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

February 12, 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. 1 - THIRD ROUND OF REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST FOR ADOPTION OF NFPA 805 (TAC NO. ME8899)

Dear Mr. Costanzo:

By letter dated June 11, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12170A868), Nine Mile Point Nuclear Station, Unit 1 (NMP1) submitted a license amendment request (LAR) for adoption of a new risk-informed performance-based (RI-PB) fire protection licensing basis which complies with the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.48(a) and 10 CFR 50.48(c); the guidance in Regulatory Guide (RG) 1.205, "Risk-Informed Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Revision 1, and National Fire Protection Association 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition. This LAR also follows the guidance in Nuclear Energy Institute (NEI) 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program under 10 CFR 50.48(c)," Revision 2.

By letters dated February 27, 2013, March 27, 2013, and April 30, 2013 (ADAMS Accession Nos. ML13064A466, ML13092A139, and ML131270405, respectively), the licensee submitted its responses to the U.S. Nuclear Regulatory Commission's (NRC) request for additional information (RAI) dated January 3, 2013 (ADAMS Accession No. ML12361A050). The NRC staff has issued the second round of RAIs dated October 9, 2013 (ADAMS Accession No. ML13281A010). The licensee responses to these RAIs are expected in 2 batches, December, 9, 2013, and January 22, 2014. The NRC staff is in the process of reviewing the licensee responses received by the letter dated December 9, 2013 (ADAMS Accession No. ML13347B187).

As indicated in the October 9, 2013, letter from the NRC, enclosed is the request for additional information (RAI). This additional information is needed to complete the NRC staff review.

Clarification conference calls were held between the NRC staff and the licensee on December 11, 2013, and January 24, 2014, and it was agreed that the response times for the enclosed RAIs would be no later than February 27, 2014.

Please note that review efforts on this task are being continued and additional RAIs may be forthcoming.

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:
Request for Additional Information

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST

TO ADOPT NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805

PERFORMANCE-BASED STANDARD FOR FIRE PROTECTION FOR LIGHT WATER

REACTOR GENERATING PLANTS

NINE MILE POINT NUCLEAR STATION, UNIT 1

DOCKET NUMBER 50-220

(TAC NO. ME8889)

PRA RAI 1.01

In a letter dated February 27, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13064A466), the licensee responded to Probabilistic Risk Assessment (PRA) Request for Additional Information (RAI) 01 and provided an event tree in Figure PRA RAI 01-2 depicting fire scenario progression; however, this event tree does not appear to reflect branch points A and D of the simplified fire event tree provided in Figure PRA RAI 01-01. Explain the effect of credited automatic and manually actuated suppression systems on fire scenario progression, including target damage states and timing considerations. In particular, provide technical justification as to the appropriateness of the time to suppression system actuation applied to fire scenarios. Include discussion of those systems that require manual activation (e.g., the CO2 suppression systems discussed in response to PRA RAI 56).

PRA RAI 10.01

In a letter dated February 27, 2013 (ADAMS Accession No. ML13064A466), the licensee responded to PRA RAI 10 and stated that the additional risk of recovery actions (RAs) is calculated as the total delta risk from the fire area variances from deterministic requirements (VFDRs) that are addressed by crediting a RA. The response also implies that risk-reduction modifications, i.e., those not associated with a VFDR, appear to be credited in the post-transition plant but not in the compliant plant. If so, equating the additional risk of RAs to the total delta risk is non-conservative for those VFDRs that credit both a RA and a risk-reduction modification. Confirm whether risk-reduction modifications are credited in the compliant plant. Crediting risk-reduction modifications in the post-transition but not the compliant plant will provide a non-conservative estimate of the additional risk of RAs. If risk reduction modifications are not credited in the compliant plant (yet are credited in the post transition plant), provide a revised Table W-3 that reports correct values for additional risk of RAs, e.g., by crediting any risk-reduction modifications in both the post-transition and compliant plants for those VFDRs that also credit a RA.

PRA RAI 10.02

In a letter dated February 27, 2013 (ADAMS Accession No. ML13064A466), the licensee responded to PRA RAI 10 and does not indicate how the compliant and variant plants were modeled to determine the change in core damage frequency (ΔCDF) and change in large early release frequency (ΔLERF) for abandonment scenarios. Provide a description specific to how the ΔCDF and ΔLERF and additional risk of RAs were calculated for the main control room (MCR) and any other fire area that results in MCR abandonment. If the calculated ΔCDF and ΔLERF differs from the total risk of MCR abandonment, then provide the risk (i.e., CDF and LERF) associated with MCR abandonment as well.

PRA RAI 11.01

LAR Attachment S, Table S-2, Item 4 does not provide a plan of action should the change in risk exceed risk acceptance guidelines. Revise this implementation item to include a plan of action to notify the NRC if risk acceptance guidelines are exceeded subsequent to completion of both PRA-credited modifications and implementation items.

PRA RAI 20.01

In a letter dated February 27, 2013 (ADAMS Accession No. ML13064A466), the licensee responded to PRA RAI 20 and provided a summary description of the human reliability analysis (HRA) process leading to the human error probabilities (HEPs) applied to individual abandonment actions and the evaluation of their feasibility; however, a description of how CDF and LERF are estimated in MCR abandonment scenarios is not provided. As a result, provide the following. Should this affect the PRA results, provide a sensitivity study yielding the impact on CDF, LERF, ΔCDF and ΔLERF.

a. Explanation of the logic modeled by the fire PRA (FPRA) for crediting the alternate shutdown and the basis for that logic.

b. Explanation of the range of probabilities for properly shutting down the plant, and discussion of how they were applied in the scenario analysis. In doing so, provide examples over the full range of values utilized, a characterization of the scenarios to which these values are applied, and a summary of how each value is developed. This information should include explanations of how the following scenarios are addressed.

    i. Scenarios where the fire fails few functions aside from MCR habitability and successful shutdown is straightforward.

    ii. Scenarios where the fire could cause some recoverable functional failures or Spurious operations that complicate the shutdown but successful shutdown is likely.

    iii. Scenarios where the fire induced failures cause great difficulty for shutdown by failing multiple functions and/or causing complex spurious operations that make successful shutdown unlikely.

c. Explanation of how timing was established (i.e., total time available, time until a cue is reached, manipulation time, and time for decision-making) and of which fire or fires were used as the basis for the timing. Include in the explanation the basis for any assumptions made about timing.

d. Discussion of the probabilities applied for transferring control to the alternate shutdown panel or justification for the lack thereof.

e. Discussion related to communication and coordination required during the implementation of the alternate shutdown procedure by the different operators at their different locations. Include consideration of actions that require taking off headsets or the unavailability of phone systems.

f. Description of how the impact of complexity on coordination of actions and operator performance in the alternate shutdown procedure is addressed.

g. Description of the treatment of potential dependencies between individual actions, including discussion of operator actions that can impact the actions of other operators.

PRA RAI 41.01

In a letter dated February 27, 2013 (ADAMS Accession No. ML13064A466), the licensee responded to PRA RAI 41 and stated that a sensitivity study was performed via a Bayesian update on the Bin 15.1 and 36 ignition frequencies owing to the fact that potentially challenging fires in these bins have occurred in the period between 1999 and 2008. Based on the response to PRA RAI 41, the update for Bin 15.1 is significant. Include the updated frequencies for bins 15.1 and 36 in the aggregate change in risk evaluation requested in PRA RAI 61.

PRA RAI 53.01

In a letter dated February 27, 2013 (ADAMS Accession No. ML13064A466), the licensee responded to PRA RAI 53 and discussed the treatment of self-ignited cable fires, cables fires due to welding, and junction boxes. This requires further clarification for the NRC staff to judge the acceptability of methods employed. Address the following:

a. Discuss and justify the acceptability of the approach by which ignition frequencies, which are developed on a compartment- or fire-zone-basis, are apportioned to cables and junction boxes within a transient zone.

b. Credit for suppression may only be taken for items external to the ignition source. Therefore, remove any credit taken for suppression to prevent overall cable tray or junction box damage for the single tray or junction box damaged in the fire scenario.

c. Discuss how the conditional core damage probability (CCDP) assigned to a junction box was determined and whether it bounds the CCDP associated with all of the cables that enter the junction box. If not bounding, justify the approach. Otherwise, update the PRA and provide the aggregate change in risk evaluation requested in PRA RAI 61.

Note that draft frequently asked questions (FAQs) 13-0005 (ADAMS Accession No. ML13150A242) and 13-0006 (ADAMS Accession No. ML13212A378) offer complete technical paths related to cable fires and junction boxes, respectively.

PRA RAI 59.01

In a letter dated February 27, 2013 (ADAMS Accession No. ML13064A466), the licensee responded to PRA RAI 59 and provided additional fire scenarios to account for fire propagation between transients zones; however, the methods by which transient zones are developed and analyzed, including the means by which propagation to adjacent transient zones is considered, do not appear to be well defined. As a result, address the following:

a. Outline the procedure followed to define transient zones, including the process by which transient and fixed ignition sources and targets are selected.

b. Explain how transient zones are treated within fire scenario progression. Include clarification on the timing associated with target damage states that represent full transient zone damage.

c. For fire zones where a hot gas layer is postulated, it appears that no damage is postulated in the neighboring transient zone prior to development of the hot gas layer. Provide a justification that damage does not occur in the neighboring transient zone prior to the development of the hot gas layer.

d. For transient zones with cables extending beyond zone boundaries, provide technical justification of the method utilized to determine the time of fire propagation to adjacent transient zones for both fixed and transient ignition sources (whether "grouped" or "ungrouped") within the exposing transient zone. Include discussion on how the combustibles, hot gas layer effects, etc.) that may influence fire distances referenced in the RAI response are calculated.

e. For transient zones without cables extending beyond zone boundaries, provide technical justification for precluding fire propagation to adjacent transient zones. Include consideration of ignition sources near the boundaries of the exposing transient zone and scenario-specific fire effects (e.g., secondary and intervening combustibles, hot gas layer effects, etc.) that may influence fire propagation.

PRA RAI 60

The approach employed to develop and quantify fire scenarios in the MCR, specifically evaluation of main control board (MCB) fires, deviates from accepted methods and approaches in NUREG/CR-6850. In a letter dated February 27, 2013 (ADAMS Accession No. ML13064A466), the licensee responded to PRA RAI 01f(ii) and partially addressed this deviation by providing a comparison between non-suppression probabilities used in the FPRA

and those that would be obtained from Appendix L of NUREG/CR-6850. In each case, the approach used in the FPRA was shown to be conservative relative to the approach in Appendix L. However, the response to the RAI does not address other factors (e.g., frequency apportionment) that may lead to differences in the risk results obtained. In this regard, address the following:

a. Provide justification that the overall NMP approach for evaluating MCB fires bounds the results (i.e., CDF, LERF, ΔCDF and ΔLERF) that would be obtained had an approved method (e.g., Appendix L of NUREG/CR-6850) been employed. Note that the approved method applies the full MCB ignition frequency to each postulated MCB scenario.

b. The NRC staff does not consider panels 1A through 8A and panels 1B through 8B as part of the MCB per guidance in Supplement 1 to NUREG/CR-6850 given that these panels are detached and house balance-of-plant and off-site power controls and indicators. In addition, the NRC staff has reservations that panels N, M, J and G are part of the MCB based on the description provided in Appendix L of NUREG/CR-6850. Provide the results (i.e., CDF, LERF, ΔCDF and ΔLERF) of a sensitivity study that treats panels N, M, J, G, 1A through 8A, and 1B through 8B as general electrical panels in terms of frequency apportionment and fire scenario development. Additional information may also be provided that provides further justification that the panels excluded by the NRC are part of the MCB.

PRA RAI 61

Section 2.4.3.3 of the NFPA-805 standard incorporated by reference into 50.48(c) states that the probabilistic safety assessment (PSA) (PSA is also referred to as PRA) approach, methods, and data shall be acceptable to the authority having jurisdiction (AHJ), which is the NRC. Regulatory Guide (RG) 1.205 identifies NUREG/CR-6850, NEI 04-02, revision 2, and the ongoing FAQ process as documenting methods acceptable to the NRC staff for adopting a fire protection program consistent with NFPA-805.

The NRC staff identified several methods and weaknesses that the licensee used in the FPRA that have not been accepted by the staff. RAIs were provided about these methods and weaknesses and the response have been received. The staff has concluded that some of these methods and weaknesses are unacceptable in that justification does not seem to be complete (e.g. credit for control power transformers is not supported by experiments).

Unacceptable methods and weaknesses are:

- PRA RAI 06 regarding elimination of control power transformers (CPT) credit
- PRA RAI 55 regarding removal of halon system credit in multi-compartment analysis of scenarios in which the exposing compartment does not contain a halon system
- PRA RAI 56 regarding revised suppression credit for the manually activated CO2

- SSD RAI 08 regarding uncoordinated breakers
- PRA RAI 59 regarding scenarios added to model propagation between transient zones (include any additional scenarios added in response to PRA RAI 59-01)
- PRA RAI 57 regarding the use of CPT credit and its impact on Assumption 4 in the circuit failure probability calculations
- PRA RAI 53 (as clarified in 53-01b) regarding credit taken for suppression to prevent overall cable tray damage or junction box damage for the single tray or junction box damaged in the fire scenario
- PRA RAI 41 regarding plant-specific ignition frequency update (clarified in PRA RAI 41.01)

The following methods and weaknesses have been identified, but the NRC staff's review is continuing with additional RAIs, requesting further supporting information. Alternately, the licensee may replace any of these methods and weaknesses with a method or model previously accepted by the NRC by modifying the FPRA. Methods and weaknesses still under review are:

- PRA RAI 20-01 regarding quantification of MCR abandonment scenarios
- PRA RAI 53-01 regarding self-ignited cable fires, cable fires due to welding, and junction box fires as described in (a) and c) of 53-01.
- PRA RAI 60 regarding modeling of MCB fire scenarios

a. Provide the results of a composite analysis that shows the integrated impact on the fire risk (CDF, LERF) after replacing all the unacceptable methods and weaknesses with acceptable ones. As the review process is concluded, additional changes to replace any method or weakness still under review that are determined to be unacceptable may be required. In the composite analysis, for those cases where the individual issues have a synergistic impact on the results, a simultaneous analysis must be performed. For those cases where no synergy exists, a one-at-a-time analysis may be done. If the impact on the change in risk from transition is negligible, a quantitative evaluation is unnecessary. In the response, explain how the RG 1.174 risk acceptance guidelines are satisfied for the composite analysis, and if applicable, a description of any new modifications or operator actions being credited to reduce the delta risk and the associated impacts to the fire protection program.

b. If any of the unacceptable methods or weaknesses will be retained in the PRA that will be used to estimate the change in risk of post transition changes to support self-approval, please explain how the quantitative results for each future change will account for the use of the unacceptable method or weakness.

Please contact me at (301) 415-3308, 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. 50-220

Enclosure:
Request for Additional Information

cc w/encl: Distribution via Listserv

DISTRIBUTION:

PUBLIC	LPL1-1 R/F	RidsNRRPMNineMilePoint
RidsNRRLAKGoldstein	RidsNrrDorlDpr	RidsRgn1MailCenter
RidsNrrDirsltsb	RidsAcrsAcnw_MailCTR	DSchroeder,
RIRidsNrrDraApla	RidsNrrDraAfpb	RidsNrrDssStsb
RidsNrrDraAhpb	LFields, NRR/AFPB	JHyslop, NRR/APLA
CCandace, NRR/AHPB	JRobinson, NRR/AFPB	HKhadijah, NRR/STSB
SWall, NRR/DORL	RidsDorlLpl1-1	

ADAMS Accession No..: ML14030A377 ***For APLA**

OFFICE	LPL1-1/PM	LPL1-1/LA	NRR/DRA/APLA/BC (Lead Reviewer)(*)	LPLI-1/BC	LPLI-1/PM
NAME	BVaidya	KGoldstein	HHossein/LFields	BBeasley	BVaidya
DATE	02/06/14	02/06/14	02/06/14 02/06/14	02/12/14	02/12/14

OFFICIAL RECORD COPY