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August 23, 1994

NRC Gen Ltr 94-03

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

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Initial (30 day) Response to NRC Generic Letter 94-03, "Intergranular Stress Corrosion Cracking of Core Shrouds in Boiling Water Reactors"

The purpose of this letter is to provide our initial (30 day) response to NRC Generic Letter 94-03, dated July 25, 1994. The Generic Letter describes staff concerns related to core shroud cracking that has been identified at several foreign and domestic BWRs and requests that licensees inspect their core shrouds and perform safety analyses to support continued operation until inspections are conducted.

Reporting Requirement No. 1 of the Generic Letter required that within 30 days of the date of the letter all BWR addressees (except Big Rock Point) submit:

"(a) A schedule for inspection of the core shroud."

Monticello Response: Inspections of the Monticello core shroud have been scheduled for the 1994 refueling outage. The outage is currently scheduled to begin September 15, 1994.

"(b) A safety analysis, including a plant-specific assessment, as appropriate, supporting continued operation of the facility until inspections are conducted."

Monticello Response: The requested safety evaluation has been documented in Safety Review Item (SKI) 94-011. A copy of the SRI is provided as Enclosure 1 of this submittal. The evaluation determined that Monticello can continue to operate safely until inspections are conducted during the refueling outage scheduled to begin in approximately three weeks.

"(c) A drawing or drawings of the core shroud geometry (e.g., support configurations for the lower core support plate and the top guide, weld locations and configurations"

Monticello Response: The requested drawings are provided as Enclosures

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2 through 5 of this submittal.

"(d) A history of shroud inspections for the plant should be provided addressing date, scope, methods and results, if applicable."

Monticello Response: The requested information is provided as summarized in Attachment (2) to this submittal. As indicated in Attachment (2), no core shroud cracks have been discovered during any inspection performed to date.

Reporting Requirement No. 2 of the Generic Letter required that no later than 3 months prior to performing the core shroud inspections (or in accordance with the submittal schedule established with the NRC project manager for near term outage plant) all BWR addressees (except Big Rock Point) submit:

"(a) The inspection plan requested above in item 3 of Requested Action."

Monticello Response: Our Inspection Plan for the Monticello Core Shroud for the 1994 Refueling Outage is provided as Attachment 3 to this submittal.

"(b) Plans for evaluation and/or repair of the core shroud based on the inspection results."

Monticello Response: Monticello will be performing inspections of our core shroud during our 1994 refueling outage. Evaluation of our inspection results and an analysis of our core shroud structural performance will be completed prior to the end of the 1994 refueling outage. Any decisions concerning repair options would be based on the results of the 1994 inspection evaluation, the core shroud structural performance analysis, and the BWR Vessel Internals Project (BWRVIP) work.


The Generic Letter also requested that our response indicate whether we intended to follow the guidance developed by the BWROG to address this issue. The imminent start of our 1994 refueling outage (scheduled to begin on September 15, 1994) mandates that the majority of our planning for performing the core shroud inspections be accomplished in advance of the final BWRVIP guidance being available. We are participating in the BWRVIP efforts, and have established our shroud inspection plan based on the best information available at this time.

In addition to the above, the Generic Letter requested that in our response we indicate whether we would implement the actions requested by the letter. In reply to this question, NSP will implement Requested Licensee Actions (1) through (5) of Generic Letter 94-03.

This letter contains the following new NRC commitments:

1. NSP will implement the core shroud inspection plan specified in Attachment 3 during our 1994 refueling outage.
2. NSP will implement Requested Licensee Actions (1) through (5) of Generic Letter 94-03.

Please contact Terry Coss, Sr Licensing Engineer, at (612) 295-1449 if you require any additional information concerning this submittal.



Lon H Waldinger
General Manager
Monticello Nuclear Site

cc: Regional Administrator-III, NRC
NRR Project Manager, NRC
Resident Inspector, NRC
State of Minnesota,
Attn: Kris Sanda (w/o enclosures)
J Silberg (w/o enclosures)

- Attachment (1): Affidavit to the US Nuclear Regulatory Commission
- Attachment (2): History of Core shroud Inspection for the Monticello Nuclear Generating Plant
- Attachment (3): Core Shroud Inspection Plan for the Monticello Nuclear Generating Plant
- Enclosure (1): SEI 94-011, Revision 0, "Safety Evaluation of the Existing Core Shroud to Provide Justification for Continued Operation Until the Next Refueling Outage"
- Enclosure (2): Drawing NX-8290-96
- Enclosure (3): Drawing NX-8290-97
- Enclosure (4): Drawing NX-7831-257-1
- Enclosure (5) Drawing NX-7831-257-2

Attachment 1

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

MONTICELLO NUCLEAR GENERATING PLANT

DOCKET NO. 50-263

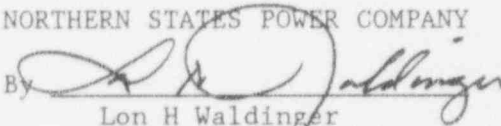
Initial (30 day) Response to NRC Bulletin 94-03, "Intergranular Stress Corrosion Cracking of Core Shrouds in Boiling Water Reactors"

Northern States Power Company, a Minnesota corporation, hereby provides the 30 day response information required by NRC Generic Letter 94-03.

This letter contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

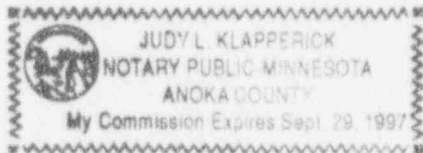
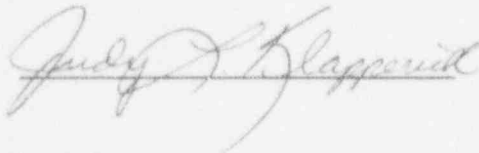
By



Lon H Waldinger
General Manager

Monticello Nuclear Site

On this 23rd day of August 1994 before me a notary public in and for said County, personally appeared Lon H Waldinger, General Manager, Monticello Nuclear Site, 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.



Attachment 2

History of Core Shroud Inspections
for the Monticello Nuclear Generating Plant

1993 Refueling Outage

Date: February 13, 1993 through February 14, 1993

Scope: Limited areas of welds H7, H8 and H9 were visually inspected in conjunction with the visual inspection of items in the annulus area. Approximately twelve (12) to fifteen (15) inches of weld accessible between each jet pump pair was inspected. Inspection was limited by restricted access due to jet pump sensing lines and jet pump diffusers.

Methods: A VT-1 Visual Inspection using a black and white camera. A 1 mil wire was used for a resolution standard.

Results: No cracks were observed.

1991 Refueling Outage

Date: April 26, 1991 through April 28, 1991

Scope: Augmented visual inspection per General Electric Co. RICSIL 054. Inspected vertical welds between welds H3 and H5 to the extent possible from the inside diameter and the outside diameter of the core shroud. Inspected 100% of circumferential weld H4 from the inside diameter and partially from the outside diameter.

Methods: A Visual Inspection using a black and white camera. A 1 mil wire was used for a resolution standard.

Results: No cracks were observed.

Attachment 3

Core Shroud Inspection Plan for the Monticello Nuclear Generating Plant

Inspection Scope

The goal of the core shroud inspection plan is to obtain the necessary information such that in conjunction with a plant specific core shroud performance analysis, a conservative assessment of the structural integrity of the Monticello core shroud can be established. This critical path refueling outage activity will be performed to provide the most comprehensive inspection practical with inspection emphasis established considering factors such as the susceptibility of the inspection location to crack formation, the accessibility of the inspection location, and the inspection technology available.

Refer to Figure A-1 of this attachment for weld identification locations.

Inspection Locations H1 through H5

Welds H1 through H5 are to be inspected to the maximum extent practical within the available outage window. If necessary, the inspection window will be expanded to confirm adequate ligament (with margin) to conservatively verify core shroud structural integrity. Inspection of the H1 location is limited to approximately 65% of the total weld length by core spray piping interferences. Approximately 85% of the total weld length at locations H2, H3, H4, and H5 can be inspected, with inspection limited by interferences such as core spray injection lines, guide rod brackets, and instrumentation brackets. Sufficient accessible material is to be inspected to provide a conservative evaluation of structural integrity while allowing for margin to account for inspection crack sizing uncertainty and crack growth rates if crack defects are detected.

Welds H1, H2, H3, H4, and H5 are to be inspected from the outside diameter of the core shroud employing ultrasonic testing augmented by eddy current testing. This approach of using a combination of inspection techniques provides for excellent flaw detection as well as flaw assessment. Monticello will be one of the first BWR facilities to use eddy current testing for this inspection application. Equipment for application of eddy current testing for this inspection is currently being fabricated. If difficulties arise that preclude the use of eddy current testing, then the ultrasonic inspection will be utilized for the weld evaluation.

Inspection Locations H6 through H9

Welds H6, H7, H8, and H9 are to be inspected as accessible at the reactor vessel azimuth location of 0° and 180°.

The H6 weld is to be inspected from the outside diameter of the core shroud using the inspection methodology of ultrasonic examination augmented by eddy current examination as discussed above for welds H1 through H5.

The H7 weld configuration employs a backing ring on the annulus side of the

core shroud. Neither eddy current examination nor visual examination of location H7 is feasible due to the presence of the backing ring. We will therefore perform an ultrasonic inspection from the outside diameter of the shroud to the extent practical.

Due to weld accessibility and weld configuration the use of ultrasonic examination or eddy current examination is not feasible for weld location H8 and H9. An enhanced visual inspection is to be performed of these weld locations in the vessel annulus area above the shroud support plate. The enhanced visual inspection is to be performed utilizing the enhanced visual inspection guidelines established by the BWR Vessel Internals Project (BWRVIP).

Inspection locations H10 through H12

Welds at locations H10, H11, and H12, comprising the fourteen shroud support legs, are not to be inspected during the 1994 refueling outage. Inspection of these welds is to be evaluated for the 1996 refueling outage after the BWRVIP guidance documents are developed and finalized. The following establishes our basis for not inspecting these welds at this time.

Low susceptibility to stress corrosion cracking due to the excellent protection provided by the employment of hydrogen water chemistry during the last 5 cycles of operation. Protection of the vessel internals has been shown by Electro-Chemical-Potential readings and is qualitatively supported by fuel scrape analysis.

Low susceptibility to stress corrosion cracking due to maintenance of proper water chemistry to mitigate the formation and growth of BWR vessel internals cracking. Chemistry data for the Monticello plant provided in GENE-523-A107P-0794 identifies the mean conductivity for the first five fuel cycles as 0.299 $\mu\text{S}/\text{cm}$. When compared to the data presented in GENE-523-A107P-0794 this would indicate a low susceptibility of the Monticello core shroud to stress corrosion cracking based on chemistry factors. Continuous improvement in reactor system water quality has been maintained throughout plant life.

Low susceptibility to stress corrosion cracking due to the core shroud support assembly being manufactured from Inconel. Inconel has a lower susceptibility to stress corrosion cracking than the 304 and 304L stainless steels.

Weld H12 was a shop fabricated weld which was stress relieved with the reactor vessel. This fabrication process lowers the susceptibility of this location to stress corrosion cracking.

The currently available technology for inspection of the welds below the shroud support plate is limited to visual inspection techniques. These inspection locations are not accessible during our normal refueling

outage. The ability to perform an enhanced inspection of these weld locations is questionable considering the limited accessibility and inspection location cleanliness.

The welds are below the shroud support plate and are loaded in compression and are constrained by the shroud support plate above and the vessel head below.

Vertical welds between H3 and H5

The vertical welds which join the rolled plate sections between welds H3 and H5 are not to be included in the scope of inspections for the 1994 refueling outage. The following establishes our basis for not inspecting these welds at this time.

These welds were visually inspected during the 1991 refueling outage with no crack indications observed.

The core shroud fabrication process resulted in the vertical welds having lower residual stresses than the circumferential welds, and thus have a lower susceptibility to stress corrosion cracking.

The Monticello core shroud barrel assembly was manufactured from Type 304 stainless steel. Material certification data for the Monticello core shroud barrel assembly shows the core shroud material carbon content to be below 0.06%. This carbon content is below that at which significant cracking has been observed in the BWR industry. Based on these material considerations, a moderate to low susceptibility to stress corrosion cracking is indicated for the Monticello core shroud.

As discussed above for inspection locations H10 through H12, chemistry factors indicate a low susceptibility of the Monticello core shroud to stress corrosion cracking.

Figure A-1

Monticello Core Shroud Cross Section
Core Shroud Weld Locations and Weld Identification

