



**Nuclear Management Company, LLC**  
Prairie Island Nuclear Generating Plant  
1717 Wakonade Dr. East • Welch MN 55089

September 4, 2001

NRC Bulletin 2001-01

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 NRC Bulletin 2001-01,  
“Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles**

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As required by NRC Bulletin 2001-01, *Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles*, Prairie Island offers the following:

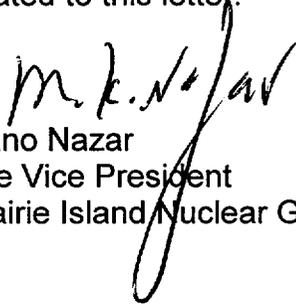
- (1) The information requested by the Bulletin is being submitted via this site-specific letter and the integrated response contained in MRP-48, *PWR Materials Reliability Program Response to NRC Bulletin 2001-01*, which was submitted by NEI to the NRC on August 21, 2001.
- (2) The information has been submitted via this letter within the time period requested by the Bulletin.

Prairie Island is participating in the Materials Reliability Program (MRP) integrated response to NRC Bulletin 2001-01, *Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles*. The integrated response is provided in MRP-48, *PWR Materials Reliability Program Response to NRC Bulletin 2001-01*, which was submitted by NEI to the NRC on August 21, 2001. MRP-48 contains the plant rankings using the time-at-temperature model, provides the supplementary information requested by paragraphs 1.a and 1.b of the NRC Bulletin, and provides comments regarding applicable regulatory requirements. The attached response to this correspondence provides the Prairie Island site-specific information related to NRC Bulletin 2001-01.

AOBB

In this letter we have made the one new Nuclear Regulatory Commission commitments indicated as the paragraph in bold in the attached response.

Please contact Jack Leveille (651-388-1121, Ext. 4142) if you have any questions related to this letter.



Mano Nazar  
Site Vice President  
Prairie Island Nuclear Generating Plant

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

Attachments:

1. Affidavit
2. Prairie Island Response to NRC Bulletin 2001-01

UNITED STATES NUCLEAR REGULATORY COMMISSION

NUCLEAR MANAGEMENT COMPANY, LLC

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

DOCKET NO. 50-282  
50-306

RESPONSE TO NRC BULLETIN 2001-01:  
"CIRCUMFERENTIAL CRACKING OF REACTOR PRESSURE  
VESSEL HEAD PENETRATION NOZZLES"

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Nuclear Management Company, LLC, a Wisconsin corporation, with this letter is submitting information requested by NRC Bulletin 2001-01.

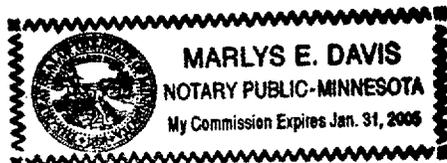
This letter contains no restricted or other defense information.

NUCLEAR MANAGEMENT COMPANY, LLC

By *M. K. Nazar*  
Mano Nazar  
Site Vice President  
Prairie Island Nuclear Generating Plant

On this 4<sup>th</sup> day of Sept. 2001 before me a notary public in and for said County, personally appeared Mano Nazar, Site Vice President, Prairie Island Nuclear Generating Plant, and being first duly sworn acknowledged that he is authorized to execute this document on behalf of Nuclear Management Company, LLC, 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.

*Marlys E. Davis*



## Prairie Island Response to NRC Bulletin 2001-01

1. *All addressees are requested to provide the following information:*

- a. *the plant-specific susceptibility ranking for your plant(s) (including all data used to determine each ranking) using the PWSCC susceptibility model described in Appendix B to the MRP-44, Part 2, report;*

a. Plant Specific PWSCC Susceptibility Ranking

Prairie Island Units 1 and 2 have been ranked for the potential for primary water stress corrosion cracking (PWSCC) of the reactor pressure vessel (RPV) top head nozzles using the time-at-temperature model and plant-specific input data reported in MRP-48 [1]. As shown in Table 2-1 of MRP-48 [1], this evaluation indicates that it will take Prairie Island Unit One 26.6 effective full power years (EFPYs) and Prairie Island Unit Two 26.7 EFPY of additional operation from March 1, 2001, to reach the same time at temperature that Oconee Nuclear Station Unit 3 (ONS3) had at the time that its leaking nozzles were discovered in February 2001.

Using the criteria stated in NRC Bulletin 2001-01, both Prairie Island units fall into the NRC category of plants with greater than 5 EFPY and less than 30 EFPY relative to Oconee 3.

- b. *a description of the VHP nozzles in your plant(s), including the number, type, inside and outside diameter, materials of construction, and the minimum distance between VHP nozzles;*

b. Description of VHP Nozzles

Each Prairie Island Unit has 40 total Vessel Head Penetration (VHP) nozzles and one head vent nozzle. The VHPs consist of twenty-nine full length rod penetrations with pressure housings that extend upward to the seismic platform, four plugged penetrations previously used for part-length CRDM's, three penetrations adapted for columns that support the Core Exit Thermocouple (CET) assemblies; and four spare penetrations that are plugged at the head. The head arrangement and requested nozzle details are provided in Table 2-3 of MRP-48. The material of construction is SB-166 Ni Cr Fe Alloy. The VHP centerline to centerline distance is reported in Table 2-3 of MRP 48[1]. The head vent nozzle is located near the center of the reactor vessel head, at a center-to-center distance of 7.80 inches to the nearest VHP.

- c. *a description of the RPV head insulation type and configuration;*

c. Description of RPV Head Insulation

As reported in Table 2-1 of MRP-48 [1], both Prairie Islands units have reflective horizontal insulation. The insulation is nominally 3-inch thick and consists of thin stainless steel sheets. Clearance between the head and the insulation is approximately 1 inch at the center and 18 inches at the outside nozzles. The insulation includes four

view ports which allow bare metal inspection on the reactor vessel head from all sides. All penetrations are visible through 2 or more of the view ports.

- d. *a description of the VHP nozzle and RPV head inspections (type, scope, qualification requirements, and acceptance criteria) that have been performed at your plant(s) in the past 4 years, and the findings. Include a description of any limitations (insulation or other impediments) to accessibility of the bare metal of the RPV head for visual examinations.*

d. Description of RPV Head and Nozzle Inspections Within Past Four Years

As reported in Table 2-1 of MRP-48 [1], a bare metal RV head visual inspection has been performed at least once each cycle for each Prairie Island unit since 1997. The inspections are typically performed by two Reactor Vessel System Engineers working together for safety and ALARA considerations (although some inspections have been performed by only one engineer). The inspections are usually done early in the outage to identify any indications as soon as possible. The inspections can be done with the head on the vessel and the unit in cold shut down, or when the head is on the stand during refueling. There are no limitations or impediments to the inspections as all penetrations can be clearly viewed through two or more of the four view ports. The RV head of each unit is very clean with no residual boric acid or other debris that would mask a leak. There has been no indication of either a crack or leak at the nozzle penetrations on either unit. Following is a summary of inspections with completion date and associated work order number. Attached (Pages 6 and 7) are two photographs taken through the view port of the most recent Unit 1 inspection.

**Unit One Inspections:**

<u>Date Completed</u>	<u>Work Order</u>	<u>Notes</u>
8/01	0109313	Forced Outage
1/01	0004462	Only viewed from 3 of 4 view ports
4/99	9901828	
11/97	9712250	Installed View Ports
11/97	9708267	Removed Insulation

**Unit Two Inspections:**

<u>Date Completed</u>	<u>Work Order</u>	<u>Notes</u>
5/00	9912396	
11/98	9809962	
2/98	9708268	Installed View Ports

- e. *a description of the configuration of the missile shield, the CRDM housings and their support/restraint system, and all components, structures, and cabling from the top of*

*the RPV head up to the missile shield. Include the elevations of these items relative to the bottom of the missile shield.*

e. Description of Equipment and Cables on Top of Vessel Head

The attached sketch (Page 8) depicts the general arrangement of components and cables between the RV head and the RV missile shield. The control rod drive mechanism (CRDM) housings are supported in the vertical direction by the CRDM nozzles. The CRDM magnetic motors slip over the housings and are supported in the vertical direction by a horizontal ledge on the CRDM housings. The Rod Position Indication (RPI) coils slip over the upper portion of the CRDM housings and are supported in the vertical direction by a horizontal ledge at the elevation of the top of the CRDM motors. "Dummy Cans," which serve as baffles for CRDM cooling air flow, are located between CRDM drive motors. The Dummy Cans adjacent to full length CRDMs hang from the adjacent CRDM. The remaining Dummy Cans are bolted to the tops of the spare and part length nozzle caps. Horizontal movement of the Full length CRDMs and RPI coils is limited by seismic plates. The seismic plates are restrained by trunnions threaded into the RV head platform. The CRDM motor cables exit through a conduit box that fits into the associated seismic plate. The RPI cables exit through a cable connection in the associated seismic plate.

2. *If your plant has previously experienced either leakage from or cracking in VHP nozzles, addressees are requested to provide the following information:*

Not Applicable. Neither unit has experienced cracking or leaking of a VHP nozzle.

3. *If the susceptibility ranking for your plant is within 5 EFPY of ONS3, addressees are requested to provide the following information:*

Not Applicable. Neither unit is within 5 EFPY of ONS3.

4. *If the susceptibility ranking for your plant is greater than 5 EFPY and less than 30 EFPY of ONS3, addressees are requested to provide the following information:*

- a. *your plans for future inspections (type, scope, qualification requirements, and acceptance criteria) and the schedule;*

a. Plans for Future Inspections

**Prairie Island plans to perform inspections of the RPV head and nozzles of both units in a manner consistent with the inspections of the last four years, with the additional requirement of a VT-2 qualification for the examiner. The inspections will consist of a bare metal "effective visual examination" of all VHP nozzles through the insulation view ports during the next refueling outage (for each unit). Prairie Island plans to continue to initiate inspections by work order, with inspections performed by a VT-2 qualified examiner knowledgeable in the specific characteristics of VHP leakage and industry operating experience. The acceptance criteria will be no visual indication of cracks or leaks. The**

**inspection will be documented in the work control process. Although the examiner will be VT-2 qualified, this will not be an ASME Section XI VT-2 inspection subject to pressure and temperature requirements, hold times, and other requirements specific to the performance of a code-required system pressure test.**

b. *your basis for concluding that the inspections identified in 4.a will assure that regulatory requirements are met (see Applicable Regulatory Requirements section). Include the following specific information in this discussion:*

- (1) *If your future inspection plans do not include a qualified visual examination at the next scheduled refueling outage, provide your basis for concluding that the regulatory requirements discussed in the Applicable Regulatory Requirements section will continue to be met until the inspections are performed.*
- (2) *The corrective actions that will be taken, including alternative inspection methods (for example, volumetric examination), if leakage is detected.*

b. Basis for Concluding That Regulatory Requirements are Met

- (1) The technical basis for concluding that regulatory bases are met for Prairie Island Units 1 and 2 is provided in MRP-48 [1]. The plant staff believes the current visual inspections meet the criteria for "effective visual inspection" of 100% of the VHP nozzles as referenced in the bulletin.
- (2) If leakage is detected it will be investigated and repaired as needed in accordance with the current Prairie Island repair/replacement program including applicable codes and standards. Any indication of leakage or cracks will be evaluated and characterized utilizing some combination of surface and/or volumetric examinations. These examinations could include Visual, Dye Penetrant, Eddy Current, Ultrasonic, or Radiograph. The inspection technologies selected would depend on the location and orientation of the indication, and the available examination techniques.

5. *Addressees are requested to provide the following information within 30 days after plant restart following the next refueling outage:*

- a. *a description of the extent of VHP nozzle leakage and cracking detected at your plant, including the number, location, size, and nature of each crack detected;*
- b. *if cracking is identified, a description of the inspections (type, scope, qualification requirements, and acceptance criteria), repairs, and other corrective actions you have taken to satisfy applicable regulatory requirements. This information is requested only if there are any changes from prior information submitted in accordance with this bulletin.*

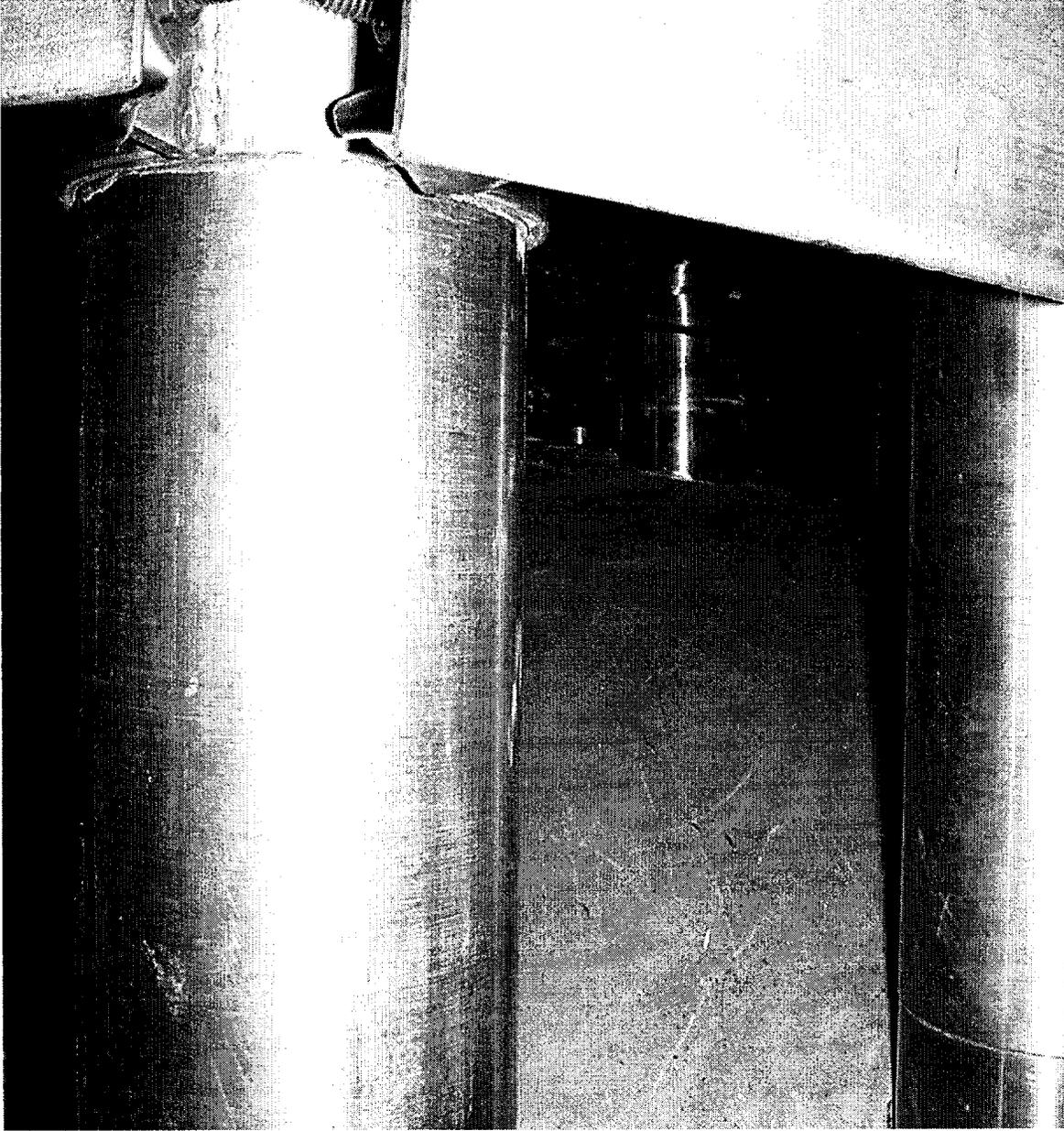
Reporting of Future Inspection Results

Prairie Island will provide the information requested in Item 5 of NRC Bulletin 2001-01 or indicate that no leakage was identified within 30 days after plant restart following the next refueling outage, which is currently scheduled to begin in February 2002 for Unit 2 and September 2002 for Unit 1.

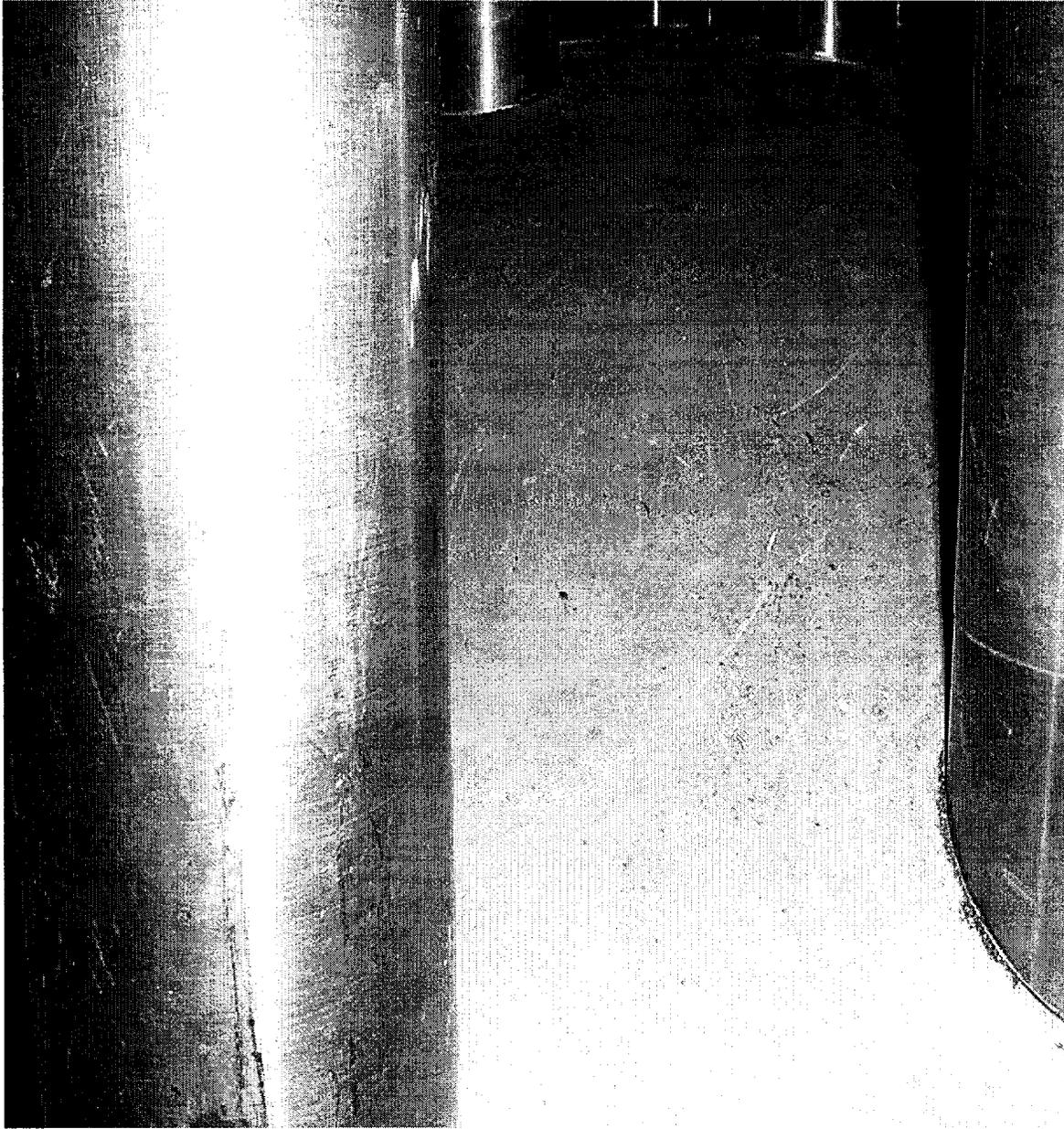
Reference

1. *PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48)*, EPRI, Palo Alto, CA: 2001. 1006284. - Submitted to the NRC by letter from Alexander Marion, Nuclear Energy Institute, to Dr. Brian W. Sheron, Nuclear Regulatory Commission, dated August 21, 2001.

Looking through north insulation door straight in



Looking through north insulation door toward the right



### Reactor Vessel Head Sketch

