November 8, 2007

Mr. Keith J. Polson
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, IMPLEMENTATION OF ALTERNATIVE SOURCE TERM (TAC NO. MD5758)

Dear Mr. Polson:

By letter dated May 31, 2007, Nine Mile Point Nuclear Station, LLC requested an amendment to the Nine Mile Point Nuclear Station, Unit No. 2 (NMP2) Renewed Facility Operating License. The proposed license amendment would revise the accident source term used in the NMP2 design basis radiological consequence analyses in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.67. The revised accident source term would replace the current methodology that is based on TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites," with the alternative source term methodology described in Regulatory Guide (RG) 1.183, "Alternative Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors." .

The Nuclear Regulatory Commission (NRC) staff has reviewed the information provided in that letter and has determined that additional information is needed to complete its review. Enclosed is the NRC staff's request for additional information (RAI). The RAI was discussed with your staff on October 30, 2007, and it was agreed that your response would be provided within 60 days from the date of this letter.

Sincerely,

/RA/

Marshall J. David, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-410

Enclosure:
RAI

cc w/encl: See next page

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<u>REQUEST FOR ADDITIONAL INFORMATION</u>

<u>NINE MILE POINT NUCLEAR STATION, UNIT NO. 2</u>

<u>IMPLEMENTATION OF ALTERNATIVE SOURCE TERM</u>

The Nuclear Regulatory Commission (NRC) staff has performed its initial review of your May 31, 2007, request to revise the accident source term used in the Nine Mile Point Nuclear Station, Unit No. 2 (NMP2) design basis radiological consequence analyses in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.67. As a result of that review, we have determined that additional information is required to adequately evaluate the acceptability of the proposed changes.

Meteorology

1. Regulatory Guide (RG) 1.183, "Alternative Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," states that the total effective dose equivalent should be determined for the most limiting person at the exclusion area boundary (EAB). Page 4 of Attachment (6) of the May 31, 2007, license amendment request (LAR) states that the distances to the EAB and low population zone (LPZ) in the coastal sectors (i.e., west clockwise through east northeast) were not considered in determining the direction dependent atmospheric dispersion factors (χ/Q values). Why was this done? Assuming that the near-shore area of Lake Ontario could be temporarily used by members of the public (e.g., boaters), what is the area and associated distance as defined in RG 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants," in each coastal sector over which Nine Mile Point Nuclear Station, LLC can exercise control in determining who may be in an area adjacent to the Nine Mile Point site?

2. The NRC staff notes that 60.7 meter wind measurements, rather than the 9.4 meter measurements, were used in the calculation of the ground level EAB and LPZ χ/Q values. In addition, the 60.7 meter wind measurements and 60.7-9.4 meter atmospheric stability measurements were used to calculate the elevated release χ/Q values for releases from the 130.8 meter Nine Mile Point Unit 2 stack. NRC Regulatory Issue Summary 2006-04, "Experience With Implementation of Alternative Source Terms," dated March 7, 2006, states that when running the offsite atmospheric dispersion model PAVAN, two or more files of meteorological data representative of each potential release height should be used if χ/Q values are being calculated for pathways with significantly different release heights. Please provide justification that use of the 60.7 meter data is adequate for generation of both the ground level and elevated release χ/Q values used in the dose assessment.

3. Provide figures which support the selection of the inputs and assumptions used to calculate all of the χ/Q values. Include a figure of the general arrangement of plant structures, drawn approximately to scale and showing true north, sufficient to enable NRC staff to make confirmatory estimates of the selected inputs and assumptions and resultant χ/Q values. For each accident, highlight the postulated release and receptor locations including control room locations that may experience unfiltered inleakage. Are

distances input into the ARCON96 calculations directly estimated as horizontal straight line distances, or was another methodology (e.g., a "taut string" methodology) used to estimate the distances? If the distances were not estimated directly as the straight line horizontal distance, how were they determined? Please explain how the procedure used to estimate the distances properly factored in differences in heights between source and receptor?

Loss-of-Coolant Accident (LOCA)

4. In Appendix J to the LOCA design analysis (H21C-106) of Attachment (7) to the May 31, 2007, LAR, it is shown that the ratios of the activities calculated using RG 1.3, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors," to the activities calculated using an alternative source term basis are all greater than 1 for the reactor building cloud, control room filter, and external plume sources. However, for at least two of those sources, the reactor building cloud and external plume, specifically, the ratio is less than an order of magnitude and approximately equal to 2. This may be considered to be "slim" margin, given the uncertainty generally associated with calculations of shine doses through shielding. Often, this type of comparison lends itself to the inclusion of factors to account for uncertainty, but no such factor appears to have been included for NMP2.

   Therefore, please discuss how uncertainty in shine dose was addressed when making the comparison between the activity associated with the magnitude of shine sources, calculated the historical way and using the alternative source term.

5. Please clarify the meaning of the word "efficiency" as it is being used in Appendix C to the LOCA design analysis (H21C-106) of Attachment (7) to the May 31, 2007, LAR. Is the usage of "efficiency" referring to the calculation of effective filter efficiency, particulate collection efficiency, or some other quantified activity removal efficiency; and how does this efficiency relate to, and interact with, other calculated, or assumed, analytical activity removal efficiencies?

6. If the NMP2 primary containment is routinely purged, please verify that the purge system is isolated before the onset of gap release following the initiation of the postulated LOCA. If it is not, please provide the dose consequences associated with core activity releases from this pathway.

7. Appendix A, Section 6.1, of RG 1.183 states that "the activity available for release via MSIV [main steam isolation valve] leakage should be assumed to be that activity determined to be in the drywell for evaluating containment leakage (see Regulatory Position 3)." Regulatory Position 3 presents the source term, in the form of activity release fractions, released into containment. It is understood that this containment source term accounts for phenomena that would serve to inhibit activity release from the vessel, prior to transport through main steam and other bypass piping. The guidance of RG 1.183 further allows for the credit of other containment removal mechanisms (i.e., natural deposition and drywell spray); however, applying these additional removal mechanisms, prior, and in addition, to crediting pipe deposition, can substantially change the containment source term assumed to enter the main steam and other bypass piping,

thus, rendering the containment source term of Regulatory Position 3 inapplicable. Because the cumulative effect of these removal mechanisms was not explicitly addressed by the containment source term provided in Regulatory Position 3, consideration should be given to the interaction of each removal mechanism with the source term of RG 1.183 when modeling the transport of activity from the drywell through bypass pathways.

The following statement is made in Section A1-4.1.1.4 of the May 31, 2007, LAR:

"The particulate deposition velocity used is equal to the third percentile value of 6.6E-5 m/s [meters per second] from Appendix A of AEB-98-03 [,"Assessment of Radiological Consequences for the Perry Pilot Plant Application using the Revised (NUREG-1465) Source Term"]. This is conservatively low and reflects the effectiveness of spray removal in the drywell."

Please discuss why a third percentile value was used for the deposition velocity. Was this value arbitrarily chosen or does the third percentile represent a specific expectation (calculated or otherwise determined) for the particle size distribution entering the steam lines?

8. AEB-98-03 is regarded as a "well-mixed" model, where activity is assumed to immediately be available for release to the environment. Although the activity concentration where it is released will "build up" and peak over time, the assumed release of activity to the environment begins with the onset of gap release from the core. As cited in the May 31, 2007, LAR, AEB-98-03 is used as the basis for the activity deposition and transport model implemented for the MSIV leakage pathway of the LOCA analysis. However, credit is taken for the current licensing basis delay in the transport of primary containment activity through the bypass pathway (i.e., main steam line, etc.). This treatment is more consistent with a plug, or slug, flow model, which in many ways can be viewed as the antithesis of a well-mixed model.

   Please explain and justify why crediting delay time in the AEB-98-03-based, well-mixed, modeling of NMP2 bypass pathways is acceptable. Also, please explain how doing so is more conservative than not.

Control Rod Drop Accident (CRDA)

9. Was leakage from a gland seal condenser considered as a potential post-CRDA release path? If not, please provide justification for not considering this path. Also, please either provide justification for excluding the steam jet air ejector as a potential post-CRDA release path, or indicate the dose consequence from this potential path as it applies to the dose analysis, as described in footnote 2 of Appendix C to RG 1.183.