June 3, 2004

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, AND QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING ALTERNATIVE SOURCE TERM AMENDMENT REQUEST (TAC NOS. MB6530, MB6531, MB6532, AND MB6533)

Dear Mr. Crane:

By letter dated October 10, 2002, Exelon Generation Company submitted an amendment request to support application of an alternative source term at Dresden Nuclear Power Station, Units 2 and 3, and Quad Cities Nuclear Power Station, Units 1 and 2. The staff has identified the need for additional information related to crediting the standby liquid control (SLC) system for pH control of the suppression pool. This RAI was mailed electronically to your staff on May 4, 2004. Your staff agreed to respond to this RAI by the end of June 2004.

Please contact me at 301-415-2863 if your staff has any questions about this RAI.

Sincerely,

/RA/

Lawrence W. Rossbach, Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

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

Enclosure: Request for Additional Information

cc w/encl: See next page

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DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

AND QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2

REQUEST FOR ADDITIONAL INFORMATION

ALTERNATIVE SOURCE TERM AMENDMENT REQUEST

Quad Cities/Dresden has proposed to credit control of the pH in the suppression pool following a loss of coolant accident (LOCA) by means of injecting sodium pentaborate into the reactor core with the standby liquid control (SLC) system. The SLC system design was not previously reviewed for this safety function (pH control post-LOCA). Licensees proposing such credit need to demonstrate that the SLC system is capable of performing the pH control safety function assumed in the alternative source term (AST) LOCA dose analysis. The following questions are from a set of generic questions developed by the staff and which are being provided to all boiling water reactor (BWR) licensees with pending AST license amendment requests. In responding to questions regarding the SLC system, please focus on the proposed pH control safety function. The reactivity control safety function is not in question. For example, the SLC system may be redundant with regard to the reactivity control safety function, but lack redundancy for the proposed pH control safety function. If you believe that the information was previously submitted to support the license amendment request to implement AST, you may refer to where that information may be found in the documentation.

1. Please identify whether the SLC system is classified as a safety-related system as defined in 10 CFR 50.2, and whether the system satisfies the regulatory requirements for such systems. If the SLC system is not classified as safety-related, please provide the information requested in Items 1.1 to 1.5 below to show that the SLC system is comparable to a system classified as safety-related. If any item is answered in the negative, please explain why the SLC system should be found acceptable for pH control agent injection.

    1.1 Is the SLC system provided with standby AC power supplemented by the emergency diesel generators?

    1.2 Is the SLC system seismically qualified in accordance with Regulatory Guide (RG) 1.29 and Appendix A to 10 CFR Part 100 (or equivalent used for original licensing)?

    1.3 Is the SLC system incorporated into the plant's ASME Code inservice inspection and inservice testing programs based upon the plant's code of record (10 CFR 50.55a)?

    1.4 Is the SLC system incorporated into the plant's Maintenance Rule program consistent with 10 CFR 50.65?

    1.5 Does the SLC system meet 10 CFR 50.49 and Appendix A to 10 CFR 50 (General Design Criteria 4, or equivalent used for original licensing)?

2. Please describe proposed changes to plant procedures that implement SLC sodium pentaborate injection as a pH control additive. In addition, please address Items 2.1 to 2.5 below in your response. If any item is answered in the negative, please explain why the SLC system should be found acceptable for pH control additive injection.

   2.1 Are the SLC injection steps part of a safety-related plant procedure?

   2.2 Are the entry conditions for the SLC injection procedure steps symptoms of imminent or actual core damage?

   2.3 Does the instrumentation cited in the procedure entry conditions meet the quality requirements for a Type E variable as defined in RG 1.97 Tables 1 and 2?

   2.4 Have plant personnel received initial and periodic refresher training in the SLC injection procedure?

   2.5 Have other plant procedures (e.g., Emergency Response Guidelines/Severe Accident Guidelines) that call for termination of SLC as a reactivity control measure been appropriately revised to prevent blocking of SLC injection as pH control measure? (For example, the override before Step RC/Q-1, *"If while executing the following steps:....It has been determined that the reactor will remain shutdown under all conditions without boron, terminate boron injection and..."*)

3. Please provide a description of the analysis assumptions, inputs, methods, and results that show that a sufficient quantity of sodium pentaborate can be injected to raise and maintain the suppression pool greater than pH 7 within 24 hours of the start of the event. (See also Position 2 of Appendix A to RG 1.183.) In your response, please discuss the adequacy of recirculation of suppression pool liquid via emergency core cooling systems through the reactor vessel and the break location and back to the suppression pool in meeting the transport and mixing assumptions in the chemical analyses. Assume a large break LOCA.

4. Please show that the SLC system has suitable redundancy in components and features to assure that for onsite <u>or</u> offsite electric power operation its safety function of injecting sodium pentaborate for the purpose of suppression pool pH control can be accomplished assuming a single failure. For this purpose, the check value is considered an active device since the check valve must open to inject sodium pentaborate. If the SLC system cannot be considered redundant with respect to its active components, the licensee should implement one of the three options described below, providing the information specified for that option for staff review.

   4.1 <u>Option 1</u> Show acceptable quality and reliability of the non-redundant active components and/or compensatory actions in the event of failure of the non-redundant active components. If you choose this option, please provide the following information to justify the lack of redundancy of active components in the SLC system:

4.1.1 Identify the non-redundant active components in the SLC system and provide their make, manufacturer, and model number.

4.1.2 Provide the design-basis conditions for the component and the environmental and seismic conditions under which the component may be required to operate during a design-basis accident. Environmental conditions include design-basis pressure, temperature, relative humidity and radiation fields.

4.1.3 Indicate whether the component was purchased in accordance with Appendix B to 10 CFR Part 50. If the component was not purchased in accordance with Appendix B, provide information on the quality standards under which it was purchased.

4.1.4 Provide the performance history of the component both at the licensee's facility and in industry databases such as equipment performance and information exchange system (EPIX) and nuclear plant reliability data system (NPRDS).

4.1.5 Provide a description of the component's inspection and testing program, including standards, frequency, and acceptance criteria.

4.1.6 Indicate potential compensating actions that could be taken within an acceptable time period to address the failure of the component. An example of a compensating action might be the ability to jumper a switch in the control room to overcome its failure. In your response please consider the availability of compensating actions and the likelihood of successful injection of the sodium pentaborate when non-redundant active components fail to perform their intended functions.

4.2 Option 2 Provide for an alternative success path for injecting chemicals into the suppression pool. If you chose this option, please provide the following information:

4.2.1 Provide a description of the alternative injection path, its capabilities for performing the pH control function, and its quality characteristics.

4.2.2 Do the components which make up the alternative path meet the same quality characteristics required of the SLC system as described in Items 1.1 to 1.5, 2 and 3 above?

4.2.3 Does the alternate injection path require actions to be taken in areas outside the control room? How accessible will these areas be? What additional personnel would be required?

4.3 Option 3 Show that 10 CFR 50.67 dose criteria are met even if pH is not controlled. If you chose this option, demonstrate through analyses that the projected accident doses will continue to meet the criteria of 10 CFR 50.67 assuming that the suppression pool pH is not controlled. The dissolution of

Cesium Iodide and its re-evolution from the suppression pool as elemental iodine must be evaluated by a suitably conservative methodology. The analysis of iodine speciation should be provided for staff review. The analysis documentation should include a detailed description and justification of the analysis assumptions, inputs, methods, and results. The resulting iodine speciation should be incorporated into the dose analyses The calculation may take credit for the mitigating capabilities of other equipment, for example the standby gas treatment system (SGTS), if such equipment would be available. A description of the dose analysis assumptions, inputs, methods, and results should be provided. Licensees proposing this approach should recognize that this option will incur longer staff review times and will likely involve fee-billable support from national laboratories.