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

August 14, 2014

Mr. Christopher Costanzo
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. 2 – THIRD ROUND OF REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST PURSUANT TO 10 CFR 50.90: MAXIMUM EXTENDED LOAD LINE LIMIT ANALYSIS PLUS (MELLLA+) (TAC NO. MF3056)

Dear Mr. Costanzo:

By letter dated November 1, 2013 (Agencywide Document Access and Management System (ADAMS) Package Accession No. ML13316B090), as supplemented by letters dated January 21, 2014 (ADAMS Accession No. ML14023A654), February 14, 2014 (ADAMS Package Accession No. ML14051A155), February 25, 2014 (ADAMS Accession No. ML14064A321), March 10, 2014 (ADAMS Accession No. ML14071A466), May 14, 2014 (ADAMS Accession No. ML14139A416), and June 13, 2014 (ADAMS Accession No ML14169A034), Nine Mile Point Nuclear Station, LLC (the licensee) submitted a license amendment request for Nine Mile Point Nuclear Station, Unit 2. The proposed amendment would allow (1) operation in the expanded maximum extended load line limit analysis plus (MELLLA+) domain; (2) use of the Detect and Suppress Solution - Confirmation Density, DSS-CD stability solution; (3) use of the TRACG04 analysis code; (4) increase the isotopic enrichment of boron-10 in the sodium pentaborate solution used to prepare the neutron absorber solution in the Standby Liquid Control System (SLS); and (5) increase the Safety Limit Minimum Critical Power Ratio (SLMCPR) for two recirculation loops in operation.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the information provided in your submissions and has determined that additional information is needed to complete its review. Enclosure 1 provides the non-proprietary version of the request for additional information (RAI), and Enclosure 2 provides the proprietary version of the RAI, identifying the proprietary information with text in double brackets (**[[. . .]]**).

NOTICE: Enclosure 2 to this letter contains Proprietary Information. Upon separation from Enclosure 2, this letter is DECONTROLLED.

Subsequent to the telephone conversation with your staff, Mr. Brandon Varga, on July 23, 2014, your staff committed your response to these RAIs by August 29, 2014.

Please contact me, 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. 50-410

Enclosures:
1. Request for Additional Information (Non-Proprietary)
2. Request for Additional Information (Proprietary)

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ENCLOSURE 1

THIRD ROUND REQUEST FOR ADDITIONAL INFORMATION RELATED TO LICENSE AMENDMENT REQUEST RE: MAXIMUM EXTENDED LOAD LINE LIMIT ANALYSIS PLUS

CONSTELLATION ENERGY

NINE MILE POINT NUCLEAR STATION, UNIT 2

DOCKET NO. 50-410

(NON-PROPRIETARY)

Proprietary information pursuant to Section 2.390 of Title 10 of the *Code of Federal Regulations* has been redacted from this document.

Redacted information is identified by blank space enclosed within double brackets.

THIRD ROUND REQUEST FOR ADDITIONAL INFORMATION RELATED TO LICENSE AMENDMENT REQUEST RE: MAXIMUM EXTENDED LOAD LINE LIMIT ANALYSIS PLUS

CONSTELLATION ENERGY

NINE MILE POINT NUCLEAR STATION, UNIT 2

DOCKET NO. 50-410

(NON-PROPRIETARY)

By letter dated November 1, 2013 (Agencywide Document Access and Management System (ADAMS) Accession No. ML13316B107), and supplemental information provided in a letter dated March 10, 2014 (ADAMS Accession No. ML14071A466), Constellation Energy, the licensee for Nine Mile Point Nuclear Station, Unit 2 (NMP2) submitted a license amendment request for maximum extended load line limit analysis plus (MELLLA+). The proposed amendment request would allow operation in the expanded MELLLA+ operating domain.

Upon review of Attachment 10 to the submittal titled "Safety Analysis Report for Nine Mile Point Unit 2 Maximum Extended Load Line Limit Analysis Plus" (ADAMS Accession No. ML13316B113), the NRC staff has the following requests for additional information:

SRXB(2)-1.0: POWER DENSITY > 50 MWT/MLBM/HR

The Methods safety evaluation report (SER) states, "*Plant-specific EPU and expanded operating domain applications will confirm that the core thermal power to core flow ratio will not exceed 50 MWt/Mlbm/hr at any statepoint in the allowed operating domain. For plants that exceed the power-to-flow value of 50 MWt/Mlbm/hr, the application will provide power distribution assessment to establish that neutronic methods axial and nodal power distribution uncertainties have not increased.*" The power distribution root mean squared, RMS, data provided to support the Methods SER (SER Figure 3-4) ranged from **[[ ]]**, and an extrapolation to 50 MWt/Mlbb/hr was allowed based on the Safety Limit Minimum Critical Power Ratio (SLMCPR) adders.

The statement in Section 2.2.5 of the Safety Analysis Report (SAR): "The incorporation of this limitation duplicates the intent of the Methods SER..." does not seem to be justified by the SER language and intent.

Since NMP2 power density is 51.86 MWt/Mlbm/hr (>50), provide a power distribution assessment to establish that neutronic methods axial and nodal power distribution uncertainties have not increased.

SRXB(2)-2.0: SAFETY LIMIT MINIMUM CRITICAL POWER RATIO (SLMCPR) ADDERS

Section 2.2.1 "Safety Limit Minimum Critical Power Ratio" states that "a +0.02 SLMCPR adder will be added to the cycle-specific SLMCPR."

1. Provide a list of SLMCPR adders in MELLLA+ with respect to Original Licensed Thermal Power (OLTP) conditions.
2. Specify which adders are part of the Extended Power Uprate (EPU), and which are MELLLA+ specific.
3. In addition, the Methods SER specifies a SLMCPR adder of 0.03. Please explain the difference between the 0.03 and 0.02 values.

SRXB(2)-3.0: VOID FRACTION

Figures 2-2 through 2-5 of the SAR show an unusual behavior towards the end of cycle in NMP2 (significant increase in flow and reduction in void past 16.5 GWD/ST).

1. Is this behavior caused by an end of cycle (EOC) stretch with increased core flow (ICF)?
2. The hot power bundle flow (Fig 2-2) increases by ~25% whereas the increased core flow has a maximum value of 5% (Fig 1-1). Please explain the unusual NMP2 behavior in Figs 2-2 through 2-5.

SRXB(2)-4.0: BACKUP STABILITY SOLUTION

Section 2.4.3 Backup Stability Protection (BSP) describes that the Detect and Suppress Solution - Confirmation Density (DSS-CD) licensing topical report (LTR) provides two options: (1) BSP manual regions and (2) BSP implemented with average power range monitor (APRM) flow bias scram. This section of the NMP2 SAR appears to be a summary of the DSS-CD LTR, but it is not clear which of the two options will be implemented by NMP2.

1. Which option will NMP2 use for the first MELLLA+ cycle?
2. Provide the BSP regions for the NMP2 equilibrium cycle.

SRXB(2)-5.0: REACTOR CORE ISOLATION COOLING (RCIC)

Section 3.9.3 "[RCIC] Net Positive Suction Head" states that "For ATWS (Section 9.3) and fire protection (Section 6.7), operation of the RCIC system at suppression pool temperatures greater than the operational limit may be accomplished by using the condensate storage tank (CST) volume as the source of water"

1. Is the CST available for RCIC even under containment isolation conditions?
2. If the suppression pool temperature reaches the operational limit, what indication/training does the operator have to switch from suppression pool to CST inlet?

SRXB(2)-6.0: ANTICIPATED OPERATIONAL OCCURANCE (AOO) IMPACT OF FLOW

On a separate MELLLA+ submittal, data was provided to justify that AOOs have smaller change in minimum critical power ratio (ΔMCPR) at 80% core flow than at 105% core flow. The argument presented in the past is a shift in power towards the bottom as the voids increase for the 80% flow case, which results in increased control rod performance that offsets the higher void reactivity coefficients at higher void levels.

NMP2 uses a core flow window from 85% to 105%. Provide the initial axial power shapes for the events in Table 9-1 of the SAR at 85% and 105% flow.

SRXB(2)-7.0: BI-STABLE FLOW

Is NMP2 susceptible to bi-stable flow in the recirculation loops? If so, what is the maximum achievable recirculation flow used in normal operation to minimize bi-stable flow concerns?

SRXB(2)-8.0: PLANT DESIGN PARAMETERS

1. Provide plant design parameters relevant to the ATWS calculations in Section 9 of the SAR. Specifically: turbine bypass capacity, sources of high-pressure injection and their operability issues (e.g., steam is lost after isolation ...), sources of low-pressure injection and their operability issues (e.g. CST pumps ...).
2. Provide vessel component elevations in units comparable to the ones used for water level in the Section 9 figures (include separators, feedwater spargers, nominal level, level setpoints for actuations, top of active fuel ...).

SRXB(2)-9.0: ATWS SEQUENCE OF EVENTS

Provide tables of the assumed sequence of events for the ODYN computer code licensing calculation, the ATWS/Stability calculation, and the ATWS/Stability/Reactor Pump Trip (RPT) calculation.

SRXB(2)-10.0: ATWS WATER LEVEL STRATEGY

1. Provide a detailed description of what water level control strategy (with emphasis on timing) was used for each ATWS calculation.
2. Describe the sources of water used to control the level. For the equipment used, describe automated actions (i.e., loss of extraction steam), and assumptions about operability (i.e., residual steam volume, if used) after the Main Steam Isolation Valve isolation occurs.

SRXB(2)-11.0: DETAILED PLOTS

The neutron flux provided for the ATWS-Instability (RPT) calculation is core-average. Provide additional plots with hot channel powers at symmetric core locations showing the amplitude of the regional oscillations for the ATWS-Instability calculation.

SRXB(2)-12.0: PEAK CLADDING TEMPERATURE (PCT)

1. Section 9.3.3 of the SAR specifies that the minimum stable film boiling temperature (T_{min}) correlation used is Shumway with clean Zirconium (Zr) credit (i.e., no Zr oxide) and no void credit. Is the TRACG quench model activated for these calculations or for the ATWS/Instability/RPT transient?
2. The ATWS/Instability/RPT calculation (Fig 9-12) shows a PCT heatup at ~140 sec when the power oscillations initiate. The PCT recovers and the rods seem to rewet at ~300 sec when the oscillations are mitigated by the flow reduction. What mechanism allows for heatup and rewet?
3. Provide plots similar to Figure 9-12 that shows PCT superimposed with the calculated T_{min} value.
4. Provide tables showing the calculated margin between PCT and T_{min} for Figure 9-12.

SRXB(2)-13.0: TURBINE TRIP EVENTS

Results for turbine trip without bypass (TTNBP) during an AWTS-I event are not included in the SAR. Provide results for TTNBP in the MELLLA+ operating domain.

SRXB(2)-14.0: STEAM DRYER STRUCTURAL INTEGRITY

1. Are the boundary conditions used in Acoustic Circuit Model, ACM, affected by MELLLA+ flow? Is there any impact on reactor water level and boundary conditions for annular region between dryer skirt and separator stand pipes, and annular region between reactor pressure vessel wall and dryer skirt? Is there any impact on dryer pressure loading used and on dryer structural analysis?
2. Are steam dryer stresses evaluated for EPU conditions bounding for plant operation at EPU conditions combined with MELLLA+ conditions?
3. Section 3.3.4 "Steam Line Moisture Performance Specification" states, "This increase resulted in a MCO value above the original moisture performance specification of 0.10 wt.%." ... "The amount of time NMP2 is operated with higher than the original design moisture content (0.10 wt %) is minimized by operations" ... "the NMP2 moisture carryover, MCO, will be monitored and controlled to < 0.25 wt.%". Provide a summary explanation of:
    a. What analyses were performed to determine the 0.25% permissible limit?
    b. What analyses were performed to determine the original 0.1% moisture carryover, MCO, under MELLLA+ conditions?
    c. What plant operations are used in NMP2 to minimize the moisture carryover, MCO?
    d. Provide a short physical explanation of what causes the increased moisture carryover, MCO, at lower flow. Is this mechanism predicted using an experimental correlation or a first principle analytical tool?

e. How is the MCO monitored during operation? What is the typical surveillance period?

SRXB(2)-15.0: LARGE BREAK AND SMALL BREAK LOCA

1. Section 4.3.1 Break Spectrum Response and Limiting Single Failure states,"A number of small break sizes were evaluated at the rated EPU power/MELLLA+ flow domain to determine the worst case small break." Provide a list of cases evaluated and indicate the limiting case.
2. The Small-Break LOCA results in Section 4.3.3 show the top-peaked axial power shape is limiting compared to the mid-peaked power shape. Why is Small-Break LOCA top-peak limited?
3. The results for Large-Break LOCA in Section 4.3.2 show the mid-peaked axial power shape being limiting. Why is Large-Break LOCA mid-peak limited?
4. In Section 4.3.2, explain the following regarding its results:
   a. The MELLLA+ LTR requires Small- and Large-Break LOCA analyses to include top-peaked and mid-peaked power shape in establishing the Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) and determining the PCT. Explain why only mid-peaked axial power shape is analyzed at 100% power and 100% flow.
   b. Explain why the mid-peaked axial power shape is limiting in terms of the PCT.
   c. What is the difference between mid-peak and top-peak values for the 1st peak results?
   d. Explain why the first peak is lower than the second peak for the mid-peaked axial power shape calculation in the Appendix K PCT analyses.
   e. Explain why no data is shown for the Nominal PCT cases.
   f. Please provide a plot of PCT versus time for Large-Break LOCA top- and mid-peaked axial power shape cases.

SRXB(2)-16.0: OPRM ARMED REGION

The generic MELLLA+ flow domain is 80% - 100% flow at 100% power. NMP2 chose a different flow domain of 85% - 100% flow at 100% power. The generic Oscillation Power Range Monitor (OPRM) armed region value for the DSS-CD is 75% flow. Please explain why the generic value for the armed region for the DSS-CD was not adjusted commensurate with the adjustments to the generic flow domain? Please provide the criteria and methodologies used to set the OPRM armed region.

SRXB(2)-17.0: SIMULATOR UPDATE

1. Describe any modifications to the training status of the key operator actions credited in the TRACG ATWS-Instability analysis.

SRXB(2)-18.0: CORE DESIGN

1. Please verify that the document from James J. Stanley to the NRC dated February 25, 2014, "License Amendment Request Pursuant to 10 CFR 50.90: Maximum extended Load Line Limit Analysis Plus – Core Reload and Safety Limit Supplemental Information" is the final supplemental reload licensing report (SRLR) for NMP2 MELLLA+ operating Cycle 15. If the document is not a final SRLR, when will the final SRLR be available to support NMP2 MELLLA+ operation?
2. When will the final Core Operating limits Report be available to support NMP2 MELLLA+ operation?
3. Table 2-1 and Figures 2-1 through 2-6 of the SAR indicate the core design and fuel monitoring parameters for each exposure statepoint. Table 2-1 shows the peak nodal exposures ranging from 38.849 to 56.660 GWd/ST (52.003 GWd/ST for NMP2 MELLLA+) and Figures 2-1 through 2-6 show cycle exposure only up to 18 GWd/ST.
   a. Why do the figures show the data only up to 18 GWd/ST?
   b. Provide values for maximum bundle power, flow for peak bundle, exit void fraction for peak power bundle, maximum channel exit void fraction, core average exit void fraction, and peak LHGR at peak nodal exposure.
4. Please provide a detailed description and basis as to why the operational conditions for NMP2 in the MELLLA+ operating domain are within expected parameters based on the data shown in Figures 2-7 through 2-17.

SRXB(2)-19.0: STANDBY LIQUID CONTROL SYSTEM

1. Provide rationale to revise the acceptance criterion in Surveillance Requirement 3.1.7.7 from a discharge pressure of ≥ 1,327 pounds per square inch gauge (psig) to ≥ 1,335 psig.

SRXB(2)-20.0: CYCLE SPECIFIC SAFETY LIMITS

1. It appears that both Figure 1 of Attachment 11 to the SAR and Figure 1 of the February 25, 2014, SRLR show the same core loading pattern. Please verify that Figure 1 in both documents is the same final core loading pattern. If they are not the same final core loading pattern, explain what they represent.
2. Figure 3 in Attachment 11 of the SAR shows Monte Carlo trials for the SLMCPR value through all of the uncertainty subroutines. Are there any Part 21 reports associated with SLMCPR?

3. Table 3 of Attachment 11 shows that the Final Estimated SLMCPR for a state-point at 100% power and 85% flow is [[ ]]. The Calculated Monte Carlo SLMCPR is [[ ]]. Explain why the 0.02 adder for MELLLA+ operation was applied to the Calculated Monte Carlo SLMCPR and not the Final Estimated SLMCPR.
4. Was the STERN test data used to improve the non-power distribution uncertainties shown in Table 4 in Attachment 11? If so, explain how the data was used. If not, explain why?

SRXB(2)-21.0: TECHNICAL SPECIFICATIONS

Please identify which version of GESTAR is used for TS 5.6.5.b.1.

SRXB(2)-22.0: LIMITING EVENTS ANALYZED IN ATWS VERSUS ATWS-I

1. For NMP2, the limiting ATWS events analyzed were initiated from 100% current licensed thermal power, CLTP, and 85% rated core flow at beginning of cycle, BOC, and EOC exposure conditions. Why is peak reactivity exposure not analyzed as a limiting event for ATWS?

SRXB(2)-23.0: ATWS ANALYSIS RESULTS

Table 9-4 shows the key results of the ATWS analyses. Footnote 2 of Table 9-4 states "Coolable core geometry is ensured by meeting the 2200°F PCT and 17% local cladding oxidation acceptance criteria of 10 CFR 50.46." No calculation was performed for peak local cladding oxidation. Verify that the peak local cladding oxidation is insignificant under NMP2 MELLLA+ operation.

Subsequent to the telephone conversation with your staff, Mr. Brandon Varga, on July 23, 2014, your staff committed your response to these RAIs by August 29, 2014.

Please contact me, if you have any questions.

Sincerely,

/RA/

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

Docket No. 50-410

Enclosures:
1. Request for Additional Information (Non-Proprietary)
2. Request for Additional Information (Proprietary)

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