UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 13, 2012

Mr. Ken Langdon
Vice President Nine Mile Point
Nine Mile Point Nuclear Station, LLC
P.O. Box 63
Lycoming, NY 13093

SUBJECT: NINE MILE POINT NUCLEAR STATION, UNIT NO. 1, REQUEST FOR ADDITIONAL INFORMATION (RAI) RE: REQUEST NO. 1ISI-004, REQUEST TO UTILIZE AN ALTERNATIVE FOR THE REPAIR OF CONTROL ROD DRIVE HOUSING PENETRATIONS (TAC NO. ME5789)

Dear Mr. Langdon:

By letter dated March 4, 2011 (Agencywide Documents Access and Management System (ADAMS) Package Accession No. ML110680293), Nine Mile Point Nuclear Station, LLC submitted the "Request to Utilize an Alternative to the Requirements of 10 CFR 50.55a(g) for the Repair of Control Rod Drive Housing Penetrations for the Remainder of the License Renewal Period of Extended Operation." Additionally, the licensee has responded to the Nuclear Regulatory Commission (NRC) staff's request for additional information (RAI) by letters dated March 25, 2011, (ADAMS Package Accession No. ML110950302), September 29, 2011, (ADAMS Accession No. ML11279A037), April 9, (ADAMS Package Accession No. ML121020213), and June 7, 2012, (ADAMS Accession No. ML12160A349).

The NRC staff has reviewed the information provided in the letters from the licensee and has determined that additional information is needed to complete its review. Enclosed is the NRC staff's RAI.

The RAI was discussed with your staff on September 6, 2012, to clarify the draft RAIs sent to the licensee earlier and the licensee committed to provide the responses to these RAIs by COB October 31, 2012.

Please contact me at (301) 415-3308, if you have any questions.

Sincerely,

B.K. Vaidya

Bhalchandra Vaidya, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-220

Enclosure:
As stated

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REQUEST FOR ADDITIONAL INFORMATION
NMPNS RELIEF REQUEST 1ISI-004 REVISION 1
INSERVICE INSPECTION PROGRAM REQUEST FOR ALTERNATIVE FOR
NINE MILE POINT NUCLEAR STATION UNIT 1
DOCKET NUMBER 50-220
(TAC NO. ME5789)

RAI A

Table 1 to Attachment 2 of the submittal dated March 25, 2011 (Ref. 1) notes that abrasive waterjet machining is specified for the severing, weld prep forming and final machining, under the repair methodology approved in [Boiling Water Reactor Vessel and Internals Project Topical Report] BWRVIP-58-A: BWR Vessel and Internals Project, [Control Rod Drive] CRD Internal Access Weld Repair (Ref. 2). A variation to allow conventional machining, followed by rotary peening, was requested for the Nine Mile Point, Unit 1 (NMP1) specific repair methodology. By letter dated June 7, 2012, (Ref. 3), the request to perform rotary peening was withdrawn. The variation to use conventional machining versus abrasive waterjet machining was linked to the use of peening. Therefore, the staff requests the licensee to clarify which machining technique is planned. If conventional machining is planned, provide a revised justification for the variation considering that peening will no longer be performed.

RAI B

For Proposed Alternative 2, 48-hour hold, the Basis for Relief in Section 2B of 1ISI-004 (Ref. 4) states, "EPRI [Electric Power Research Institute] Report 1013558, *Repair and Replacement Applications Center: Temperbead Welding Applications 48-Hour Hold Requirements for Ambient Temperature Temperbead Welding*, provides justification for starting the 48-hour hold after completion of the third temperbead weld layer rather than waiting for the weld overlay to cool to ambient temperature." The EPRI report provides information to address issues associated with allowance of a 48-hour hold following completion of the third temperbead weld layer as applied to low alloy steel SA-508, Class 2 reactor vessel (RV) nozzle materials as an alternative to the provisions in Code Case N-638 and N-740. The reactor vessel bottom head and CRD housing penetration materials are not SA-508, Class 2. Provide a technical basis for the applicability of this report to the materials listed in Table 1 of the March 25, 2011 submittal (Ref. 1). In addition, whereas the EPRI report discusses American Society of Mechanical Engineers Boiler & Pressure Vessel Code (ASME Code) Code Case N-638 and N-740, the applicable ASME Code requirement for the CRD bottom head penetrations is Code Case N-606-1. Provide a technical basis for the applicability of this report to Code Case N-606-1.

RAI C

Section 1A of 1ISI-004 (Ref. 4) states that "the nondestructive examination (NDE) volumes and areas will be similar to those described in BWRVIP-58-A, as discussed in Attachment 2," and references Figure 2 [of 1ISI-004] which depicts the areas for PT and UT examinations of the modified CRD penetration. BWRVIP-58-A, consistent with Figure IWB-2500-18 of the ASME Code, Section XI, requires the surface examination area to extend ½ inch beyond the upper and lower weld toe. However, Section 1A and the figure do not provide any dimensions for the examination area/volume for the PT or UT examinations.

As such, the staff requests the following information:

1. Clarify the ASME Code required exam volumes/surfaces for ultrasonic testing (UT) and penetrant testing (PT) that apply for the CRD housing penetration welds at NMP1 by providing a description of the examination volumes and areas that includes dimensions. The description should indicate the dimension from the weld toe to the end of the examination area/volume.
2. Revise Figure 2 accordingly with the dimensions of these areas/surfaces clearly marked and to ensure that the figure depicts both the required exam and the coverage that is achievable.
3. In addition, please clarify the weld extent as shown by Figure 2; it appears that there is a thin layer of weld material that extends down from the primary weld area.

RAI D

The basis for relief in Section 1B of 1ISI-004 (Ref. 4) states that the UT exam is "qualified to detect flaws in the new weld and base metal interface beneath the new weld." The basis for relief for Proposed Alternatives 1 and 3 in Section 1A and 3A of 1ISI-004 (Ref. 3), describe the nondestructive examination (NDE) volumes and areas, and the NDE technique, for the proposed UT technique for the NMP1 repair, as similar to those specified in BWRVIP-58-A. However, the staff notes that the UT technique described in BWRVIP-58-A was only demonstrated on two stub tube mock-ups with implanted flaws, and of the four fatigue cracks in these mock-ups, three were documented as "not detected" by the UT technique. It is therefore not clear how the results presented in Table 4-3 on page 4.12 of BWRVIP-58-A show that "satisfactory performance for detection of the flaws was accomplished."

Therefore, the staff requests the licensee to clarify and provide details on how the UT technique described in 1ISI-004 has been qualified.

RAI E

Request No. 1ISI-004 (Ref. 4) states that UT exam acceptance criteria are in accordance with NB-5331 as modified by BWRVIP-58-A. Please explicitly explain how the acceptance criteria are modified by BWRVIP-58-A. Provide justification for any modifications to the acceptance criteria.

RAI F

Provide details of how it was determined that the UT is able to detect and size the triple point anomaly such that, should a rejectable anomaly be present (>0.1"), the UT would be able to detect and size it appropriately.

RAI G

ASME Code, Section III acceptance criteria require discrimination of flaw type such that cracks, lack of fusion (LOF), and incomplete penetration (ICP) > 20% distance amplitude curve (DAC) are rejected. How is flaw type determined by the UT procedure such that this criterion may be applied?

RAI H

At least two vendors in the United States have performance demonstration initiative (PDI) qualified UT techniques for inspecting upper head control rod drive mechanism (CRDM) nozzles in pressurized water reactors (PWRs). As noted in Table 1 on page 7 of 13 of Attachment 2 to the March 25, 2011 submittal (Ref. 1), "The CRDM nozzle penetration repair configuration is very similar to the dissociated configuration for NMP1; therefore the same beam angles will be used." In addition to using the same beam angles, will the personnel, procedures, and equipment used for the qualified PWR upper head exams be used for NMP1 CRD housings repairs?

RAI I

As noted in Table 1 on page 8 of 13 of Attachment 2 to the March 25, 2011 submittal (Ref. 1), UT examination at the end of the defined inservice inspection (ISI) interval will confirm acceptance for the subsequent interval. However, ISI NDE qualifications were not addressed in this relief request or BWRVIP-58A. Please provide a detailed description of the UT that will be used for ISI.

RAI J

In Item 4 of Table 1 of Attachment 2 to the March 25, 2011 submittal (Ref. 1), as part of the justification for the reduced UT coverage of the modified weld configuration, an evaluation of a postulated flaw in the area of reduced UT coverage is referenced (Reference 18 to Attachment 2 of the March 25, 2011 submittal). Provide Reference 18 to Attachment 2 to the March 25, 2011 submittal (Ref. 1) for staff review.

The following questions are related to AREVA Document No. 32-9138065-002, "NMP1 CRD Housing IDTB Weld Anomaly Analysis" (Proprietary), (ADAMS Accession No. ML110950319), hereafter referred to as "the flaw evaluation." References to the ASME Code, Section XI, are to the 2004 Edition, No Addenda.

RAI K

Table 4-2 of the flaw evaluation lists the load combinations and cycles used to calculate fatigue crack growth for the postulated flaws. Tables 5-2, 5-5, and 5-7 through 5-10 show the contributions of these transients to fatigue crack growth various postulated flaw types and propagation paths. However, for the end-of-life stability evaluations of the three flaw types postulated (continuous external circumferential flaw and external axial flaw in the repair weld, cylindrical flaw in repair weld or low-alloy steel), it is not clear which of these loads were

considered and which loads were considered limiting. Two AREVA internal documents, References 5 and 7 to the flaw evaluation are referenced as the source of the transients considered. It is not clear how these transients were derived from the NMP1 design basis.

For the evaluations of the circumferential and axial flaws in the weld metal summarized in Table 5-3 and 5-6, only the safety factor for Service Level A (normal operating) conditions is given, implying that only Service Level A conditions were considered, or were determined to be limiting.

For the cylindrical flaws, the margins for normal, upset, faulted and emergency conditions were calculated in accordance with the ASME Code, Section XI, IWB-3612. However, it is not clear which transient conditions and loadings were used to determine the applied stress intensity factors (K_I) for these evaluations.

The staff therefore requests the following information:

1. Explain which transients and load combinations were used for the end-of-life evaluation for each type of flaw, and how these transients and load combinations were determined to be limiting.,
2. Identify which Service Levels the limiting loads provided in the response to item 1 represent. If the end-of-life flaw stability evaluation did not consider each Service Level (A, B, C, and D), justify why only certain service level conditions were considered.
3. Identify the source in the NMP1 design basis for the transients and loading combinations used to determine fatigue crack growth and to evaluate end-of-life flaw stability. Describe how the transients listed were derived from the plant design basis.

RAI L

For the normal startup and shutdown transients, the number of occurrences listed in Table 4-2 differs from the number of occurrences of these transients listed in Table V-2 of the Nine Mile Point, Unit 1 (NMP1) Updated Final Safety Analysis Report (UFSAR). Explain this discrepancy.

RAI M

Clarify whether the end-of-life evaluations for the continuous external circumferential flaw and external axial flaw, summarized in Tables 5-3 and 5-6 and described as "limit load" analyses, should be characterized as "Elastic-Plastic Fracture Mechanics (EPFM)" evaluations since the procedures of Article C-6000 of the ASME Code, Section XI were used for these evaluations.

RAI N

Figure C-4210 of the ASME Code, Section XI, Appendix C, "Flowchart for Selecting Analysis Method for Austenitic Piping," indicates for a weld metal flaw in a nonflux weld, the procedures of C-5000 should be used. Therefore, the staff requests that the licensee explain why the

procedures of C-6000 were used for the evaluations of the continuous external circumferential flaw and external axial flaw in the repair weld, since the gas-tungsten arc welding (GTAW) process used for the repair weld does not involve flux.

References

1. Nine Mile Point, Unit 1 - Request to Utilize an Alternative to the Requirements of 10 CFR 50.55a(g) for the Repair of Control Rod Drive Housing Penetrations for the Remainder of the License Renewal Period of Extended Operation, March 25, 2011 (ADAMS Accession No ML110950307)
2. BWRVIP-58-A: BWR Vessel and Internals Project, CRD Internal Access Weld Repair, EPRI, Palo Alto, CA: 2005, 1012618
3. Nine Mile Point, Unit 1, Request to Utilize an Alternative to the Requirements of 10 CFR 50.55a(g) for the Repair of Control Rod Drive Housing Penetrations - Withdrawal of the Portion of the Request Regarding Rotary Peening (TAC No. ME5789) June 7, 2012 (ADAMS Accession No. ML12160A349)
4. Nine Mile Point Nuclear Station, Unit1, 10CFR50.55a Request Number 1ISI-004, Revision 1, Attachment 2 to Nine Mile Point, Unit 1 - Request to Utilize an Alternative to the Requirements of 10 CFR 50.55a(g) for the Repair of Control Rod Drive Housing Penetrations - Response to NRC Follow-up Request for Additional Information, April 9, 2012 (ADAMS Accession No. ML12102A112)

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Vice President Nine Mile Point
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/ra/
Bhalchandra Vaidya, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
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Docket No. 50-220

Enclosure:
RAI

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