



Michael T. Boyce  
Vice President Engineering

April 4, 2022  
ET 22-0002

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555 - 0001

Subject: Docket No. 50-482: 10 CFR 50.55a Request Number I4R-08 for the Fourth Inservice Inspection Program Interval, Relief for Extension of Follow up Examination and Visual Examination Requirements for Reactor Pressure Vessel Head Penetration Nozzles with Mitigated Alloy 600/82/182 Peened Surface

Commissioners and Staff:

Pursuant to 10 CFR 50.55a(z)(1), Wolf Creek Nuclear Operating Corporation (WCNOC) hereby requests Nuclear Regulatory Commission (NRC) approval of 10 CFR 50.55a Request Number I4R-08 for the fourth ten-year interval of WCNOC's Inservice Inspection (ISI) Program.

During Refueling Outage 24 (RF24), which occurred during Spring 2021, WCNOC implemented the Ultra High-Pressure Cavitation Peening (UHPCP) process on Reactor Pressure Vessel Head Penetration Nozzles (RPVHPNs) with Alloy 600/82/182 surfaces. In the Attachment to this submittal, WCNOC is requesting a change to the examination interval of the follow-up inspections for peened RPVHPNs and associated welds, as well as allowing relief for visual examinations on RPVHPNs during the outages when volumetric examination is performed.

WCNOC requests approval by March 1, 2023, to allow for planning RF26 (Spring 2024) and RF27 (Fall 2025).

This letter contains no commitments. If you have any questions concerning this matter, please contact me at (620) 364-8831 X8687, or Ron Benham at (620) 364-4204.

Sincerely,

A handwritten signature in black ink, appearing to read "MTB Boyce", written over a light blue horizontal line.

Michael T. Boyce

MTB/rlt

Attachment: 10 CFR 50.55a Request I4R-08

cc: S. S. Lee (NRC), w/a  
S. A. Morris, (NRC), w/a  
G. E. Werner (NRC), w/a  
Senior Resident Inspector (NRC), w/a

## **Wolf Creek Nuclear Operating Corporation**

### **10 CFR 50.55a Request I4R-08**

**Request for Relief for Extension of Follow up  
Examination and Visual Examination  
Requirements for Reactor Pressure Vessel Head  
Penetration Nozzles with Mitigated Alloy  
600/82/182 Peened Surface in Accordance with  
10 CFR 50.55a(z)(1)**

**10 CFR 50.55a Request Number I4R-08**

**Request for Relief for Extension of Follow up Examination and Visual Examination Requirements for Reactor Pressure Vessel Head Penetration Nozzles with Mitigated Alloy 600/82/182 Peened Surface in Accordance with 10 CFR 50.55a(z)(1)**

**Alternative Provides Acceptable Level of Quality and Safety**

**1. ASME Code Components Affected**

Component:	Reactor Vessel Closure Head (RVCH) Nozzles
Code Class:	Class 1
Examination Category:	B-P
Code Item Number:	B4.50 B4.60
Description:	Control Rod Drive Mechanism (CRDM) Nozzles Core Exit Thermocouple Nozzle Assy (CETNA) Nozzles Head Vent Pipe
Size:	4.00 Inch (Nominal Outside Diameter) NPS 1 inch schedule 160 pipe
Material:	RVCH SA533 Grade B, Class 1 Nozzle SB 167 N06600 (Alloy 600) Alloy 82/182 weld material

**2. Applicable Code Edition and Addenda**

- American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI, 2007 Edition through 2008 Addenda
- ASME Code Case N-729-6 as conditioned by 10 CFR 50.55a(g)(6)(ii)(D)

**3. Applicable Code Requirement**

10 CFR 50.55a(g)(6)(ii)(D)(1) requires that examinations of the reactor vessel head be performed in accordance with ASME Code Case N-729-6 subject to the conditions specified in paragraphs 10 CFR 50.55a(g)(6)(ii)(D)(2) through (8).

10 CFR 50.55a(g)(6)(ii)(D)(5) states the following:

*Peening.* In lieu of the inspection requirements of Table 1, Items B4.50 and B4.60, and all other requirements in ASME BPV Code Case N-729-6 pertaining to peening, in order for a RPV upper head with nozzles and associated with J-groove welds mitigated by peening to obtain examination relief from the requirements of Table 1 for unmitigated heads, peening must meet the performance criteria, qualification, and examination requirements stated in MRP-335, Revision 3-A, with the exception that a plant specific alternative request is not required and the NRC condition 5.4 of MRP-335, Revision 3-A does not apply.

MRP-335, Revision 3-A requires a follow-up examination to be performed in the second refueling outage subsequent to peening for plants with heads that the reactor pressure vessel head penetration nozzles (RPVHPNs) and associated J-groove welds have experienced effective degradation years (EDY) < 8, and are free of pre-peening flaws. MRP-335, Revision 3-A also requires a bare metal visual examination (VE) to be performed every refueling outage.

#### **4. Reason for Request**

Wolf Creek Nuclear Operating Corporation (WCNOC) performed peening on the RPVHPNs and associated J-groove welds in Refueling Outage 24 which occurred in Spring, 2021.

The warranty from the vendor that provided the peening service specifies that the follow-up inspection be conducted in the third refueling outage subsequent to the peening being performed, whereas MRP-335, Rev 3-A, Section 4.3 specifies the follow-up inspection two outages following peening. To perform inspections in both the second and third outage subsequent to the peening adds unnecessary dose and expense to the refueling outage. Performance of the follow-up examinations in two separate outages results in hardships that are not compensated by a corresponding increase in safety or quality. Additionally, combining the two inspections to one inspection as proposed would reduce entries into a Locked High Radiation Area decreasing the potential for industrial safety issues and contamination exposure,

A VE is performed each outage to detect leakage through the RPVHPNs. During outages when volumetric/surface exams are being conducted, a leak path assessment is performed which would make any leakage through the RPVHPNs evident. Performing a VE during outages when volumetric/surface examinations are being performed also adds unnecessary dose and expense to the refueling outage.

#### **5. Proposed Alternative and Basis for Use**

The peening process performed at Wolf Creek Generating Station (WCGS) on RPVHPNs met all requirements including performance criteria, mitigation process criteria, examination criteria, adverse effects criteria and inspectability criteria as required by Appendix II of Code Case N-729-6. The subject RPVHPNs and associated J-groove welds have experienced EDY < 8 and were free of pre-peening flaws. MRP-335, Revision 3-A, Section 4.3 requires a follow-up inspection in the second refueling outage subsequent to peening for these components. On the contrary, item B4.20 of Table 1 of Code Case N-729-6, the volumetric or surface exam frequency is 8 calendar years or before reinspection years (RIY) = 2.25, whichever is less.

WCNOC proposes to perform the MRP-335, Revision 3-A follow-up inspection in the third refueling outage subsequent to peening to align with the post-peening warranty follow-up inspection requirements.

The pre-peening baseline inspection was conducted prior to the peening being performed in the same outage. As allowed by MRP-335, Revision 3-A, the pre-peening baseline inspection was performed by an ultrasonic examination of the nozzle tube and a demonstrated ultrasonic leak path assessment. It is possible that a flaw (crack) existed in the J-groove weld that was outside of the examination boundary.

The purpose of the follow-up inspection is to detect flaws in the J-groove weld (that were outside the detectable range during the pre-peening baseline inspection) that have grown through wall or into the nozzle tube. Performing the follow-up inspection in the third refueling outage subsequent to peening will allow one extra cycle for any undetected flaws (that may have been present at the time of peening) to grow into the region where they would be detected. Performing the follow-up inspection in the third outage subsequent to peening will still fall within the schedule of Code Case N-729-6, since it is within 8 years and RIY < 2.25 for unmitigated Alloy 600 components on RPV upper heads, which ensures adequate safety margin is maintained.

Furthermore, WCGS Technical Specification (TS) 3.4.13 requires operational leakage monitoring, which includes containment sump monitoring and containment atmosphere radioactivity monitoring (TS 3.4.15). Moreover, the plant will continue to perform bare metal VEs as required by MRP-335 Rev 3A, except in outages where volumetric/surface examinations are being performed, as proposed below. These tools would provide reasonable assurance of structural integrity over the inspection extension period. In addition, if any leakage is identified, the nozzle would be required to be repaired by the plant and would not impact the basis of this technical analysis.

Lastly, WCNOG proposes to perform a VE of each RPVHPN for evidence of pressure boundary leakage every refueling outage unless volumetric/surface examinations are being performed. The leak path assessment performed during the volumetric/surface examinations will make any leakage through the RPVHPNs evident.

## **6. Duration of Proposed Alternative**

The proposed alternative will be utilized to perform the follow-up inspection in WCNOG Refueling Outage 27 (Fall 2025) instead of Refueling Outage 26 (Spring 2024). WCNOG will assume the inspection schedule required by MRP-335, Revision 3-A with the conditions of 10 CFR 50.55a following Refueling Outage 27.

## **7. References**

1. ASME Boiler and Pressure Vessel Code Case N-729-6 "Alternative Examination Requirements for PWR Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1"
2. Electric Power Research Institute Topical Report MRP-335, Revision 3-A, dated November 2016