



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

November 28, 2011

Mr. Michael J. Pacilio
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2, AND BYRON STATION, UNIT NOS.
1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION RE:
MEASUREMENT UNCERTAINTY POWER UPRATE REQUEST
(TAC NOS. ME6587, ME6588, ME6589, AND ME6590)

Dear Mr. Pacilio:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated June 23, 2011, as supplemented on August 25, 2011 and November 1, 2011, Exelon Generation Company, LLC submitted a license amendment request associated with a measurement uncertainty recapture power uprate, for the Braidwood Station, Units 1 and 2, and Byron Station, Unit Nos. 1 and 2.

The NRC staff is reviewing your submittal and has determined that additional information is required to complete the review. The specific information requested is addressed in the enclosure to this letter. During a discussion with your staff on November 10, 2011, it was agreed that you would provide a response by December 10, 2011.

Please note that if you do not respond to this letter by the agreed-upon date or provide an acceptable alternate date in writing, we may reject your request for approval under the provisions of Title 10 of the *Code of Federal Regulations*, Section 2.108.

The NRC staff considers that timely responses to requests for additional information help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources.

-2-

If circumstances result in the need to revise the requested response date, please contact me at (301) 415-1115.

Sincerely,

A handwritten signature in black ink, appearing to read "Nicholas J. DiFrancesco". The signature is fluid and cursive, with a large initial "N" and "D".

Nicholas J. DiFrancesco, Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-456, STN 50-457,
STN 50-454, and STN 50-455

Enclosure:
Request for Additional Information

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

BRAIDWOOD STATION, UNITS 1 AND 2 AND BYRON STATION, UNIT NOS. 1 AND 2

REGARDING MEASUREMENT UNCERTAINTY RECAPTURE POWER UPRATE

LICENSE AMENDMENT REQUEST

DOCKET NOS. STN 50-454, STN 50-455, STN 50-456, AND STN 50-457

TAC NOS. ME6587, ME6588, ME6589, AND ME6590

In reviewing of the Exelon Generation Company, LLC (licensee) license amendment request (LAR), dated June 23, 2011, and as supplemented on August 25, 2011 and November 1, 2011 Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML111790030, ML11255A332, and ML113050426, respectively), related to a measurement uncertainty recapture (MUR) power uprate, for the Braidwood Station (Braidwood), Units 1 and 2, and Byron Station, (Byron), Unit Nos. 1 and 2, the U.S. Nuclear Regulatory Commission staff has determined that the following information is needed in order to complete its review:

Request for Additional Information – Nuclear Performance and Code Review Branch

1. Please identify the numerical values for the parameter uncertainties and biases that were used in the derivation of the departure for nucleate boiling ratio design limit of 1.19 for the ABB-NV correlation in accordance with the revised thermal design procedure and further justify that these values are acceptable for Byron and Braidwood.

Request for Additional Information – Steam Generator Tube Integrity and Chemical Engineering Branch

2. Section II.3.2, "Auxiliary Equipment Design Transients," indicates that the only auxiliary equipment design transients impacted by the power uprate are those associated with the reactor coolant system hot- and cold-leg temperatures. It is further stated that the existing auxiliary equipment design transients are conservative and bounding for the power uprate. Please discuss whether the analysis included changes in nitrogen-16 activity that would potentially affect letdown line decay time requirements.
3. Section IV.1.E.iii, "Erosion/Corrosion Program," describes the flow-accelerated corrosion (FAC) monitoring program. The FAC monitoring program includes the use of a predictive method to calculate the wall thinning of components susceptible to FAC. For the piping lines that have been recommended for FAC review, please provide a sample list of the components expected to experience the greatest increases in wear rates for MUR power uprate conditions. Include the initial wall thickness (nominal), current (measured) wall thickness, a comparison of the measured wall thickness to the thickness predicted by the CHECWORKS Steam/Feedwater Application [SFA] FAC model, and predicted time to reach minimum allowable wall thickness.

Enclosure

4. Section IV.1.A.vi.2.c, "Steam Generator [SG] Tube Bundle Integrity, Flow Induced Vibration and Wear, H*, and Chemistry," states that changes in the key operating parameters associated with the MUR power uprate do not impact on the H* lengths or leakage factors for the Byron and Braidwood, Unit 2, Model D5 SGs. Please describe the key operating parameters affected by the MUR power uprate and discuss how they are bounded by the H* analysis to support the claim that H* lengths and leakage factors are not affected.
5. Section IV.1.A.vi.2.d, "Steam Generator Steam Drum Evaluation," states that increased fluid velocity at MUR power uprate conditions may increase current estimated degradation rates up to 25 percent for Byron, Unit No. 2, and Braidwood, Unit 2. Additionally, it states that erosion-corrosion has previously been detected in several components of the Byron, Unit No. 2, and Braidwood, Unit No. 2, Model D5 SGs steam drum internals. Please provide examples of the most rapid degradation rates observed to date for steam drum internals and discuss whether a 25 percent increase in degradation rate would impact the inspection frequency and/or scope of these components.
6. Section IV.1.A.vi.2.f, "Steam Generator Loose Parts," states that some existing objects in the Byron, Unit No. 2, SGs have caused wear on the tubing during past cycles, however, these objects are termed, "unknown objects or inaccessible objects," since the support plate locations are difficult to access. It is also stated that the inspection criteria for these objects will remain unaffected as a result of the MUR power uprate. Please describe the inspection frequency, type of eddy-current technique used, and extent to which secondary-side inspections are performed to disposition these "unknown objects or inaccessible objects." Also, describe how it was determined that the inspection criteria for these objects can remain the same under MUR power uprate conditions.

Request for Additional Information – Electrical Engineering Branch

7. In the LAR, Attachment 5, Section V.1.B.i, "Alternate AC (AAC) Power Source," the licensee stated that the AAC power source has sufficient capacity to operate systems necessary for coping with a station blackout (SBO) event for the required 4-hour coping duration.

Provide a summary of the load study versus AAC power source capacity to validate the above statement under MUR conditions.

8. In the LAR, Attachment 5, Section V.1.B.iii, "Condensate Storage Tank Inventory," the licensee stated that the condensate storage tank provides adequate inventory for decay heat removal following a SBO event at MUR power uprate conditions.

Provide a discussion of condensate storage tank inventory required under normal operating conditions versus the required inventory for the SBO duration at MUR power uprate conditions.

9. In the LAR, Attachment 5, Section V.1.B.iv, "Class 1E Battery Capacity," the licensee stated that the Class 1E batteries have sufficient capacity to provide adequate power for safe shutdown loads.

Provide a discussion of capacity margins available in the Class 1E batteries under MUR conditions.

10. In the LAR, Attachment 5, Section V.1.C, "Environmental Qualification (EQ) of Electrical Equipment," the licensee stated that they conducted an evaluation and concluded that the power uprate will not impact the equipment qualification.

Provide a discussion/summary of temperature, pressure, and radiation levels/profiles to demonstrate that adequate margins remain with respect to EQ of electrical equipment in accordance with IEEE Std. 323-1974, under the worst-case accident conditions at MUR power uprate conditions.

11. In the LAR, Attachment 5, Section V.1.F.v, "Reserve Station Service Transformers," the licensee stated that the plant operation at power uprate conditions has no effect on loss of voltage or degraded grid voltage protection schemes and motor starting scenarios.

Provide steady state voltages at 4.16kV safety-related buses under worst-case design basis conditions, before and after MUR conditions, in a tabular form.

12. In the LAR, Attachment 5, Section V.1.F.i, "Main Generator," the licensee stated that the generator is operated within the Capability Curve.

Provide the Capability Curve to verify the MW [megawatt] and MVAR [megawatt volt amperes reactive] capability of the main generator.

13. In the LAR, Attachment 5, Section V.1.E, "Onsite Power Systems," the licensee stated that "The LEFM [Leading Edge Flow Meter] CheckPlus System is being installed as an MUR power uprate device, however, no changes to the 120 V design loading will occur."

Provide a discussion on the auxiliary power requirement for the Cameron LEFM CheckPlus System, such as direct current or AC power requirements, and its loading impact, if any, on the associated safety-related or nonsafety-related buses.

14. In the LAR, Attachment 5, Section V.1.E, "Onsite Power System," the licensee identified some load changes in the 6.9 kV system.

Provide a discussion that as a result of some load changes in 6.9 kV system, there are no adverse impacts on any 6.9 kV switchgear equipment such as short-circuit ratings, protective relay settings, etc.

Request for Additional Information – Balance-of-Plant Branch

15. Please provide the additional references associated with the Steam Generator Tube Rupture Analysis. These references are needed to understand the treatment of potential non-conservative assumption in WCAP-10698-P-A and its Supplement 1 as discussed in Attachment 5a (ADAMS Accession No. ML111790038).
 - NSAL-07-11, "Decay Heat Assumption in Steam Generator Tube Rupture Margin-to-Overfill Analysis Methodology," November 2007.
 - WCAP-16948-P, "Clarifications for the Westinghouse Steam Generator Tube Rupture Margin to Overfill Analysis Methodology," December 2008.

M. Pacilio

- 2 -

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Sincerely,

/RA/

Nicholas J. DiFrancesco, Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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DISTRIBUTION:

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ADAMS Accession No. ML113010403

NRR-088

OFFICE	LPL3-2/PM	LPL3-2/LA	LPL3-2/BC	LPL3-2/PM
NAME	NDiFrancesco	SRohrer	JZimmerman	NDiFrancesco
DATE	11/21/11	11/21/11	11/25/11	11/28/11

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