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February 28, 2008

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

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

Subject: Response to Request for Additional Information Concerning License Amendment Request – Application of Alternative Source Term

References:

1. Letter from P. B. Cowan, Exelon Generation Company, LLC, to U. S. Nuclear Regulatory Commission, "License Amendment Request – Application of Alternative Source Term," dated July 13, 2007

2. Letter from John D. Hughey, Project Manager, U.S. Nuclear Regulatory Commission to Charles G. Pardee, Chief Nuclear Officer and Senior Vice President, Exelon Generation Company, LLC, "Peach Bottom Atomic Power Station, Units 2 and 3 License Amendment Request for Application of Alternative Source Term," dated February 7, 2008

In Reference 1, Exelon Generation Company, LLC (Exelon) submitted an application requesting a change to the Technical Specifications (TS), Appendix A, of Renewed Facility Operating License Nos. DPR-44 and DPR-56 for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3, respectively. The proposed change was requested to support the application of Alternative Source Term (AST) methodology at PBAPS, Units 2 and 3.

In Reference 2, the Nuclear Regulatory Commission (NRC) requested additional information concerning the PBAPS License Amendment Request (LAR). In particular, the NRC requested that Exelon provide additional information pertaining to the seismic qualification analysis performed for certain piping, ductwork, and controls. Attachment 1 restates each of the NRC's questions followed by Exelon's response. Supporting calculations are provided in Attachments 2 through 6.

Exelon has concluded that the information provided in this response does not impact the conclusions of the: 1) Technical Analysis, 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).

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NRR

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 28th day of February 2008.

Respectfully,

Pamela B. Cowan
Director – Licensing and Regulatory Affairs
Exelon Generation Company, LLC

Attachment 1: Response to Request for Additional Information
Attachment 2: PBAPS Calculation 1-1, Revision 1, *"Stress Analysis for Main Steam Outside Containment"*
Attachment 3: PBAPS Calculation PS-049, Revision 2, *"Seismic Evaluation of Consoles 2(3)0C05A, 2(3)0C04A and 2(3)0C03 for Mod 955"*
Attachment 4: PBAPS Calculation G-0106-002, Revision 4, *"Control Room Upgrading HVAC Duct Supports"*
Attachment 5: PBAPS Calculation 23-4/X-1, Revision 0, *"Reactor Building - H&V Ducts, Seismic Analysis"*
Attachment 6: PBAPS Calculation 49-48/H, Revision 0, *"Heating and Ventilation - Seismic Analysis for Anchor Bolts"*

cc: Regional Administrator - NRC Region I w/ Attachment 1 only
NRC Senior Resident Inspector - PBAPS "
NRC Project Manager, NRR - PBAPS "
Director, Bureau of Radiation Protection - Pennsylvania Department of Environmental Protection "

ATTACHMENT 1

Peach Bottom Atomic Power Station
Units 2 and 3
Docket Nos. 50-277 and 50-278

License Amendment Request
Response to Request for Additional Information

Alternative Source Term (AST)

Background

By letter dated July 13, 2007, Exelon Generation Company, LLC (Exelon) submitted an application requesting a change to the Technical Specifications (TS), Appendix A, of Renewed Facility Operating License Nos. DPR-44 and DPR-56 for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3, respectively. The proposed change was requested to support the application of Alternative Source Term (AST) methodology at PBAPS, Units 2 and 3.

By letter dated February 7, 2008, the Nuclear Regulatory Commission (NRC) formally transmitted a Request for Additional Information and acknowledged Exelon's commitment to provide a response by February 29, 2008. The specific questions are restated below followed by Exelon's response along with additional supporting information.

NRC Question 1 (EMCB RAI 1)

In reference to the main steam isolation valve (MSIV) leakage path, Table B, item 6.5, in Attachment 7 of the LAR states that "All piping credited is seismically analyzed to assure the piping wall integrity during and after a seismic (safe shutdown earthquake [SSE]) event." Provide a description of piping systems that are credited in the proposed alternative source term (AST). For each effected piping system discuss the method for seismic qualification. Also clarify whether the Boiling Water Reactor Owners Group (BWROG) approach described in the GE topical report NEDC-31858P, "BWROG Report for Increasing MSIV Leakage Limits and Elimination of Leakage Control Systems," has been utilized in the proposed AST. If report NEDC-31858P has been utilized in the proposed AST, show how the nine limitations listed in the NRC staff's Safety Evaluation (ADAMS Accession No. ML010640286) of the topical report have been addressed.

Response

The piping within the primary containment (drywell) between the reactor pressure vessel and outboard Main Steam Isolation Valves (MSIVs) is credited for iodine deposition. The dose analysis assumes the one line within the drywell that would afford the most deposition efficiency is excluded from the dose analysis for conservatism. Main steam piping from the outboard MSIVs to the Turbine Stop Valves (TSVs) is also credited for iodine deposition in the radiological dose analysis. MSIV leakage is directed through the MSIVs and main steam piping and is assumed to exit to the Turbine Building (TB) at the end of the seismically supported piping at the TSVs. Piping credit consists of only two steam lines at a time, although all piping is seismically qualified to withstand a Safe Shutdown Earthquake (SSE). In order to conservatively estimate the removal of aerosols and elemental iodine within the piping, the two shortest lengths of main steam pipe are used in the radiological dose calculation to maximize the calculated dose. The activity exits the TB into the environment at the TSVs location without credit for holdup or plateout by intervening TB structures.

The piping system analysis for the main steam piping inside the drywell was prepared, and is maintained, by General Electric (GE). The main steam piping outside the drywell (i.e., from the drywell penetration to the turbine stop valves) was analyzed using a finite element piping analysis program, Stone & Webster's NUPIPE-SW, as presented in Appendix 1 of Peach Bottom

Calculation 1-1 (Reference 3) and is provided in Attachment 2, with non-pertinent information extracted. The calculation includes both Operating Basis Earthquake (OBE) and SSE seismic loading, and determines that the pipe stresses are within code allowable limits and that valve accelerations are acceptable.

The removal mechanism credited is consistent with the two well-mixed volume node methodology described in AEB 98-03, *"Assessment of Radiological Consequences for the Perry Pilot Plant Application Using the Revised (NUREG-1465) Source Term"* (Reference 1). The leakage from the MSIV pathway has always been considered as a ground level release. PBAPS has never had an MSIV Leakage Control System and therefore has no alternate drain piping.

The PBAPS AST Loss of Coolant Accident (LOCA) analysis does not use or reference the BWROG Topical Report NEDC-31858P. However, the nine (9) limitations discussed in the NRC SER for the BWROG Topical Report (Reference 2) are discussed below.

1. *Individual licensees should provide a detailed description of the ALT drain path and the basis for its functional reliability, commensurate with its intended safety-related function. The licensee should also describe their maintenance and testing program for the active components (such as valves) in the ALT path.*

   - PBAPS does not have an ALT drain path for MSIV leakage. Therefore, the LOCA analysis has never credited such a path. The AST LOCA analysis also does not credit or propose to credit an ALT drain path for MSIV leakage. Plateout of iodine is credited in the main steam piping as modeled in AEB 98-03 (Reference 1).

2. *Individual licensees should provide plant-specific information for piping design parameters (e.g., uniqueness of piping configurations, pipe span between supports, and diameter-to-thickness ratios for each pipe size), to demonstrate that they are enveloped by those associated with the earthquake experience database.*

   - Calculation 1-1 (Reference 3) is being provided in Attachment 2 to demonstrate seismic qualification for main steam piping beyond the MSIVs.

3. *Individual licensees should demonstrate that the plant condenser design falls within the bounds of design characteristics found in the earthquake experience database. This should include a review of as-built design documents and/or a walkdown to verify that the condenser has adequate anchorage.*

   - The PBAPS condenser is not seismically analyzed and therefore, the LOCA radiological analysis has never and does not credit the condenser for treatment of MSIV leakage.

4. *Individual licensees should perform a plant-specific seismic evaluation for representative supports and anchorages associated with affected piping and the condenser.*

   - The PBAPS condenser is not seismically analyzed and therefore, the LOCA radiological analysis has never and does not credit the condenser for treatment of MSIV leakage.

5. *Individual licensees should confirm that the condenser will not fail due to seismic II/I type of interaction (e g., structural failure of the turbine building and its internals).*

   - The PBAPS condenser is not seismically analyzed and therefore, the LOCA radiological analysis has never and does not credit the condenser for treatment of MSIV leakage.

6. *Individual licensees of plants whose FSARs or UFSARs reference Appendix A to 10 CFR Part 100 should perform a bounding seismic analysis for the ALT path piping. Those licensees committed to Part 100 should discuss the basis for selecting a particular portion of the bypass/drain line for the bounding analysis.*

   - PBAPS does not have or credit an ALT drain path for MSIV leakage in the LOCA analysis.

7. *The methodology and criteria used for the analytical evaluations should be those which are in compliance with the design basis methodology and criteria, or those which are acceptable to the staff.*

   - PBAPS does not use or refer to the BWROG NEDC-31858P methodology regarding MSIV leakage in the LOCA radiological dose analysis. As stated above, AEB 98-03 was used.

8. *The facility ground motion estimates shown in Figures 1 through 13 of this attachment have been reviewed and accepted by the staff for inclusion in BWROG's earthquake experience database. These 13 facility ground motion estimates may be used to verify the seismic adequacy of equipment in the alternative MSIV leakage pathway for plants referencing the BWROG's Topical Report, NEDC-31858P Revision 2.*

   - PBAPS does not credit the condenser or ALT drain pathway for MSIV leakage in the LOCA analysis.

9. *At the present time, there is no standard, endorsed by the NRC, that provides guidance for determining what constitutes an acceptable number of earthquake recordings and their magnitudes and for determining the required number of experience database when utilizing the BWROG methodology. Therefore, individual licensees are responsible for ensuring the sufficiency of the data submitted for staff review and determination. When a revision of the QME Standard that incorporates specific criteria for use of experience data in the qualification of mechanical equipment is endorsed by NRC, such criteria should be followed in future applications involving MSIV ALT pathway evaluations.*

   - Seismic qualification of the main steam piping is based on quantitative calculations, and does not utilize experience data as a basis for qualification.

NRC Question 2 (EMCB RAI 2)

On page 22 of Attachment 1 of the AST application, six items are listed as necessary for justifying the lack of redundancy of active components in the Standby Liquid Control (SLC) system. Item two (2) indicates the need for providing the design-basis conditions for each active component and the environmental and seismic conditions under which the component may be required to operate during a design-basis accident. Please provide the seismic conditions under which active component III-Remote switch RMS-2(3)-11A-S001 (page 27 of Attachment 1 of the AST application) may be required to operate during a design-basis accident and describe how its seismic adequacy has been evaluated.

Response

The switch in question, RMS-2(3)-11A-S001, is the switch that turns on either the "A" or "B" Standby Liquid Control (SLC) Pump in the event that SLC injection is required. It is the one switch that will start both pumps, but only one pump at a time. It will not start two pumps at a time. It will fire both the "A" and "B" Explosive Valves on the system, irrespective of which SLC pump is started. It also inhibits the operation of the Reactor Water Cleanup System when either pump is running. The switches are required and designed to function during a design-basis accident and following a SSE.

Based on Principal Design Criteria (UFSAR 1.5) and the Statements of Consideration (SOC) for the ATWS rule, there are no requirements for SLC to be seismically qualified. However, the SLC system is designed to Seismic Class I criteria per the PBAPS UFSAR. This means that the subject switches are dynamically qualified and will function following the SSE. RMS-2(3)-11A-S001 is located in the control room (panel 2(3)0C005). These panels and their contained instruments were qualified to the seismic loads applicable to their location by station Calculation PS-049 (Reference 5) and is provided in Attachment 3. This SLC switch is specifically listed in this calculation as being qualified based on testing to 10g acceleration in 3 orthogonal directions. The reference source for the testing of this GE switch is GE document NEDO-10678, *"Seismic Qualification of Class I Electric Equipment,"* which indicates that this qualification is based on testing.

NRC Question 3 (EMCB RAI 3)

Verify whether there are any HVAC ducts, air handling units and/or other HVAC components that are credited in the proposed AST. If affirmative, discuss the methodology used for the HVAC seismic qualification.

Response

The Standby Gas Treatment System (SGTS) and Main Control Room Emergency Ventilation System (MCREV) both have ductwork and components that are credited in the PBAPS AST radiological dose analyses. This credit is consistent with that credit for previous PBAPS radiological dose analyses.

Peach Bottom upgraded the ductwork above the main control room under Modification 1729, "Control Room Upgrade", in the 1988 time frame. Calculations were prepared for the ductwork and its supports. Calculation G-0106-002, and original construction Calculation 23-4/X-1, (References 6 and 7, respectively) determined suitable duct spans for the duct to behave as a rigid body, and then designed standard, braced duct supports that limit the deflection of the duct so that the ductwork system remains in the rigid range (with a natural frequency greater than 30 Hz). These calculations are provided as Attachments 4 and 5, respectively. Supports and support anchorage were designed to withstand the SSE loads. Fan and filter anchorage were also evaluated for seismic load capability under Calculation 49-48/H (Reference 8) and is provided as Attachment 6.

Ductwork is classified as safety-related for various ventilation systems. Ducts are a passive component of the ventilation system. In all cases, the associated ventilation system is capable of withstanding a design basis earthquake to align the system to perform its intended function. The primary safety-related function of ductwork is to enable air to be distributed at design velocities and flows to provide clean air for cooling ventilation. Thus, the pressure integrity of the ducts is not adversely affected, system pressure losses are not increased in excess of fan capacities, and the ducts deliver airflow during normal and emergency conditions.

Seismic, Class I ductwork is identified on site drawings and on vendor drawings. Seismic hanger details are shown on site-specific drawings.

Modifications to safety-related ductwork are performed with at least the same level of quality standards as the original installation. In order to ensure that the quality of safety-related ventilation systems is not compromised by ductwork modifications, the following is considered during modification or maintenance work:

1. All materials may be purchased commercial grade and evaluated in accordance with established applicable procedures.

2. Duct sheet metal thickness shall be as identified on vendor drawings. Receipt inspection and in-process Quality Control (QC) verification that the correct gauge sheet metal is being installed if necessary.

3. Design of ductwork modifications shall be a safety-related activity. The design must ensure that flow of air for safety-related ventilation system satisfies ventilation and cooling requirements for the equipment and compartments/areas.

4. Modifications to hangers, new attachments to ductwork, and the use of heavier gauge ductwork shall be evaluated to ensure that the Seismic Class I capability of the ductwork is not adversely affected.

5. Installation of ductwork shall be in accordance with HVAC industry standards specified in applicable procedures and Sheet Metal Construction for Ventilating and Air Conditioning System (SMACNA). In-process inspection and leak testing specified in applicable procedures (or equivalent) if necessary to verify installation.

6. Seismic hanger details shall be installed in accordance with site-specific drawings.

7. Seismic hangers shall be procured as safety-related components.

8. The installation activities which should be treated as safety-related include:

    a. Verification that correct gauge ductwork was installed.
    b. Verification that duct connections are leak tight.
    c. Verification that no unapproved attachments have been made to ductwork.
    d. Verification that seismic hangers have been installed correctly.
    e. Seismic hanger installation shall be safety-related.

The above items impose more stringent documentation and installation requirements than the original design. They assure that system operation is not compromised and provide reasonable assurance that the level of safety as specified in the UFSAR is achieved.

Additionally, the Main Control Room Emergency Ventilation (MCREV) system qualifications were previously reported to the NRC in the Exelon response to Generic Letter 2003-01, *"Control Room Habitability."*

References

1. AEB 98-03, *"Assessment of Radiological Consequences for the Perry Pilot Plant Application Using the Revised (NUREG-1465) Source Term"*
2. U.S. NRC, "Safety Evaluation of GE Topical Report, NEDC-31858P, Revision 2, *BWROG Report for Increasing MSIV Leakage Limits and Elimination of Leakage Control Systems, September 1993*," letter dated March 3, 1999, ADAMS Accession Number ML010640286
3. PBAPS Calculation 1-1, Revision 1, *"Stress Analysis for Main Steam Outside Containment"*
4. PBAPS Calculation PM-1077, Revision 0, "Post-LOCA EAB, LPZ, and CR Doses Using Alternative Source Term (AST)"
5. PBAPS Calculation PS-049, Revision 2, *"Seismic Evaluation of Consoles 2(3)0C05A, 2(3)0C04A and 2(3)0C03 for Mod 955"*
6. PBAPS Calculation G-0106-002, Revision 4, *"Control Room Upgrading HVAC Duct Supports"*
7. PBAPS Calculation 23-4/X-1, Revision 0, *"Reactor Building - H&V Ducts, Seismic Analysis"*
8. PBAPS Calculation 49-48/H, Revision 0, *"Heating and Ventilation - Seismic Analysis for Anchor Bolts"*