December 8, 2005

Mr. Christopher M. Crane, President
and Chief Nuclear Officer
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3; QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION REGARDING TRANSITION TO WESTINGHOUSE SVEA-96 OPTIMA2 FUEL (TAC NOS. MC7323, MC7324, MC7325, AND MC7326)

Dear Mr. Crane:

By letter dated June 15, 2005, Exelon Generation Company, LLC (Exelon) submitted requested amendments to the Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2 to support the transition to Westinghouse SVEA-96 Optima2 fuel.

Based on the review of the submittal and discussions with Exelon and Westinghouse, the the Nuclear Regulatory Commission staff has determined that it needs the additional information specified in the enclosed Request for Additional Information (RAI) in order to complete its review. The RAI has been discussed with members of your staff. Based on those discussions, it was agreed that the Exelon response will be provided by January 31, 2006.

If there are technical or scheduler problems, please contact me at 301-415-3019.

Sincerely,

/RA/

George F. Dick, Sr. Project Manager
Plant Licensing Branch III-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-237, 50-249, 50-254 and 50-265

Enclosure: As stated

cc w/encl: See next page

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DATE	12/08/05	12/7/2005	12/8/05	12/8/2005

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REQUEST FOR ADDITIONAL INFORMATION

TRANSITION TO WESTINGHOUSE SVEA-96 OPTIMA2 FUEL DESIGN

EXELON GENERATION COMPANY, LLC

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-237, 50-249, 50-254, AND 50-265

During its review of the licensee's request for a license amendment regarding transition to Westinghouse SVEA-96 Optima2 Fuel, the Nuclear Regulatory Commission (NRC) staff has determined that the following information is needed in order for the staff to complete its review.

1. The license amendment request was completed prior to the staff's approval of WCAP-15836-P-A and WCAP-15942-P-A. Now that these two topical reports have been completed, please update the applicability tables in Attachment 6 and the conditions and limitations tables in Attachment 7 to reflect the approved documents. Include the following:

    a. Detailed descriptions of the plant-specific changes to the SVEA-96 Optima2 fuel design and the evaluation to ensure mechanical compatibility with core components and co-resident fuel (WCAP-15942-P, Condition #2a).

    b. Detailed description of the control blade interference evaluation in accordance with WCAP-15942-P, Condition #4.

2. Identify all fuel design operational limits (e.g. thermal mechanical operating limit, burnup, pellet/cladding interaction maneuvering restrictions, etc.) for each fuel type and describe how each is monitored by plant operations.

3. Describe the interaction between the General Electric (GE) emergency core cooling (ECCS) performance analyses of the GE14 fuel design and the Westinghouse ECCS performance analyses of the Optima2 fuel design with respect to developing the bounding maximum average planar linear heat generation rate limits. Include within this description an explanation of the flow characteristics of each bundle design and how this information is addressed in each respective ECCS analysis.

4. Provide the basis for the 0.05 relative assembly power uncertainty used in the safety limit minimum critical power ratio calculation.

5. Discuss the applicability of seismic/loss-of-coolant accident methodology in CENPD-288-P-A to the SVEA-96 Optima2 fuel design. Include a discussion of the mechanical testing done on the Optima2 grids.

ENCLOSURE

6. Section 2.5.5 of the license amendment request identifies a physical change to the standby liquid control (SLC) system being credited in the anticipated transient without scram (ATWS) analysis. Specifically, the sodium pentaborate in the SLC tank has been upgraded from natural boron (19.8 a/o B10) to enriched boron (30 a/o B10). This enhancement is directly responsible for the mitigation of the accident analysis and therefore must be surveilled in accordance with the ATWS rule, Title 10 of the *Code of Federal Regulations* (10 CFR) Part 62. The Exelon license amendment request does not include a change to technical specification (TS) 3.1.7 and thus, is deficient in that it does not capture this important physical change to the plants nor any surveillance requirements (SRs). Standard TS SR 3.1.7.10 defines the SR for verifying enriched sodium pentaborate. The licensee should address this deficiency to their amendment request.

7. Section 2.3 of the license amendment request identified a change to the Westinghouse ECCS evaluation methodology for the transition to SVEA-96 Optima2.

    a. Per 10CFR50.46, Exelon needs to submit for staff review:

        i. Justification that the Westinghouse ECCS Models are acceptable for and properly applied to Dresden and Quad Cities.

        ii. Results of the plant-specific ECCS evaluation (detail sufficient for staff review).

8. Section 4.3.1 states, “Since the raw CPR data that was used to develop the legacy fuel vendor’s CPR correlation will not be provided, a conservative adder will be applied to the legacy fuel operating limit minimum CPR which satisfies the 95/95 statistical criterion.” Demonstrate that the adder meets the 95/95 criterion.

9. In Attachment 6, page 5 of 11, the last paragraph alludes to the Westinghouse Topical Report WCAP-15942-P as containing the Westinghouse experience base. Please provide this experience data base in Tabulated form, including as much detail as possible regarding Extended Power Uprates (EPU) and operation with high exit void fractions. That is specifically:

    a. Demonstrates quantitatively and qualitatively, that the Lattice/Depletion code systems, and that the current uncertainties and biases established in the Lattice/Depletion code systems remain valid for the neutronic and thermal-hydraulic conditions predicted for the EPU operation. Specifically, demonstrate the uncertainties and biases that are used in the licensee's reactivity coefficients (e.g. void coefficient) are applicable or remain valid for the neutronic and thermal-hydraulic conditions expected for EPU operation.

    b. Demonstrate quantitatively and qualitatively, that the fuel isotopic validations and testing performed in the Lattice/Depletion code systems remain applicable for prolonged operation under high void conditions for the fuel lattice designs that would be used for the expected EPU core designs.

c. Demonstrate qualitatively and quantitatively that the Westinghouse neutronic methodology experience base and demonstrate that the Westinghouse methodology is applicable to EPU conditions, specifically to EPU conditions at Dresden Nuclear Power Station (DNPS) and Quad Cities Nuclear Power Station (QCNPS).

d. Provide any validation data in support of the Westinghouse neutronic methodology prediction capability by comparison to gamma scans and Transverse Incore Probe (TIP) core follow benchmarking based on the current fuel designs operated under the current operating strategies and core conditions. This request pertains to any recent fuel, such as the SVEA-96+ and OPTIMA-2, in particular for first cycle and second cycle fuel.

10. In Attachment 6, page 6 of 11, the first paragraph discusses briefly the contents of CENPD-390-P-A.

    a. Does ths topical include OPTIMA-2 data/analyses?

    b. Does ths topical contain TIP pin power comparisons for normal and extended power operations?

11. Provide the TIP and Gamma comparisons and PROTEUS results, discussed in the 2nd, 3 and 4th Paragraphs on page 6 of 11, Attachment 6.

12. In Attachment 6, page 7 of 11, the first four paragraphs on this page, and the Tables that go with them, require further clarification.

13. In Attachment 6, page 8 of 11, the first paragraph alludes to pin power testing with results obtained for the mid-planes.

    a. Does Westinghouse have any exit plane pin power behavior, particularly at very high exit void fractions?

    b. Provide qualitative description of the void data base and the associated correlation. Specifically describe the uncertainty associated with the data gathering, specifying the uncertainties currently applied to the void fraction correlation and justify its applicability for EPU conditions.

14. In Attachment 7, page 9 of 43, the justification provided on the next three pages to extend the AA78 slip correlation to pressures beyond those reviewed and approved in the topical report, will require additional quantitative technical justification. For example, nothing was stated regarding the possible effects on the uncertainties introduced due to extrapolation of the Westinghouse void correlation beyond its current data base. Please provide qualitative description of the void data base and the associated correlation. Specifically describe the uncertainty associated with the data gathering, specifying the uncertainties currently applied to the void fraction correlation and justify its applicability for EPU conditions.

15. State the bypass voiding criteria or specification that applies to the TIP and the local power range monitor.

16. Evaluate the capability of the licensing code systems, including the core simulator, in determining the potential for bypass voiding.

17. Provide evaluation and discussion of the lattice/depletion code capability to generate the cross-section with voiding in the in-channel water rods and bypass.

18. Evaluate EPU core neutronic and thermal-hydraulic conditions and state for EPU core designs and operating conditions, if bypass voiding can occur during steady state or transient events. Consider operation at all limiting statepoints in the MELLLA domain.

19. In August 30, 2004, General Electric Nuclear Energy (GENE) issued a Part 21 report (ML042720293), stating that using limiting control rod blade patterns developed for less than rated flow at rated power conditions could sometimes yield more limiting bundle-by-bundle MCPR distributions and/or more limiting bundle axial power shapes than using limiting control rod patterns developed for rated flow/rated power in the SLMCPR calculation. GNF-A evaluated the plants operating at the MELLLA operating domain and concluded that the potential exists for more limiting SLMCPR at the nonrated flow conditions for plants currently operating at the MELLLA domain as well. GNF-A also evaluated the plants operating at the MELLLA operating domain and identified four plants that may have more limiting SLMCPR calculated at the minimum core flow statepoint. The affected plants submitted amendment requests increasing their SLMCPR value. The staff understand that Framatome did not issue a Part 21 reporting on the SLMCPR methodology that addresses the calculation of the SLMCPR at minimum core flow and offrated conditions similar to GENE's Part 21 report (ML042720293). The following topics pertain to Framatome's methodology for calculating the SLMCPR at minimum core flow at rated power statepoint.

    a. Provide reference(s) to the applicable sections of the SLMCPR Westinghouse methodology that specifies the requirement to calculate the SLMCPR at the worst-case conditions for minimum core flow conditions for rated power. Please demonstrate to the staff that the SLMCPR is calculated at different statepoints of the licensed operating domain, including the minimum core flow statepoint and that the calculation is performed for different exposure points.

    b. Discuss or reference the applicable Sections/Chapters that addresses what rod patterns are assumed in performing the nonrated flow SLMCPR calculations. State how it is established that the rod patterns assumed in the SLMCPR calculations for rated power, flow, and minimum core flow conditions, would reasonably bound the planned rod pattern that DNPS and QCNPS would operate under EPU conditions.

c. For implementation of ARTS/MELLLA using Westinghouse methods, show that the DNPS and QCNPS can operate at all statepoints, including the minimum core flow statepoint, without violating their SLMCPR in the event of an anticipated operational occurrence. The minimum core flow statepoint SLMCPR calculations should demonstrate that DNPS and QCNPS can operate at the minimum flow statepoint with some margin.

20. Section 2.4 of Attachment 7 does not provide sufficient information regarding the Stability Analysis for the staff to reach a safety determination. The staff expects the following documentation to be submitted in a supplemental submittal to the TS Amendment that was previously reviewed by the staff:

a. Provide a summary of the process followed by Westinghouse and plants with Westinghouse fuel to implement Long-Term Stability Solution III.

b. Provide a summary of the process followed by Westinghouse to calculate plant-specific setpoints and core operating limit report items.

c. Provide a list and short description of the major codes used by Westinghouse and their uses for licensing applications.

d. Describe the status of the licensing basis for these methodologies and identify any topical reports that are NRC-approved or under review to support the methodologies.

e. Document the plant-specific DIVOM calculation for each plant.

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