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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)

2) 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)

3) 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)

7) Letter from D. P. Helker (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 January 26, 2011 (ML110280103)

8) 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 March 10, 2011 (ML110601101)

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.

Exelon provided supplemental information in support of the proposed License Amendment Request by letters dated August 16, 2010 (Reference 3), December 6, 2010 (Reference 5), and January 26, 2011 (Reference 7).

Subsequently, by letter dated March 10, 2011 (Reference 8), the U.S. Nuclear Regulatory Commission (NRC) requested that Exelon provide additional information in order to complete the review of the LAR. 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 25th day of March 2011.

Respectfully,

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

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

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 3.6.1.3, *"Primary Containment Isolation Valves (PCIVs),"* and TS 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 ≥ 22 inches water column, or equivalent volume of ≥ 124, 000 standard cubic feet (scf), replacing the currently stated level of ≥ 16 inches water column.

Exelon provided supplemental information in support of the proposed License Amendment Request (LAR) by letters dated August 16, 2010, December 6, 2010, and January 26, 2011.

Subsequently, by letter dated March 10, 2011, the U.S. Nuclear Regulatory Commission (NRC) requested additional information in order to complete the review of the LAR. The specific questions are restated below followed by Exelon's response.

RESPONSE INFORMATION

NRC Question (RAI-04)

The NRC staff requests that the licensee provide an explanation for why an 8 second, as opposed to a 10 second, stroking time would provide a more conservative estimation for total nitrogen demand.

Response

The actual nitrogen inventory presented in Calculation PM-0375 is accurate. An 8-second stroke would not be considered conservative with respect to a 10-second stroke time when comparing the amount of nitrogen inventory required. Calculation PM-0375 Reference 21 calculated the air actuator volume for the affected valves, i.e., AO-2(3)-07B-2(3)502A and AO-2(3)-07B-2(3)502B. In order to obtain a flow rate in the referenced document, an 8-second stroke time was assumed and the calculated actuator volume was divided by this stroke time. Calculation PM-0375 calculated the valve stroke nitrogen inventory by utilizing an 8-second stroke time and recalculated the actuator inventory based on one change-out of actuator volume to stroke the valve. Therefore, the values presented in Calculation PM-0375 (page 18 of 24) of 1.69 scf for AO-2(3)-07B-2(3)502A and 10.9 scf for AO-2(3)-07B-2(3)502B are the correct nitrogen inventories required for stroking these valves. The statement in Calculation PM-0375 regarding conservative stroke times requires clarification. This issue has been captured in Exelon's Corrective Action Program (CAP) and will be addressed accordingly.

NRC Question (RAI-05.a)

The NRC staff requests that the licensee identify which valves, from which units under each condition (LOCA, safe shut down), have boot seals that require SGIG.

Response

The following PBAPS, Units 2 and 3, valves include a boot seal configuration, which require Safety Grade Instrument Gas (SGIG) system nitrogen as a safety-related pneumatic supply to maintain the seals inflated.

	Unit 2 Boot Seal Valves	Name	Diameter (Inches)
1	AO-2-07B-2502A	Reactor Building-to-Suppression Chamber Vacuum Breaker A North	20"
2	AO-2-07B-2505	Drywell Air Purge Inlet Isolation Valve	18"
3	AO-2-07B-2506	Drywell 18" Vent Inboard Isolation Valve to Standby Gas Treatment	18"
4	AO-2-07B-2507	Drywell 18" Vent Outboard Isolation Valve to Standby gas Treatment	18"
5	AO-2-07B-2511	Suppression Chamber 18" Vent Inboard Isolation Valve to Standby Gas Treatment	18"
6	AO-2-07B-2512	Suppression Chamber 18" Vent Outboard Isolation Valve to Standby Gas Treatment	18"
7	AO-2-07B-2519	Drywell and Suppression Chamber Inlet N2 Purge Isolation Valve	6"
8	AO-2-07B-2520	Drywell Air and Nitrogen Purge Isolation Valve	18"
9	AO-2-07B-2521A	Suppression Chamber Air Purge Outboard Isolation Valve	18"
10	AO-2-07B-2521B	Suppression Chamber Air and N2 Purge Outboard Isolation Valve	18"

	Unit 3 Boot Seal Valves	Name	Diameter (Inches)
11	AO-3-07B-3502A	Reactor Building-to-Suppression Chamber Vacuum Breaker A North	20"
12	AO-3-07B-3505	Drywell Air Purge Inlet Isolation Valve	18"
13	AO-3-07B-3506	Drywell 18" Vent Inboard Isolation Valve to Standby Gas Treatment	18"
14	AO-3-07B-3507	Drywell 18" Vent Outboard Isolation Valve to Standby Gas Treatment	18"
15	AO-3-07B-3511	Suppression Chamber 18" Vent Inboard Isolation Valve to Standby Gas Treatment	18"
16	AO-3-07B-3512	Suppression Chamber 18" Vent Outboard Isolation Valve to Standby Gas Treatrment	18"
17	AO-3-07B-3519	Drywell and Suppression Chamber Inlet N2 Purge Isolation Valve	6"

18	AO-3-07B-3520	Drywell Air and Nitrogen Purge Isolation Valve	18"
19	AO-3-07B-3521A	Suppression Chamber Air Purge Outboard Isolation Valve	18"
20	AO-3-07B-3521B	Suppression Chamber Air and N2 Purge Outboard Isolation Valve	18"

Each PBAPS unit has one (1) 20-inch valve, eight (8) 18-inch valves, and one (1) 6-inch valve with boot seals, for a total of twenty (20) SGIG-supplied boot seal valves combined for PBAPS, Units 2 and 3, as listed in the tables above.

Scenario (1) as described in Calculation PM-0375 considers one unit to be experiencing a Design Basis Loss of Coolant Accident (LOCA) condition, while the other unit is presumed to be in a Safe Shutdown condition. With containment oxygen concentration maintained within required limits during normal operation, combustible gas limits will not be reached until well over 100 days after initiation of a Design Basis LOCA and containment venting would not be required. The boot seals are required to be inflated on affected valves to satisfy the primary containment isolation function. For this unit, stroking the Reactor Building-to-Suppression Chamber Vacuum Breakers open may be necessary to provide a vent path between the reactor building and primary containment, and subsequent closed stroke would be required to perform the primary containment isolation function. The unit in the Safe Shutdown condition would require boot seal inflation until entering into Mode 4 (Cold Shutdown) to satisfy the primary containment isolation function.

Scenario (2) as described in Calculation PM-0375 considers one unit in a TW sequence (i.e., beyond design basis severe accident with loss of residual heat removal) and the other unit in a Safe Shutdown condition. Since the TW sequence is a beyond design basis severe accident scenario, the Technical Specification required SGIG nitrogen inventory would not include this scenario.

NRC Question (RAI-05.b)

The NRC staff requests that the licensee identify the required nitrogen demand for the boot seals.

Response

The nitrogen demand requirements are determined in Calculation PM-0375. Page 20 of 24 of the calculation assumes the boot seal inventory as the volume of an annulus ring for the different sized valves.

During Scenario (1), it is assumed that all SGIG-supplied boot seal valves on the Safe Shutdown unit are initially open and will stroke and remain closed for the duration of the event. This will require one (1) inflation of all boot seals on this unit. For the unit experiencing the Design Basis LOCA, it is conservatively assumed that all boot seal valves are initially open. Furthermore, it is conservatively assumed that the Reactor Building-to-Suppression Chamber Vacuum Breaker A North will be stroked ten (10) times, requiring the boot seal to be inflated ten (10) times. The remaining nine valves will be stroked closed once, requiring inflation of the boot seals. This would satisfy the primary containment isolation function. This equates to 0.67 scf for boot seals on the Safe Shutdown unit and 1.38 scf for the boot seals on the Design Basis LOCA unit.

NRC Question (RAI-05.c)

The NRC staff requests that for the valves with boot seals, the licensee state which valves stroke, the associated total stroking demand, and the basis for the number of strokes required.

Response

As discussed in the response to RAI-05.b, all valves with boot seals are assumed to stroke. This involves stroking the Reactor Building-to-Suppression Chamber Vacuum Breaker A North ten (10) times on the Design Basis LOCA unit and once on the Safe Shutdown unit. The remaining boot seal valves will be stroked once in the closed direction for both units. However, this stroke involves venting the operator and no nitrogen would be required. The total stroking demand for all boot seal valves is 1.69 scf for the Safe Shutdown unit and 16.9 scf for the Design Basis LOCA unit. Refer to response to RAI-07 for the basis of the number of strokes required.

NRC Question (RAI-05.d)

The NRC staff requests that the licensee identify the total required nitrogen to support the SGIG function for inflating and maintaining valve boot seal for each unit for the 7-day day post-accident period.

Response

There are two factors impacting the required nitrogen to inflate and maintain each boot seal valve for the 7-day post-accident period: (1) valve station leakage and (2) boot seal inflation.

(1) Calculation PM-0375 details that there will be leakage through the valve stations of 200 scc/min (page 15 of 24). There are ten (10) boot seal valves supplied by the SGIG system for each PBAPS unit. This results in a total nitrogen requirement of 711.9 scf per unit to accommodate for valve station leakage. This number is independent of the number of strokes.

(2) The boot seal inflation requirements are 0.67 scf for the Safe Shutdown unit and 1.38 scf for the Design Basis LOCA unit as discussed in the response to RAI-05.b.

Therefore, the total required nitrogen to support SGIG system function for inflating and maintaining valve boot seals is 712.57 scf for the unit in the Safe Shutdown condition and 713.28 scf for the unit in the Design Basis LOCA condition.

NRC Question (RAI-06.a)

The NRC staff requests that the licensee identify which valves are supported by SGIG, specific to which unit condition (i.e. LOCA or safe shut down).

Response

The following PBAPS, Units 2 and 3, valves are supported by the SGIG system.

	Unit 2 SGIG Supplied Valves	Name	Boot Seal	Diameter (Inches)
1	AO-2-07B-2502A	Reactor Building-to-Suppression Chamber Vacuum Breaker A North	Y	20"
2	AO-2-07B-2502B	Reactor Building-to-Suppression Chamber Vacuum Breaker B South	N	20"
3	AO-2-07B-2505	Drywell Air Purge Inlet Isolation Valve	Y	18"
4	AO-2-07B-2506	Drywell 18" Vent Inboard Isolation Valve to Standby Gas Treatment	Y	18"
5	AO-2-07B-2507	Drywell 18" Vent Outboard Isolation Valve to Standby Gas Treatment	Y	18"
6	AO-2-07B-2509	Drywell 2" Vent Inboard Isolation Valve to Standby Gas Treatment	N	2"
7	AO-2-07B-2510	Drywell 2" Vent Outboard Isolation Valve to Standby Gas Treatment	N	2"
8	AO-2-07B-2511	Suppression Chamber 18" Ventilation Inboard Isolation Valve to Standby Gas Treatment	Y	18"
9	AO-2-07B-2512	Suppression Chamber 18" Ventilation Outboard Isolation Valve to Standby Gas Treatment	Y	18"
10	AO-2-07B-2513	Suppression Chamber 2" Ventilation Inboard Isolation Valve to Standby Gas Treatment	N	2"
11	AO-2-07B-2514	Suppression Chamber 2" Ventilation Outboard Isolation Valve to Standby Gas Treatment	N	2"
12	AO-2-07B-2519	Drywell and Suppression Chamber Inlet N2 Purge Isolation Valve	Y	6"
13	AO-2-07B-2520	Drywell Air and Nitrogen Purge Isolation Valve	Y	18"
14	AO-2-07B-2521A	Suppression Chamber Air Purge Outboard Isolation Valve	Y	18"
15	AO-2-07B-2521B	Suppression Chamber Air and N2 Purge Outboard Isolation Valve	Y	18"
16	AO-2-07B-80290	Containment Emergency Ventilation Outboard Isolation Valve to Atmosphere	N	16"
17	CV-2-07C-4954	Suppression Chamber Exhaust Vent to Standby Gas Treatment System Control Valve	N	1"
18	CV-2-07C-4957	Drywell Exhaust Vent to Standby Gas Treatment System Control Valve	N	1"

	Unit 3 SGIG Supplied Valves	Name	Boot Seal	Diameter (Inches)
19	AO-3-07B-3502A	Reactor Building-to-Suppression Chamber Vacuum Breaker A North	Y	20"
20	AO-3-07B-3502B	Reactor Building-to-Suppression Chamber Vacuum Breaker B South	N	20"
21	AO-3-07B-3505	Drywell Air Purge Inlet Isolation Valve	Y	18"
22	AO-3-07B-3506	Drywell 18" Ventilation Inboard Isolation Valve to Standby Gas Treatment	Y	18"

23	AO-3-07B-3507	Drywell 18" Ventilation Outboard Isolation Valve to Standby Gas Treatment	Y	18"
24	AO-3-07B-3509	Drywell 2" Vent Inboard Isolation Valve to Standby Gas Treatment	N	2"
25	AO-3-07B-3510	Drywell 2" Vent Outboard Isolation Valve to Standby Gas Treatment	N	2"
26	AO-3-07B-3511	Suppression Chamber 18" Vent Inboard Isolation Valve to Standby Gas Treatment	Y	18"
27	AO-3-07B-3512	Suppression Chamber 18" Vent Outboard Isolation Valve to Standby Gas Treatment	Y	18"
28	AO-3-07B-3513	Suppression Chamber 2" Vent Inboard Isolation Valve to Standby Gas Treatment	N	2"
29	AO-3-07B-3514	Suppression Chamber 2" Vent Outboard Isolation Valve to Standby Gas Treatment	N	2"
30	AO-3-07B-3519	Drywell and Suppression Chamber Inlet N2 Purge Isolation Valve	Y	6"
31	AO-3-07B-3520	Drywell Air and Nitrogen Purge Isolation Valve	Y	18"
32	AO-3-07B-3521A	Suppression Chamber Air Purge Outboard Isolation Valve	Y	18"
33	AO-3-07B-3521B	Suppression Chamber Air and N2 Purge Outboard Isolation Valve	Y	18"
34	AO-3-07B-90290	Containment Emergency Ventilation Outboard Isolation Valve to Atmosphere	N	16"
35	CV-3-07C-5954	Suppression Chamber Exhaust Vent to Standby Gas Treatment System Control Valve	N	1"
36	CV-3-07C-5957	Drywell Exhaust Vent to Standby Gas Treatment System Control Valve	N	1"

There are a total of eighteen (18) SGIG-supplied valves in each unit, for a total of thirty-six (36) combined valves for PBAPS, Units 2 and 3. There is one (1) 20-inch valve, one (1) 16-inch valve, four (4) 2-inch valves, and two (2) 1-inch valves supplied by SGIG per unit at PBAPS not equipped with a boot seal. There is one (1) 20-inch valve, eight (8) 18-inch valves, and one (1) 6-inch valve equipped with boot seals supplied by SGIG per PBAPS unit.

On page 15 of 24 of Calculation PM-0375 there is a note indicating that "there are 17 valve stations per unit." This comment is based on Reference 14 of the calculation, which is an internal letter dated May 22, 1984. At the time the calculation was performed, there were only 17 valve stations. However, in response to NRC Generic Letter (GL) 89-16, "Installation of a Hardened Wetwell Vent," the Containment Emergency Ventilation Outboard Isolation Valve was added after Revision 0 of this calculation was performed. This valve would only be stroked for beyond design basis severe accident scenarios. The current plant configuration has 18 valves supplied by the SGIG system per unit. As further discussed in the response to RAI-06.c, this minor discrepancy associated with the number of valve stations will be addressed in Exelon's CAP.

Scenario (1) as described in Calculation PM-0375 considers one unit to be experiencing a Design Basis LOCA condition, while the other unit is presumed to be in a Safe Shutdown condition. With containment oxygen concentration maintained within required limits during normal operation, combustible gas limits will not be reached until well over 100 days after initiation of a Design Basis LOCA and containment venting would not be required. The boot seals are required to be inflated on affected valves to satisfy the primary containment isolation function. For this unit, stroking the Reactor Building-to-Suppression Chamber Vacuum Breakers open may be necessary to provide a vent path between the reactor building and primary containment, and subsequent closed stroke would be required to perform the primary containment isolation function. The unit in the Safe Shutdown condition would require boot seal inflation until entering into Mode 4 (Cold Shutdown) to satisfy the primary containment isolation function. Refer to the response to RAI-07 below for additional information.

Scenario (2) as described in Calculation PM-0375 considers one unit to be in a TW sequence (i.e., beyond design basis severe accident with loss of residual heat removal) and the other unit to be in a Safe Shutdown condition. Since the TW sequence is a beyond design basis severe accident scenario, the Technical Specification required SGIG nitrogen inventory would not include this scenario.

NRC Question (RAI-06.b)

The NRC staff requests that the licensee identify the number of strokes required and the nitrogen demand to support the function of the valves identified in RAI-06.a.

Response

During Scenario (1), the unit under Safe Shutdown will stroke closed all valves once. For the unit under the LOCA, the Reactor Building-to-Suppression Chamber Vacuum Breakers will stroke open/closed ten (10) times. The remaining SGIG-supplied valves will be stroked closed once. For the beyond design basis Containment Emergency Ventilation Outboard Isolation Valve on each unit, administrative controls are in place to prevent their operation. This valve will not be stroked on either unit under the Design Basis LOCA scenario. The nitrogen demand to satisfy all required stroking and boot seal inflation of SGIG supplied valves is 13.26 scf for the Safe Shutdown unit and 127.28 scf for the Design Basis LOCA unit.

NRC Question (RAI-06.c)

The NRC staff requests that the licensee identify the total required nitrogen to support the SGIG function for cycling the required valves for each unit for the 7-day post-accident period.

Response

The factors impacting the total required nitrogen to support the SGIG function to the supplied valves for the 7-day post-accident period are: (1) valve station leakage and (2) boot seal inflation and valve stroke requirements.

(1) Calculation PM-0375 calculates valve station leakage as described in response to RAI-05.d above. This methodology was established prior to installation of Containment Emergency Ventilation Outboard Isolation Valve; however, similar pneumatic supply line-up with Instrument Air and SGIG check valves is utilized in this application as with the other valve stations. It is therefore reasonable to conclude that the Containment Emergency Vent Outboard Isolation Valve station will have similar leakage. There are

18 valve stations supplied by SGIG for each PBAPS unit. This results in a total nitrogen requirement of 1281.3 scf per unit to accommodate for valve station leakage. This number is independent of the number of strokes. Calculation PM-0375 will be revised to include valve station leakage for Containment Emergency Ventilation Outboard Isolation Valve and is being tracked in Exelon's CAP.

(2) Boot seal inflation and valve stroking nitrogen inventory usage requirements are discussed previously in response to question RAI-06.b.

Therefore, the total required nitrogen to support SGIG system function for cycling the required valves for the 7-day post-accident period is 1294.56 scf for the Safe Shutdown unit and 1408.58 scf for the Design Basis LOCA unit.

NRC Question (RAI-07)

The NRC staff requests that the licensee provide the basis for the number of strokes.

Response

Scenario (1) assumes that one unit is experiencing a Design Basis LOCA condition and the other unit is in a Safe Shutdown condition. For the unit under Safe Shutdown, it is assumed that all SGIG supplied valves (except for the beyond design basis Containment Emergency Ventilation Outboard Isolation Valve, which have administrative controls in place to prevent their operation) are initially open. Based on the multiple exhaust paths and the amount of time the valves are open, assuming they are all initially open is conservative. These valves will stroke closed and remain closed for the duration of the event. This will require one (1) inflation of all boot seals on this unit to satisfy primary containment isolation function. Additionally, nitrogen inventory will be required to close the fail-open Reactor Building-to-Suppression Chamber Vacuum Breakers. The remaining SGIG-supplied valves will be closed by venting their associated operator thereby not requiring additional nitrogen inventory usage.

With containment oxygen concentration maintained within required limits during normal operation, it will not reach the combustible gas limits until well over 100 days after initiation of a Design Basis LOCA and containment venting would not be required. It is conservatively assumed that the Design Basis LOCA unit is initially in the process of purging/venting with all of its SGIG supply valves open (except for the beyond design basis Containment Emergency Ventilation Outboard Isolation Valves, which have administrative controls in place to prevent their operation). For this unit, stroking the Reactor Building-to-Suppression Chamber Vacuum Breakers open may be necessary to provide a vent path between the reactor building and primary containment, and subsequent closed stroke would be required to perform the primary containment isolation function. For the unit experiencing the Design Basis LOCA it is conservatively assumed that Reactor Building-to-Suppression Chamber Vacuum Breaker will require stroking ten (10) times, requiring the boot seal to be inflated ten (10) times.

NRC Question (RAI-08)

The NRC staff requests that the licensee justify the exclusion of the function to supply air to the containment emergency vent system valves, and identify any effect on the quantity of nitrogen required to support the required 7-day period.

Response

The Containment Emergency Ventilation System valves are included in the Calculation PM-0375. The Containment Emergency Ventilation System is discussed in the TW sequence (Calculation PM-0375, page 10a of 24), which is defined as the loss of the residual heat removal capability on one unit, while the other unit is in a Safe Shutdown condition. Containment Emergency Ventilation is synonymous with Suppression Chamber Hardened Vent (beyond current licensing basis of the plant) consisting of the Suppression Chamber 18" Vent Inboard Isolation Valve and Containment Emergency Ventilation Outboard Isolation Valve. The nitrogen demand for stroking of these two (2) valves is calculated on page 17a of 24 in Calculation PM-0375 and is included in the total required nitrogen inventory on page 19a of 24. As discussed in response to questions RAI-05 and RAI-06 above, since the TW sequence is a beyond design basis severe accident scenario, the Technical Specification required SGIG nitrogen inventory would not include this scenario.

NRC Question (RAI-09.a)

The NRC staff requests that the licensee address whether the alarm setpoint is adequate to prevent inadvertent usage of the nitrogen in the CAD tank while retaining a sufficient quantity of nitrogen to support the SGIG function.

Response

The minimum CAD tank nitrogen inventory to support SGIG system operability in support of this LAR is 124,000 scf of nitrogen (22 inches CAD storage tank level). The CAD tank low level alarm is set at 36 inches (approximate equivalent inventory of 298,000 scf of nitrogen). PBAPS operating procedures direct the CAD tank to be refilled when level drops below 42 inches (approximate equivalent inventory of 366,700 scf of nitrogen). The low level alarm provides approximately 140% additional nitrogen inventory prior to reaching the minimum level for SGIG system operability and procedural guidance provides approximately 195% additional inventory above the SGIG minimum level. This is considered sufficient margin to ensure that the quantity of nitrogen maintained in the nitrogen storage tank to support the SGIG system function will be maintained at all times.

NRC Question (RAI-09.b)

The NRC staff requests that the licensee list and describe the controls regarding nitrogen over-usage that exist to ensure that an adequate quantity of nitrogen remains in the CAD tank to support the 7-day period.

Response

Calculation PM-0375 has determined that 38.5 inches of liquid nitrogen inventory is sufficient to ensure full functionality of CAD and operability of SGIG. CAD tank inventory is recorded daily in accordance with Technical Specification Surveillance Requirement 3.6.1.3.1 and 3.6.1.5.1 to verify sufficient safety grade pneumatic supply inventory every 24 hours. The CAD system operating procedures have a prerequisite that the CAD tank inventory must be greater than 38.5

inches prior to operation. Administrative controls have been implemented in the daily Technical Specifications Surveillance Requirement logs to ensure that the minimum CAD tank level to support SGIG operability is maintained greater than or equal 22 inches to support SGIG operability, and greater than 38.5 inches to support CAD system functions. The earlier Exelon CAP issue that identified the potential non-conservative Technical Specifications condition and resulted in the revision to Calculation PM-0375 is referenced to support the administrative controls instituted for maintaining minimum CAD storage tank level. The acceptance criterion is to verify that CAD storage tank level is maintained greater than 42 inches. There is an existing Exelon CAP issue to revise the CAD tank alarm setpoint based on Calculation PM-0375, this submittal, and CAD system use in conjunction with Emergency Operating Procedures.

CONCLUSION

Based on the analysis performed in support of this response and that of the LAR, Exelon is confident that there will be sufficient nitrogen inventory available to ensure SGIG system operability when accounting for all required 1) valve stroking, 2) inflating and maintaining boot seals, and 3) valve station and system leakage.