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

March 10, 2010

Mr. Samuel L. Belcher
Vice President Nine Mile Point
Nine Mile Point Nuclear Station, LLC
P.O. Box 63
Lycoming, NY 13093

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING NINE MILE POINT NUCLEAR STATION, UNIT NO. 2 – RE: THE LICENSE AMENDMENT REQUEST FOR EXTENDED POWER UPRATE OPERATION (TAC NO. ME1476)

Dear Mr. Belcher:

By letter dated May 27, 2009, as supplemented on August 28 and December 23, 2009, and February 19, 2010, Nine Mile Point Nuclear Station, LLC, submitted for Nuclear Regulatory Commission (NRC) staff review and approval, a proposed license amendment requesting an increase in the maximum steady-state power level from 3467 megawatts thermal (MWt) to 3988 MWt for Nine Mile Point, Unit No. 2 extended power uprate operation.

The NRC staff is reviewing the information provided in that letter and has determined that additional information is needed to support its review. Enclosed is the NRC staff's request for additional information (RAI). The RAI was discussed with your staff on March 3, 2010, and it was agreed that your response would be provided within 45 days from the date of this letter.

Sincerely,

Richard V. Guzman

Richard V. Guzman, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-410

Enclosure:
As stated

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REQUEST FOR ADDITIONAL INFORMATION (RAI)

NINE MILE POINT NUCLEAR STATION, LLC

NINE MILE POINT, UNIT NO. 2 (NMP2)

LICENSE AMENDMENT REQUEST RE: EXTENDED POWER UPRATE (EPU)

DOCKET NO. 50-410

The Nuclear Regulatory Commission (NRC) staff is reviewing the Nine Mile Point Nuclear Station, LLC (NMPNS or the licensee) license amendment request (LAR) application dated May 27, 2009, as supplemented on August 28 and December 23, 2009, and February 19, 2010. The NRC staff has determined that additional information requested below will be needed to support its review.

Mechanical & Civil Engineering (Non-steam dryer)

RAI 1

The NRC staff requests that the licensee update Table 1-2, which contains information on plant parameters for current licensed thermal power (CLTP) and EPU, by adding a column for original licensed thermal power (OLTP). Please include design and maximum temperatures and pressures for the vessel inlet and outlet reactor recirculation system (RRS) nozzles, feedwater (FW) inlet and main steam (MS) outlet and core spray (CS) inlet.

RAI 2

Confirm whether the determination of postulated pipe break and crack locations for EPU are in accordance with the criteria found in Standard Review Plan (SRP) Section 3.6.2, BTP MEB 3-1, and explain the method of evaluation that was performed at EPU conditions.

RAI 3

Provide a list of high energy (HE) systems and a list of moderate energy (ME) systems which have experienced increases in pipe stresses and cumulative usage factors (CUFs), where applicable, due to EPU.

RAI 4

The Safety Analysis Report for Nine Mile Point Nuclear Station Unit 2 Constant Pressure Power Uprate (PUSAR) does not contain an assessment for postulated failures in ME lines which is recommended by the constant pressure power uprate licensing topical report (CLTR). Provide an evaluation which shows that postulated pipe failures and their associated effects on the ME lines have been assessed for EPU.

RAI 5

Guidance of SRP Section 3.6.1 (Table 3.6.1-2) lists the condensate (CND) system as a potential HE system. Please provide the maximum operating temperature and pressure for the CND system. The PUSAR states that the thermal expansion of the condensate increases by 17.6 percent for EPU. Has the condensate system been evaluated for postulated pipe failures and their associated effects on the plant systems, structures, and components (SSCs)?

RAI 6

Page 2-26 of the PUSAR indicates that the HE steam lines, steam line vents and drains, FW, main steam relief valve (MSRV) piping, and water cleanup system (WCS) are affected by the proposed EPU. In a number of places in the PUSAR, the following statement is made: "No new break or crack locations are required to be postulated, as a result of the increased piping stresses associated with EPU." Provide a justification and describe the work performed that resulted in this blanket statement conclusion. Include the method of evaluation for postulated pipe failures. Explain whether existing data were scaled up (list systems) or new analyses were performed to derive new values for comparison to existing pipe break/crack allowable values.

RAI 7

For piping systems that will experience an increase in loads due to EPU, provide a quantitative summary which shows that the dynamic effects of pipe whip and jet impingement have been evaluated and show comparison of results to acceptable limits. Include the FW and WCS.

RAI 8

Indicate whether the FW lines have been structurally analyzed for any flow instabilities and loads due to water hammer or other flow transients, and whether reanalysis has considered the EPU higher flows for these transients in evaluating pipe stresses, pipe breaks, and pipe supports.

RAI 9

In reference to safety-related thermowells and sample probes, page 2-30 of the PUSAR states that:

> "The total vibratory stress was calculated by using the square root of the sum of the squares (SRSS) of the oscillating lift and drag forces."

a) Do the stresses shown account for the direct force of the incident flow? If not, provide a justification.

b) Are the stresses shown under the EPU value column of the table on page 2-30 of the PUSAR calculated at the instrument sockolet to pipe weld and how have they been accounted for in the total Code pipe stresses at that location?

c) Show how the allowables, listed on pp 2-30 of the PUSAR, have been derived.

d) The PUSAR stated that the forces that produce the shown stresses for the thermowells and probes are the oscillating lift and drag forces. If Section III, Appendix N, Equation 69 of N-1321 is utilized for the vortex shedding oscillating lift forcing function, discuss how the vortex shedding drag forces have been accounted for.

e) The PUSAR also states that:

> "To calculate the structural response, a non-dimensional parameter, termed reduced damping (N-1324.1 Equation 76), was calculated:
>
> For off-resonance (non-lock-in) conditions, the structural response is ordinarily small and was calculated using the standard method (N-1324.2, first paragraph)."

However, the PUSAR does not state that resonance or "lock-in" conditions do not exist in any of the safety-related thermowells and sample probes. Were there any cases where resonance or lock-in could not be avoided? Discuss how these cases were evaluated.

RAI -10

NMP2 EPU LAR Attachment 10, Section 2.0, "Susceptibility And Monitoring," states that:

> "[T]he vibration levels of the MSS and FWS piping are expected to increase by approximately 38% based on a steam flow increase of 17.6%."

It also indicates that these systems will be monitored and tested:

> "Walkdowns of the systems impacted by EPU flow increases will be performed to identify if there are any additional potentially susceptible small bore line configurations."

The NRC staff requests that the licensee consider revising Section 2.0 to be in accordance with the generic CLTR evaluation, in that if the tested vibration levels in the main piping in the FW and MS systems are found to be significant (as specified in the CLTR), then an engineering evaluation of the attached branch piping connections (small bore and large bore) will be performed to ensure that the steady state stresses are within the endurance limits, and that any necessary small bore or large bore line modifications will be made prior to the EPU.

RAI- 11

Provide a justification for not having completed the base line vibration monitoring for selected systems and components. Also, please provide the schedule of completion and whether Attachment 10 will be revised accordingly.

RAI 12

In Attachment 10, two locations on the MS have been predicted to be above the 50% criterion. One is projected at 59% of the acceptance criterion and the other at 82%. Have contingency evaluations been performed for branch lines in the vicinity of these locations?

a) Provide a discussion of the evaluation results or a justification for not having these evaluations in place. Only one of these locations has been chosen for monitoring.

b) Provide a justification for not planning to monitor location "2-MSS-026-45-1/ 124-Z" which shows an EPU-projected vibration of 82% of the acceptance criterion.

RAI-13

EPU LAR Attachment 10, Section 4.2.1 states that:

> "Allowable displacement (mils pk-pk) and acceleration (g's-pk) limits at the selected measurement locations were calculated based on the analysis results and ASME Code fatigue stress limits for steady state vibration per ASME O&M-Standards and Guidelines (S/G) Part 3 [2007 Edition]."

a) Is the 2007 Edition of the ASME OM Code Part 3 the design-basis OM Part 3 for NMP2? If not, provide your technical justification for using a different Code year than your design-basis.

b) Provide a more detailed explanation of how the allowable displacements and accelerations having been derived. Provide a column for Tables 3-1 and 3-2 which shows the acceptance criteria values. Currently, the tables only show OLTP measured and EPU projected values.

RAI 14

a) For the MS and FW piping, state the design-basis codes and years for the safety-related piping and pipe supports, inside and outside containment.

b) Verify that all structural evaluations of all SSCs, required for EPU, were performed in accordance with the design-basis codes of record for piping and pipe supports. If a different Code or Code edition other than the design-basis code of record was used for any of the SSCs, provide a justification.

RAI 15

Provide a list of systems (inside and outside containment), for which temperature, pressure, flow and mechanical loads have been increased due to EPU. Please also provide the associated OLTP and EPU values.

RAI 16

Scaling factors from the percentage increases due to pressure temperature and flow for Code equations are shown in PUSAR Table 2.2-2. It is indicated in Tables 2.2-3 and 2.2-4, that these scaling factors are used to derive EPU stresses and fatigue CUFs (where applicable) from OLTP analyses values. Verify that these factors are the results of scaling OLTP to EPU values and not CLTP to EPU values, as this is not clear from the PUSAR presentation. Also, show how these scaling factors were derived.

RAI 17

PUSAR Tables 2.2-5c through 2.2-5g, for the balance of plant (BOP) piping, contain percent increases for pipe stresses and pipe support loads varying from 5 to 15 percent increases, due to EPU increased loads. These are not indications that piping and pipe supports meet Code equation allowable values without providing maximum resulted values compared to Code allowable values. Provide a brief summary that shows the EPU maximum Code equation stresses for the affected systems meet the Code or FSAR-listed allowable values.

RAI 18

Verify whether the increased flow rate due to CPPU affects the structural analysis (pipe stress and support loads) of only the MS and FW piping.

RAI 19

The PUSAR states that "the MS piping pressures and temperatures are not affected by EPU." Please confirm that the increase in stresses and fatigue CUF values shown on Tables 2.2-3 and 2.2-5a are due only to EPU higher turbine stop valve closure (TSVC) transient loads.

RAI 20

a) Describe the program and the method used to develop the loads due to the TSVC transient and how these loads were used to determine the pipe stresses.

b) Show the load combinations for pipe stresses and pipe support loads that include the TSVC loading.

RAI 21

The PUSAR states that the condensate support "2CNM-PSR085A4" needs to be modified for EPU. Attachment 6 of the EPU LAR contains the modifications required for the EPU and states that for MS, FW, and BOP supports will be revised, as necessary. Are there any other pipe supports or piping that need to be modified as a result of EPU, in addition to 2CNM-PSR085A4?

RAI 22

Page 2-38 of the PUSAR, in reference to the FW pipe supports states that the "the existing analyses bound the EPU conditions." Do the existing analyses for the FW system contain temperature and/or flow loadings that are higher than the EPU parameters? If not, then this statement is not correct and would need to be revised.

RAI 23

Provide a brief description and the schedule of completion of any FW piping and pipe support modifications that may be required due to the FW system rerating at EPU conditions.

RAI 24

Page 2-41 of the PUSAR states that, "For those [BOP] systems that do not require a detailed analysis, pipe routing and flexibility were determined to remain acceptable." Please explain the process of the evaluation that determined these systems acceptable at EPU conditions and state whether any of these systems are safety-related (SR).

RAI 25

Page 2-43 of the PUSAR contains a paragraph which justifies WCS Class 1 piping at EPU conditions. Has an evaluation been conducted for the non-Class 1 SR WCS piping and what were the results/conclusion of the evaluation? If such an evaluation has not been performed for the WCS, provide your justification for not having evaluated the remainder of the WCS for EPU.

RAI 26

In many places of the PUSAR (Class 1 pipe stress), Tables 2.2-3 through 2.2-4, where the Code allowable for primary plus secondary stress intensity (Sn) of 3Sm (EQ 10) has not been met, the PUSAR indicates that the alternate criteria of the simplified elastic-plastic analysis (EQ 12, 13 and 14) have been employed. In these places though, the nodes for EQ 10 and the nodes for EQs 12, 13, and 14 are not the same. In addition, it is not clear whether the fatigue penalty for not meeting EQ 10 has been taken. Provide a technical justification or show that the criteria of the alternate Code equations have been met for those nodes that did not meet EQ 10.

RAI 27

For MS and FW Class 1 piping, are there currently any pipe stress analyses that utilize a later Code than the original code of record, American Society for Mechanical Engineers Boiler Pressure and Vessel Code (ASME Code) 1974 Edition.

RAI 28

Table 2.2-6 of the PUSAR shows that the Sn for the FW nozzle carbon steel safe end increased for EPU by approximately 24%. Provide a technical justification to explain why the EPU CUF decreased significantly (by approximately 32%). Provide a similar justification for the stainless steel safe end which also shows that the Sn increased for EPU, while the fatigue CUF decreased.

RAI 29

In Table 2.2-6, three locations where Sn exceeded the Code allowable limit of 3Sm, the simplified elastic-plastic analysis was performed. It is stated that "P+Q stresses are acceptable per the CLTP elastic-plastic analysis, which is valid at EPU conditions." The NRC staff notes that these locations show an increase in Sn values of approximately 10%, 24%, and 32%. To justify the above PUSAR statement, please provide a summary of the evaluations which shows that the special rules for exceeding 3Sm, as provided by (a) through (f) of Subparagraph NB-3228.3 (ASME Sect III, 1974), have been met for the EPU Sn value.

RAI 30

In Table 2.2-6, it is indicated that the shown fatigue CUFs for the FW nozzle are for a 40-year plant life. This table also shows the fatigue CUF for the steam outlet nozzle. Please indicate whether the steam outlet nozzle CUFs are for the 40-plant year life or the 60-year renewed plant life.

RAI 31

a) In the current design basis of the plant, are there any piping analyses that contain stratification and is there any CLTP stratification monitoring currently in place? Please list these stratification locations.

b) Explain how these stratification locations have been evaluated and accepted for the EPU conditions and provide a summary of their evaluation results.

RAI 32

GE Hitachi Nuclear Energy (GEH) issued Safety Communication SC 09-01 to address an error in their methodology that developed Annulus Pressurization (AP) loads and lists NMP2 as one of the affected plants. SC 09-01 states that "the AP loads used as input for design adequacy evaluations of NSSS safety related components for "New Loads" plants might have resulted in non-conservative evaluations." SC 09-01 contains the following corrective action:

> "Plants on the affected plant list should review their design and licensing basis in light of the issue presented above and consider reevaluating the AP loads to ensure that they are consistent with the plant's design-basis."

It is also noted in PUSAR Section 2.6.2, Subcompartment Analyses, pp 2-233 that, "during the review of the impact of EPU conditions on the AP load, several non-conservative assumptions were discovered related to the original design-basis..." and that "the result of the combined changes of the non-conservative assumptions and EPU is an increase in the AP load structural forces and accelerations in the range of 0% to 45% for most of the components and structures evaluated, with the increases for a few components in the range of 63% to 133%."

a) Please confirm whether these two issues on AP loads are the same and whether the SC 09-01 recommended corrective action has been completed. Also, please verify whether EPU evaluations for reactor pressure vessel (RPV) nozzles, RPV supports and internals have considered these increased AP loads.

b) Page 2-40 of the PUSAR provides a discussion for the evaluation of AP loads on the RPV attached piping, piping supported on the bio shield wall (including the feedwater system, main steam system, high pressure and low pressure core spray systems, ICS head spray piping, reactor coolant system, residual heat removal system, standby liquid control system, and WCS), wetwell piping and piping outside containment but connecting to drywell penetrations. It also indicates that the effect of the increased AP loads on these SSCs is bounded by "other hydrodynamic loads." List these "other hydrodynamic loads" and whether, according to the NMP2 design basis, the AP loads combine with any of these hydrodynamic loads. Also, explain how it was determined that the AP loads are bounded by

these "other hydrodynamic loads." In addition, discuss whether the new AP loads, (calculated and then applied to the structural analysis SSC models in the drywell) were affected by the AP loads, including the RPV and internals?

RAI 33

Explain how the effect of the increase in AP loads on the total component stresses are reduced when the AP loads are combined with the SSE seismic loads by the square root of the sum of the squares in the faulted load combination, as stated on page 2-234 of the PUSAR, and verify whether the worst-case scenario has been considered.

RAI 34

Provide a justification which shows that the EPU effects have been addressed for safety-related equipment with non-metallic components such as resilient seats in valves and hydraulic snubbers, non-metallic flex joint bellows, etc.

RAI 35

Section 2.2.5 of the PUSAR, entitled, "Seismic and Dynamic Qualification of Mechanical and Electrical Equipment," does not contain an evaluation for the electrical equipment. Please provide such an evaluation.

March 10, 2010

Mr. Samuel L. Belcher
Vice President Nine Mile Point
Nine Mile Point Nuclear Station, LLC
P.O. Box 63
Lycoming, NY 13093

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING NINE MILE POINT NUCLEAR STATION, UNIT NO. 2 – RE: THE LICENSE AMENDMENT REQUEST FOR EXTENDED POWER UPRATE OPERATION (TAC NO. ME1476)

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Sincerely,

/RA/

Richard V. Guzman, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
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Docket No. 50-410

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As stated

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ADAMS Accession No.: ML100630112 * RAI provided by memo. No substantial changes made. NRR-058

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