Exelon Nuclear 200 Exelon Way Kennett Square, PA 19348 www.exeloncorp.com

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January 26, 2011

U.S. Nuclear Regulatory Commission ATTN: Document Control Desk Washington, D.C. 20555-0001

> Peach Bottom Atomic Power Station, Units 2 and 3 Renewed Facility Operating License Nos. DPR-44 and DPR-56 NRC Docket Nos. 50-277 and 50-278

- Subject: Response to Request for Additional Information License Amendment Request Concerning Non-Conservative Technical Specification Associated with the Amount of Liquid Nitrogen Storage
- References: 1) Letter from P. B. Cowan (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission - License Amendment Request for Non-Conservative Technical Specification Associated with the Amount of Liquid Nitrogen Storage - dated June 25, 2010 (ML101790114)
 - Letter from J. D. Hughey (U.S. Nuclear Regulatory Commission) to M. J. Pacilio (Exelon Generation Company, LLC), "Peach Bottom Atomic Power Station, Units 2 and 3: Supplemental Information Needed for Acceptance of Requested Licensing Action Re: Liquid Nitrogen Storage (TAC Nos. ME4131 and ME4132)," dated July 30, 2010 (ML102110061)
 - Letter from P. B. Cowan (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission – Supplemental Information for License Amendment Request for Non-Conservative Technical Specification Associated with the Amount of Liquid Nitrogen Storage - dated August 16, 2010 (ML102310079)
 - 4) Letter from J. D. Hughey (U.S. Nuclear Regulatory Commission) to M. J. Pacilio (Exelon Generation Company, LLC), "Peach Bottom Atomic Power Station, Units 2 and 3 – Request for Additional Information Regarding License Amendment Request Related to Liquid Nitrogen Storage (TAC Nos. ME4131 and ME4132)," dated October 21, 2010 (ML102861886)
 - (5) Letter from P. B. Cowan (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission – Response to Request for Additional Information for License Amendment Request for Non-Conservative Technical Specification Associated with the Amount of Liquid Nitrogen Storage, dated December 6, 2010 (ML103410398)
 - (6) Letter from J. D. Hughey (U.S. Nuclear Regulatory Commission) to M. J. Pacilio (Exelon Generation Company, LLC), "Peach Bottom Atomic Power Station, Units 2 and 3 – Request for Additional Information Regarding License Amendment Request Related to Liquid Nitrogen Storage (TAC Nos. ME4131 and ME4132)," dated December 30, 2010 (ML103540505)

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By letter dated June 25, 2010 (Reference 1), Exelon Generation Company, LLC, (Exelon) submitted a License Amendment Request (LAR) for the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3, requesting changes to the Technical Specifications (TS) to address non-conservative TS Surveillance Requirements (SR) associated with the amount of nitrogen available in the liquid nitrogen storage tank.

References 2 thru 5 involve requests for additional information and associated responses.

Subsequently, by letter dated December 30, 2010 (Reference 6), the NRC requested that Exelon provide additional information and clarification justifying the newly derived leakage values and existing surveillance methods. The attachment to this letter restates the NRC's questions followed by Exelon's response.

Exelon has concluded that the information provided in this response does not impact the conclusions of the: 1) Technical Evaluation, 2) No Significant Hazards Consideration under the standards set forth in 10 CFR 50.92(c), or 3) Environmental Consideration as provided in the original submittal (Reference 1).

There are no regulatory commitments contained in this submittal.

If you have any questions or require additional information, please contact Mr. Richard Gropp at (610) 765-5557.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 26th day of January 2011.

Respectfully,

D. b. Velke;

David P. Helker Manager - Licensing Licensing and Regulatory Affairs Exelon Generation Company, LLC

- Attachment: Response to Request for Additional Information License Amendment Request Concerning Non-Conservative Technical Specification Associated with the Amount of Liquid Nitrogen Storage
- cc: NRC Region I, Regional Administrator
 NRC Project Manager, NRR Peach Bottom
 NRC Senior Resident Inspector Peach Bottom
 S. T. Gray, State of Maryland
 R. R. Janati, Bureau of Radiation Protection, Commonwealth of Pennsylvania

ATTACHMENT

PEACH BOTTOM ATOMIC POWER STATION UNITS 2 AND 3

NRC Docket Nos. 50-277 and 50-278

Renewed Facility Operating License Nos. DPR-44 and DPR-56

Response to Request for Additional Information License Amendment Request Concerning Non-Conservative Technical Specification Associated with the Amount of Liquid Nitrogen Storage Attachment Response to RAI LAR for Liquid Nitrogen Storage Docket Nos. 50-277 and 50-278 Page 1 of 4

<u>Response to Request for Additional Information</u> <u>License Amendment Request Concerning</u> <u>Non-Conservative Technical Specification Associated with the Amount</u> <u>of Liquid Nitrogen Storage</u>

Background

By letter dated June 25, 2010, Exelon Generation Company, LLC, (Exelon) submitted a License Amendment Request (LAR) for the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3, requesting changes to the Technical Specifications (TS) to address non-conservative TS Surveillance Requirements (SR) associated with the amount of nitrogen available in the liquid nitrogen storage tank. The proposed changes would revise TS SR 3.6.1.3, *"Primary Containment Isolation Valves (PCIVs),"* and SR 3.6.1.5, *"Reactor Building-to-Suppression Chamber Vacuum Breakers,"* to modify the required level for the liquid nitrogen storage tank. Specifically, the proposed changes would revise TS SR 3.6.1.3.1 and SR 3.6.1.5.1 to require the minimum amount of nitrogen inventory in the liquid nitrogen storage tank be maintained at \geq 22 inches water column, or equivalent volume of \geq 124,000 standard cubic feet (scf), not the currently stated level of \geq 16 inches water column (equivalent volume of \geq 50,000 scf).

Exelon provided supplemental information in support of the proposed License Amendment Request (LAR) by letters dated August 16, 2010 and December 6, 2010.

Subsequently, by letter dated December 30, 2010, the NRC requested additional information in order to complete the review of the LAR. The NRC requested additional information and clarification related to justifying the newly derived leakage values and existing surveillance methods. The specific questions are restated below followed by Exelon's response.

NRC Question (RAI-02)

Provide a suitable method and justification for determining the required amount of nitrogen in the storage tank that would account for leakage of the entire SGIG system while in post-LOCA line-up.

Response

The Safety Grade Instrument Gas (SGIG) system provides a backup pneumatic source to the Containment Atmospheric Control (CAC) purge and vent isolation valves, Reactor Building-to-Suppression Chamber vacuum breakers, and the Containment Atmospheric Dilution (CAD) vent control valves following a DBA-LOCA coincident with a loss of instrument air (non-safety related piping).

The SGIG nitrogen supply is from the CAD liquid nitrogen storage tank. A common supply header from the tank is sent to each unit to a total of 18 end-user pneumatically operated valve stations per unit. The majority of the SGIG piping is normally filled with gaseous nitrogen from the tank, isolated from the instrument air piping by a check valve configuration. The instrument air piping is non-safety related with dual safety-related check valves providing isolation between the safety-related SGIG and non-safety related instrument air systems. Instrument air nominal

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pressure is approximately 15 psig greater than SGIG, and this delta pressure maintains the SGIG check valve closed, thus isolating the SGIG nitrogen piping from the instrument air piping. Following a DBA-LOCA with loss of instrument air, the instrument air pressure would drop to less than SGIG pressure, allowing the SGIG check valve to open and distributing nitrogen to the pneumatic stations. The instrument air system would be isolated by the dual SGIG check valves closed with backpressure from the SGIG system.

The additional piping supplied by the SGIG system following a DBA-LOCA with loss of instrument air is minimal compared to the entire volume of the SGIG and CAD system that is normally filled with nitrogen. Approximately five (5) to ten (10) feet of small diameter instrument piping at each pneumatic operating station will be supplied by SGIG nitrogen in this configuration.

The leak rate calculations to support the LAR submittal were determined during operation with the majority of the SGIG system filled with nitrogen, as well as the CAD system piping which takes a supply off the CAD liquid nitrogen storage tank. The calculation also considers the leakage from portions of SGIG system tubing, leakage at the end-user valve stations, boot seals, and valve stroking. There are multiple factors which provide a high degree of confidence that there is not significant leakage from the additional portion of piping supplied by SGIG during a post-LOCA scenario. Each refuel cycle, a Surveillance Test (ST) of the SGIG system is performed to stroke all of the SGIG valves with instrument air manually isolated by hand valves. The end-user pneumatically operated valves are stroke-timed and the results are trended to ensure that no adverse trends occur in the ability to stroke the valves. Additionally, whenever the pneumatically operated valve stations are maintained, post-maintenance leak checks of the external piping are performed to ensure that there is no external piping leakage.

The periodic checks performed on the SGIG system piping in conjunction with the proportionally small volume placed in service post-LOCA provides a high degree of confidence that negligible additional nitrogen leakage would be incurred while in the post-LOCA line-up in comparison to the leakage values described in conjunction with this LAR submittal and supporting calculation. In addition, the end-user pneumatically operated valves are included in the Peach Bottom Inservice Testing (IST) program and are tested at a periodicity specified by the IST program to ensure operability of the referenced valves. This test also includes SGIG / instrument air valve manipulations locally at each end-user SGIG supplied valve. These operations would detect any significant leakage from the SGIG piping / valves that would be exposed to SGIG pressure during post-LOCA operations. The results of the IST program valve testing is recorded and trended and any anomalies are identified and entered into the Correction Action Program (CAP) for further evaluation and resolution. The methodology presented in this LAR is suitable to determine the required inventory during normal operation and to accommodate the minor increase in system piping during post-LOCA line-up.

NRC Question (RAI-03)

Since the system leakage represents such a significant amount of the required quantity of nitrogen, the NRC staff requests that the licensee either justify how the existing surveillance requirement (i.e. tank level of 22 inches) will assure that future leakage rates will not increase to a point where 22 inches will no longer sustain the SGIG system for the 7-day period, or propose new surveillance requirements that meet the requirements of 50.36(c)(3).

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Response

The margin contained in the original site calculation was selected as 25% margin on top of the SGIG system required volume (i.e., approximately 10,000 scf margin for a required 40,000 scf SGIG system required volume). This was not based on extensive empirical data or any proposed system specific criteria. When the non-conservative TS value was originally identified, the new leakage values and administratively controlled level limit to support SGIG system operation were based on extensive empirical data. A past operability evaluation was performed that investigated system usage back to early 2000. An additional investigation was performed in 2010 during preparation of the LAR. Both investigations identified that CAD tank re-fill frequency and tank level changes have been consistent for the past ten (10) years. The current leakage trend is holding steady and the value represented in the LAR is determined to be bounding for this leakage. Furthermore, as previously discussed in response to the question above, the end-user pneumatically operated valves are included in the Peach Bottom Inservice Testing (IST) program and are tested at a periodicity specified by the IST program to ensure operability of the referenced valves. This test also includes SGIG / instrument air valve manipulations locally at each end-user SGIG supplied valve. These operations would detect any significant leakage from the SGIG piping / valves that would be exposed to SGIG pressure during post-LOCA operations. The results of the IST program valve testing are recorded and trended and any anomalies are identified and entered into the Correction Action Program (CAP) for further evaluation and resolution.

Additionally, Peach Bottom has implemented recurring administrative controls to trend SGIG system leakage. Once each refueling cycle for each Peach Bottom unit, a recurring activity has been established for the System Manager to verify leakage using the methodology established in the subject LAR submittal. The leakage check recurring task requires extensive data assembly and calculation. CAD nitrogen liquid storage tank level and pressure data are recorded by Operations during performance of daily ST rounds and the data is uploaded into the plant database for review and evaluation. This data is used to calculate a SGIG system leak rate and compared to the limiting leakage value established in this LAR to ensure that the established value is still bounding.

Supplemental Information

In addition, Exelon is clarifying information previously provided in the December 6, 2010, response to a request for additional information. Specifically, an equation described in the December 6, 2010, response did not depict the gravitational constant (g_c) value, which should have been referenced for completeness. Therefore, the equation previously depicted in the December 6, 2010, submittal has been modified below to include the (g_c) value.

Solving for h_{L} and including a conversion from inches of water column to psi for dP (Note: density terms are in units of lbm/in³):

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$$h_{L} = \frac{\left(dP * \left(0.036 \frac{psi}{in.ofw.c.}\right) - \left(\frac{g}{g_{c}}\right) D(\rho_{v1} - \rho_{v3})\right)}{\left(\left(\frac{g}{g_{c}}\right)(\rho_{L} - \rho_{v1})\right)}$$

• g_c – Gravitational Constant = 32.2 lb_m *ft / lb_f *s²

Modifying the equation to include this value is simply a clarification and does not alter, change, or modify the methodology or results for the nitrogen storage tank level/volume correlations as previously described in the December 6, 2010, supplemental response.

Conclusion

The information discussed above verifies that the newly derived leakage values are sufficient to account for leakage of the entire SGIG system while in post-LOCA line-up and that the existing surveillance methods are adequate to ensure that the required amount of nitrogen (i.e., minimum of 22 inches water column) will be available to support SGIG system post-LOCA operations.