivalency when variations in equipment, probes and essential variable ranges exist between qualified techniques and proposed techniques. All available qualification data for Specialty exams/probes not qualified per Appendix H shall be presented to the Owner one month prior to the outage for review/acceptance."

QUESTON 4:

4. Please clarify your commitment regarding the 100% inspection of the hot leg tubesheet region. Specifically address whether this commitment includes inspecting both the roll transition and the top of the tubesheet region similar to that performed in prior examinations.

ANSWER TO QUESTION 4:

The commitment is "*Furthermore, future inspection plans for Prairie Island call for 100% inspection of the hot leg tubesheet region using rotating coils with Plus-Point or equivalent for the next two steam generator inspections for each unit. At that time, we will evaluate the plans for continuing inspections.*"

The extent of the examination is Tube End Hot to 3 inches above the tubesheet which does include inspecting both the roll transition and the top of the tubesheet region similar to that performed in prior examinations.

FIRST PART OF QUESTION 5:

5. During the Maine Yankee outage in July/August 1994, several weaknesses were identified in its eddy current program as detailed in NRC Information Notice 94-88, "Inservice Inspection Deficiencies Result in Severely Degraded Steam Generator Tubes." In Information Notice 94-88, the staff observed that several circumferential indications could be traced back to earlier inspections when the data was reanalyzed using terrain plots. These terrain plots had not been generated as part of the original field analysis for these tubes. For the rotating pancake coil (RPC) examinations performed at your plant at locations susceptible to circumferential cracking during the previous inspection (i.e., previous inspection per your GL 95-03 response), discuss the extent to which terrain plots were used to analyze the eddy current data. If terrain plots were not routinely used at locations susceptible to circumferential cracking, discuss whether or not the RPC eddy current data has been reanalyzed using terrain mapping of the data. If terrain plots were not routinely used during the outage and your data has not been reanalyzed with terrain mapping of the data, discuss your basis for not reanalyzing your previous RPC data in light of the findings at Maine Yankee.

ANSWER TO FIRST PART OF QUESTION 5:

Our rotating coil data analysis guidelines have required analysts to c-scan (plot) all recorded data in addition to reviewing all recorded data with expanded strip charts set at 20 since revision 2 was issued on May 18, 1995. Between September 17, 1993 (Zetec released software capable of stepping through data while plotting) and May 18, 1995, it was our practice to evaluate the data in the same manner as above (not a written requirement). Between March of 1986 and September of 1993 we viewed lissajous, strip charts and c-scans to the extent the data analyst deemed necessary.

SECOND PART OF QUESTION 5:

Discuss whether terrain plots will be used to analyze the RPC eddy current data at locations susceptible to circumferential cracking during your next steam generator tube inspection (i.e., the next inspection per your GL 95-03 response).

ANSWER TO SECOND PART OF QUESTION 5:

Our current rotating coil data analysis guidelines require analysts to c-scan (plot) all recorded data in addition to reviewing all recorded data with an expanded strip charts set at 20. Future examination data analysis guidelines will reflect appropriate analysis techniques (practices) that have been qualified in accordance with Appendix H of EPRI Report NP-6201.