June 29, 2004

Mr. Christopher M. Crane, President
and Chief Nuclear Officer
Exelon Nuclear
Exelon Generation Company, LLC
200 Exelon Way, KSA 3-E
Kennett Square, PA 19348

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3 - REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING ALTERNATE SOURCE TERM (TAC NOS. MC0154 AND MC0155)

Dear Mr. Crane:

By letter dated July 14, 2003, as supplemented by letters dated March 15, 2004, April 23, 2004, and May 20, 2004, Exelon Generation Company, LLC, submitted a request for an amendment that would support the use of an alternative source term at Peach Bottom Atomic Power Station, Units 2 and 3. In order to continue our review of your request, the Nuclear Regulatory Commission staff requires the additional information described in the enclosure. These questions were forwarded to you by electronic mail and were discussed in a telephone call with Mr. Doug Walker and others of your staff on June 24 and 25, 2004. I understand that you will respond to these questions as quickly as possible. Please provide a schedule for your responses at your earliest opportunity.

Sincerely,

/RA/

George F. Wunder, Project Manager, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-277 and 50-278

Enclosure: RAI

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION (RAI)

PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3

REGARDING USE OF ALTERNATE SOURCE TERM

1. In Reference 1 below, Appendix 1, Page 1, the basis for the core isotopic inventory is presented. Representative values for the Cycle 14 design (cycle length, average number of fuel assemblies per batch, and average burnup) were used to determine the core inventory. Section 3.1 (page 1.183-12) of Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms For Evaluating Design Basis Accidents At Nuclear Power Reactors," states that the inventory of fission products in the reactor core and available to the containment should be based on the maximum full power operation of the core with, as a minimum, current licensed values for fuel enrichment, fuel burnup and, assumed core power equal to the current licensed rated thermal power times the emergency core cooling system (ECCS) evaluation uncertainty. In their April 23, 2004, submittal, the licensee provides a "Compliance Matrix" that gives a comparison of their submittal to that which is required by RG 1.183. The licensee states that the Peach Bottom Atomic Power Station, Units 2 and 3 (PBAPS), "conforms" with RG 1.183, Section 3.1. The method proposed appears to conflict with the regulatory guidance. Based upon the information provided, the PBAPS method does not appear to consider the spectrum of enrichments and burnups allowed by the PBAPS license and, thus does not conform to Section 3.1. Please provide justification for why the source term generated for a representative core bounds the core design values permitted by the current license (maximum enrichment, burnup etc...) or change the submittal to provide a conservative source term that bounds the allowable operational values that impact the source term. [Values used were 711 EFPD, 4.107% enrichment, 3528 MW].

2. In Reference 1, page 4 of 18, the licensee does not provide an acceptable response to question 6. The licensee has not verified that no other potential unfiltered inleakage pathways could result in X/Q values higher than the control room intake values. In light of the control room habitability issues noted in Generic Letter (GL) 2003-01, the staff does not believe that the licensee has provided adequate assurance that the current habitability requirements will continue to be met. Please provide the information requested.

3. In Reference 1, Attachment 1, page 12, a value for the ECCS flash fraction is given as 1.41% as opposed to 10% in the RG. The licensee states that a smaller amount (than the RG) can be justified based on the actual sump pH history and area ventilation rates, but the pH history and area ventilation rates were not provided. The licensee also provided a short analysis that interpolated calculated iodine partition factors taken from report ORNL-TM-2412, Part IV. The staff has reviewed the information provided and has determined that it does not provide reasonable assurance that the current habitability requirements will be maintained. The reasons for the staff's decision are as follows:

   a. Although an analysis including a limiting pH is provided, no specific details regarding the pH history versus time are provided. Also, area ventilation rates or the uncertainties associated with the sump pH are not addressed.

b. The ORNL study cited is based upon theoretical calculations for the design of reactor containment spray systems. The staff questions the applicability of this methodology. Many of the release mechanisms and other plant-specific issues have not been addressed. These issues create notable uncertainties in how much iodine is available for release. Major uncertainties exist to what extent the chemicals within the leakage will interact with the release environment and lead to a great reduction in its vapor pressures. The production of elemental iodine is related to the pH of the water pools. A major uncertainty in fixing the production of volatile iodine chemical forms is due to uncertainty in the extent of evaporation to dryness. Experts believe that up to 20% of the iodine in water pools that has evaporated would be converted to a volatile form (most likely as elemental iodine). Uncertainties also depend upon the environment where the fluid is leaked and the way the fluid is leaked (misting etc.). Fluid pH shifts may occur due to interactions with components, cable jackets, concrete and radiation.

Since none of these issues have been addressed by PBAPS, feedback is needed from PBAPS. Please advise the staff whether PBAPS will continue to pursue the value of 1.41% in light of the staff's need for additional justification for this deviation from the recommended value in the RG. This feedback is needed in a timely manner given that the staff expects that they will need outside assistance to review this request. If PBAPS decides to address the plant-specific issues identified by the staff, the staff will pursue the outside assistance and additional RAIs will be developed in coordination with outside assistance.

4. In Reference 1, Attachment 1, page 16, the response to question 32 does not provide a complete analysis upon which to judge the adequacy of the response. The staff requests further clarification and justification of the analysis performed.

Regarding Reference 1, Appendix 5, page 24:

a. What is the overall decontamination factor (DF) weighted by in rack vs. drop assemblies and how is it derived? Why is there a weighting of the rack and dropped assemblies?

b. Provide more information regarding the Fermi 2 analysis and justify why this is applicable to the PBAPS analysis.

c. The argument that provides a comparison between the fuel handling accident (FHA) in the reactor well and the fuel-handling building does not appear to be complete. Other factors influence the dose such as release timing, atmospheric dispersion factors, and control room heating, ventilation and air conditioning (HVAC) response. Please provide a more comprehensive analysis of the FHA in the reactor well and the fuel-handling building. The analysis must include all the factors which influence the dose from these accidents.

d. The proposed change to Technical Specification 3.6.4.1 (Secondary Containment) will no longer require that the secondary containment be operable during the movement of fuel assemblies that have a decay period of at least 24 hours. The FHA analysis assumes the release to the control room intake and

the environment is through the turbine building/reactor building (TB/RB) ventilation stack. Please justify that an FHA release through the TB/RB ventilation stack is an appropriately conservative assumption given that the secondary containment may be inoperable. Include general arrangement drawings in your response showing the potential release points.

5. In Reference 2 below, Attachment 1, page 10, the PBAPS response to question 17 does not provide a confirmation of the assumed inleakage value in the proposed amendment request. Many licensees have found that walkdowns, while useful, do not alone provide a reliable method of determining the susceptibility of a control room to inleakage. PBAPS has also not confirmed that their facility's control room meets the applicable habitability regulatory requirements and that the control room habitability systems are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases. Therefore, the staff believes that PBAPS has not shown that GDC 19 will be met with the proposed amendment. Please provide this confirmation as requested by question 1 of GL 2003-01 so that confirmation of your habitability requirements can be made. One method acceptable to the staff that may be used to provide this confirmation is RG 1.196, "Control Room Habitability at Light-Water Nuclear Power Reactors."

6. In Reference 2, Attachment 1, page 16, the PBAPS response to question 31 does not provide the confirmation that control room HVAC flow rates used in the accident analysis are conservative. RG 1.183, Section 5.3.1 (page 1.183-21), states: *If a range of values or a tolerance band is specified, the value that would result in a conservative postulated dose should be used.* Reference 2, Table A, states that PBAPS "conforms" with Section 5.3.1 of RG 1.183. Use of a nominal value does not provide a conservative postulated dose and therefore, the method proposed by PBAPS does not conform to RG 1.183. Based upon these responses the following additional information is requested:

   a. Provide all nominal values used in the radiological dose analysis. Justify why the use of each of these values provides the most conservative postulated dose. Provide the analysis used to justify this conclusion or provide an analysis that uses allowable values that determine the most conservative postulated dose.

   b. Provide the confirmation originally requested in question 31.

7. In Reference 2, Attachment 1, page 11, the PBAPS response to question 20 states that only the steam line piping that has been seismically qualified is credited in this analysis. Please confirm that all equipment credited have a seismic qualification for a Safe Shutdown Earthquake as defined in 10 CFR Part 100 or seismically qualified using the methodology in NEDC-31858P.

8. In Reference 2, Attachment 1, page 12, the PBAPS response to question 21 states that the AEB-98-03 methodology is used to assess the aerosol and elemental deposition and that no credit is taken for the organic deposition. Reference 2, Table 1, page 1, provides the organic deposition constant. Please confirm that the organic deposition is not used. Please describe the treatment you have used for deposition in the main steam line in full. Justify why this method is valid for use with elemental iodine.

9. In Reference 2, Attachment 1, page 13, PBAPS states that an alternate method of evaluating leak rates is now being applied. The staff requests additional information regarding the methodology used to determine the predicted leak rate of 0.437 cfm in the maximum line at containment conditions. Please provide the calculations and assumptions used to determine this leak rate. For the leakage rates in each main steam isolation valve piping segment describe the method used to determine the flow rates.

10. In Reference 2, Attachment 1, page 14, PBAPS states that the TSC doses have been reanalyzed. Since the TSC is within the control room, please describe how the TSC impacts the control room doses. Provide a general arrangement drawing of the control room and TSC and describe the inputs and assumptions used to recalculate the TSC doses and justify the values used. Also, provide the results of the analysis.

References

1. M.P. Gallagher, Exelon Nuclear, letter to U. S. Nuclear Regulatory Commission (USNRC), March 15, 2004.

2. M.P. Gallagher, Exelon Nuclear, letter to USNRC, April 23, 2004.

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