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PSEG 10 CFR 72.212 EVALUATION REPORT CHANGE COVER SHEET

212 Report Change No. 13-01

1. Type of Change (check one):	Interim Change <input checked="" type="checkbox"/> Full Revision <input type="checkbox"/>
2. Nature of Change (check one or both):	Editorial/Administrative <input type="checkbox"/> Technical <input checked="" type="checkbox"/>
3. 72.48 Review No.: <u>H 13 -01</u>	50.59 Review No.: <u>N/A</u>
4. Current 212 Report Revision: <u>7 (Interim Change 7B)</u>	
5. Sections(s) of the 212 Report affected by the change(s) (use additional sheets as necessary)	
<p>I. An interim change is being made to Revision 7 of the 212 Report to add new Subsection 5.4.1.12.1, which addresses two nonconforming conditions that were accepted as-is for a number of Hope Creek and Salem dry spent fuel storage canisters in service at the ISFSI. The accept-as-is dispositions represent deviations from the cask FSAR and require a review under 10 CFR 72.48. See the enclosed mark-up for the specific changes to the 212 Report. The changes are labeled as follows for the purposes of this 72.48 review:</p> <p>a) Thirteen Hope Creek MPCs currently in service did not have the water in the MPC-HI-TRAC annulus continuously flushed during vacuum drying as was required by the thermal analysis supporting the FSAR and TS.</p> <p>b) Nine Salem and four Hope Creek MPCs currently in service did not have the minimum required amount of helium backfilled into the fuel cavity as was required by the thermal analysis supporting the FSAR and TS.</p> <p>Four MPCs are affected by both nonconformances for a total of 22 MPCs affected <i>6.0 by 5-13-13</i></p> <p>II. Associated references are added to Section 7.0 supporting this change. This is editorial.</p>	
6. Reason for Change(s)	
<p>The change summarizes the accept-as-is disposition for 22 nonconforming dry spent fuel storage canisters that resulted in FSAR deviations. The deviations constitute changes to the cask FSAR. The technical issues that created the non-conforming conditions were resolved within the PSEG corrective action program shortly after the conditions were discovered. Those resolutions were consistent with actions required by the cask technical specifications and supported by the cask vendor's technical evaluations. This interim revision to the PSEG Nuclear 212 Report is being performed as a follow-up action for completeness.</p>	
7. Source Documents (e.g., DCP, Procedure, CoC Amendment, etc.)	
<ol style="list-style-type: none"> 1. PSEG Notifications 20478677 and 20489632, "Hope Creek MPC Annulus Flushing." 2. PSEG Notifications 20530707, 20532615, and 20532467, "Dry Cask Helium Backfill Not Meeting Tech Spec." 3. Nuclear Fuels Incoming Correspondence NFSI 12-011, Holtec Report HI-2115051, "Thermal Analysis of MPC with Lower Helium Backfill Pressure at Salem," Revision 0 4. Nuclear Fuels Incoming Correspondence NFSI 10-115, "Heat Load Limits Applicable to Vacuum Drying without Annulus Flushing – Analysis Results and Technical Position." 5. Nuclear Fuels Incoming Correspondence NFSI 11-074, "RRTI-1332-001, Response to Request for Technical Information." 	

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PSEG 10 CFR 72.212 EVALUATION REPORT CHANGE COVER SHEET

212 Report Change No. 13-01

Preparer:	<u><i>Ben Norton</i></u>	Date:	<u>3/19/13</u>
Salem Rx Engineering Mgr/Designee:	<u>N/A</u>	Date:	<u></u>
Hope Creek Rx Engineering Mgr/Designee:	<u><i>James G. Wall</i></u>	Date:	<u>3/20/13</u>
Nuclear Fuels Mgr/Designee*:	<u><i>C. Schumpe</i></u>	Date:	<u>3-19-2013</u>
Salem Plant Engineering:	<u>N/A</u>	Date:	<u></u>
Hope Creek Plant Engineering:	<u><i>Yousef Ghotok</i></u>	Date:	<u>3/20/13</u>
Salem Reg. Assurance Mgr/Designee:	<u>N/A</u>	Date:	<u></u>
Hope Creek Reg. Assurance Mgr/Designee*:	<u><i>Susan D. Simpson</i></u>	Date:	<u>04-08-13</u>
Other Reviewer:	<u>N/A</u>	Date:	<u></u>
Other Reviewer:	<u>N/A</u>	Date:	<u></u>
DCS Task Mgr/Designee*:	<u><i>P. Macconi</i></u>	Date:	<u>04/08/13</u>
Licensing Mgr/Designee*:	<u><i>P. Duke / RR</i></u>	Date:	<u>04/08/2013</u>
PORC Meeting No. (required for full 72.48 evaluations)	<u>13-023</u>		

* Required



5.4.1.12.1 MPC Decay Heat-Related FSAR Deviations

Two FSAR deviations related to MPC decay heat have been identified and accepted as-is for casks already loaded. References 6.60 and 6.66 provide the documentation and supporting references for the accept-as-is dispositions. Each deviation is summarized below. Refer to Appendix 2 for a complete listing of all MPCs loaded at the Salem/Hope Creek ISFSI.

Hope Creek MPCs Vacuum Dried without Annulus Flushing (Reference 6.60)

The 16 MPCs containing HCGS spent fuel that are in service at the ISFSI as of Revision 7 to this report were all dried using the vacuum drying process. The HI-STORM FSAR required the water in the annulus between the MPC outer shell and the HI-TRAC transfer cask inner shell to be continuously flushed during vacuum drying if the MPC decay heat exceeded a certain value. No limit on individual fuel cell heat load was established in either the FSAR or the CoC. Because the MPC total heat load threshold for continuous annulus flushing was not exceeded, the annulus water was not continuously flushed for any HCGS MPCs during vacuum drying.

Holtec later informed its clients that the thermal analyses for vacuum drying assumed a uniformly distributed heat load across all 68 fuel cell locations (the maximum heat load permitted without continuous flushing divided by the number of fuel cell locations). If any one fuel cell location exceeded the average decay heat value, then the annulus water should have been continuously flushed to preserve the assumptions in the thermal analysis. Of the 16 MPC-68s loaded with HCGS spent fuel and in service at the ISFSI, all except serial numbers 1021-145, -146, and -153 were determined to have individual fuel cell decay heats exceeding the average value limit for vacuum drying.

In response to the corrective action notifications issued at PSEG, Holtec performed an evaluation (Reference 6.79) for the 13 affected Hope Creek MPC-68s and found, in all cases, the fuel cladding temperature during vacuum drying did not exceed the applicable fuel cladding temperature limit for short-term operations. During vacuum drying of these MPCs, just the presence of water in the annulus was sufficient to ensure that the MPC shell temperature remained below its limit. Based on these results, the FSAR deviation was accepted as-is for these 13 MPCs.

This deviation does not apply to Salem MPCs because all previously-loaded Salem MPCs were dried using the forced helium dehydration (FHD) system, not vacuum drying.

Salem and Hope Creek MPCs with Less than the Required Helium Backfill (Reference 6.66)

In 2011, Holtec notified all of their cask users that some users were incorrectly calculating the MPC decay heat to determine the helium backfill requirements in accordance with HI-STORM CoC Amendment 5, Technical Specification LCO 3.1.1. Similar to the annulus water flushing issue discussed above, the cask thermal analysis assumed the MPC heat load was evenly distributed among all fuel cell locations in the MPC. If any single fuel cell location decay heat was higher than the average value computed based on the maximum permissible total MPC heat load for the lower backfill pressure range, a higher minimum helium backfill was required to ensure the thermal analysis remained bounding.

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PSEG Nuclear determined that the helium backfill Surveillance Requirement (LCO 3.1.1, SR 3.1.1.2) was not met for MPC-32s 1023-93 through -96 and 1023-128 through -132, previously loaded with SGS Unit 1 spent fuel, and MPC-68s 1021-155 through -158, previously loaded with HCGS spent fuel. PSEG subsequently declared the LCO not met for these MPCs and initiated the LCO 3.1.1, Required Action C.2.2: "Develop and initiate corrective actions necessary to demonstrate through analysis, using models and methods from the HI-STORM FSAR, that all limits for cask components and contents will be met."

Holtec provided a technical evaluation to support the required action under LCO 3.1.1, Required Action C.2.2 which demonstrated that the as-loaded MPCs remain within the HI-STORM system design basis for peak fuel cladding temperatures and the temperature limits for other cask components for normal long term dry storage of fuel, short-term operations, and off-normal and accident conditions. Therefore, these MPCs have been returned to an analyzed condition as required by the cask Technical Specifications and Bases.

Reference 6.73 provides the applicable thermal analysis supporting the as-loaded configuration for the Salem MPCs. While assessing the issue, the noted Hope Creek MPCs were determined to be bounded by a prior analysis of record for a specific regional loading case and no further analysis was required (Reference 6.80). This case was later used to develop the applicable heat load table in a Holtec FSAR change implemented via ECO-5014-196. Although all affected MPCs have been demonstrated to meet applicable thermal limits, due to its overall impact on the ISFSI design basis, this issue is considered a deviation from HI-STORM FSAR Section 2.1.9.1 for these 13 Salem and Hope Creek MPCs.

Note that for Hope Creek MPCs 1021-155 through -158 (for which both deviations are applicable), there is no aggregate effect because the vacuum drying and helium backfill are separate thermal conditions. Vacuum drying occurs as a one-time transient condition during MPC preparation and the helium backfill deficit occurred after vacuum drying was complete and exists only during long-term storage operations.

5.4.1.13 CoC Holder Approval of Cask Operating Procedures

Holtec International has reviewed and approved the site dry cask storage operating procedures as required by HI-STORM FSAR Section 8.0, as documented in Reference 6.52. Holtec International also prepared the first drafts of the new Salem cask operating procedures to adopt CoC Amendment 5 and FSAR Revision 7. The Salem procedures are being created from the Hope Creek procedures previously reviewed and approved by Holtec. Furthermore, Holtec is contracted for loading services for the first Salem cask loading campaign and thus will have input to the procedure development process. Procedures are owned, understood, maintained and revised by PSEG Nuclear after the first loading campaigns at each station.

5.4.1.14 ISFSI Pad Elevation

Section 4.4.4.3 of HI-STORM FSAR Revision 7 requires users to confirm the elevation of the ISFSI pad to determine whether a site-specific thermal analysis is required. The HI-STORM FSAR requires a unique thermal analysis for ISFSI pads situated at elevation 1500 ft or higher. The Salem/Hope Creek ISFSI is located near the eastern shore of the Delaware River on land that slopes very gradually up from the shoreline. The ISFSI pad is situated well below 1500 ft.

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- 6.56.11 SC.RE-FR.DCS-0001, "Dry Cask Storage Fuel Characterization."
- 6.56.12 SC.RE-FR.DCS-0002, "Dry Cask Storage Fuel Selection for Cask Loading."
- 6.56.13 SC.RE-FR.DCS-0003, "Fuel Spacer Matrix."
- 6.56.14 SC.RE-FR.ZZ-0001, "Fuel Handling."
- 6.56.15 RP-SA-303, "HI-TRAC Radiation Survey."
- 6.56.16 RP-SA-304, "HI-STORM Radiation Survey."
- 6.56.17 SC.RE-FR.ZZ-0007, "Verification of Fuel Locations."
- 6.57 Sargent & Lundy Report No. 009670, "Salem Generating Station Independent Spent Fuel Storage Installation Fire Hazards Analysis," Revision 1, PSEG VTD 901554 (001).
- 6.58 PSEG Nuclear letter LR-N09-0034 to the NRC, License Amendment Request S08-06, "License Amendment Request to Relocate Communications, Manipulator Crane, and Crane Travel Requirements from Technical Specifications," April 9, 2009, and Salem Units 1 and 2 License Amendments 277 and 293.
- 6.59 PSEG Design Change Package 80091593, "Salem Dry Cask Storage Operations," latest revision.
- 6.60 PSEG Notifications 20478677 and 20489632, "Hope Creek MPC Annulus Flushing."
- 6.61 **Contractor Procedures**
- 6.61.1 Holtec Procedure HPP-1746-600, "Procedure for MPC Cooldown and Weld Removal for MPC Unloading at Hope Creek and Salem Plants," Revision 2.
- 6.61.2 PCI procedure PI-900995-01, "Closure Welding of Multi-Purpose Canisters at Hope Creek and Salem," Revision 2.
- 6.62 U.S. NRC Enforcement Guidance Memorandum 09-006, "Enforcement Discretion for Violations of 10 CFR 72, Subpart K, Regarding Implementation of Certificate of Compliance Amendments to Previously Loaded Spent Fuel Storage Casks," September 15, 2009.
- 6.63 Holtec Report No. HI-2094469, "Design Basis Wind, Tornado, and Snow Load Evaluation for Salem Generating Station," Revision 1, PSEG VTD 901918 (001).
- 6.64 Holtec Report No. HI-2073864, "Seismic Analysis of the Crawler, HI-STORM and ZPT on the Egress Pad," Rev. 8, PSEG VTD 901298 (001).
- 6.65 Holtec Operations and Maintenance Manual for the Supplemental Cooling System and Manifold, Ancillary 421, PSEG VTD 901300 (001).

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- 6.66 PSEG Notifications 20530707, 20532615, and 20532467, "Dry Cask Helium Backfill Not Meeting Tech Spec."
- 6.67 Letter from Holtec International, Andrew Fecht, to PSEG Nuclear, Tom Wallender, "Leaving Mating Device Installed Atop a Loaded HI-STORM in a ZPT," dated July 30, 2010.
- 6.68 Holtec Component Completion Record 1027-421-8, "MPC Supplementary Cooling System," Revision 0.
- 6.69 Holtec Report No. HI-2073816, "Structural Analysis of Zero Profile Transporter (ZPT)," Rev. 5, PSEG VTD 901426 (001).
- 6.70 Email from A. Fecht, Holtec, to B. Gutherman, PSEG, "ZPT Hydraulic Fluid Volume and MSDS," dated July 15, 2010.
- 6.71 Holtec Purchase Specification PS-1129, "HI-STORM Zero Profile Transporter," Revision 5, PSEG VTD 901475 (001).
- 6.72 Holtec Report No. HI-2104690, "Seismic/Structural Analysis of HI-TRAC/Pedestal at Salem," Rev. 2, PSEG VTD 902010 (001).
- 6.73 Nuclear Fuels Incoming Correspondence NFSI 12-011, Holtec Report HI-2115051, "Thermal Analysis of MPC with Lower Helium Backfill Pressure at Salem," Revision 0.
- 6.74 Holtec Report No. HI-2022966, "Forced Helium Dehydrator Sourcebook," Rev. 4, PSEG VTD 902019 (001).
- 6.75 Holtec 10 CFR 72.48 Evaluation No. 915, "Thermal Evaluation of Loaded HI-STORM in the ZPT," Revision 1.
- 6.76 PSEG Design Change Package 80103873, "Salem Unit 1 DCS-Stack-up Seismic Lateral Restraints," Rev. 0.
- 6.77 PSEG Design Change Package 80104315, "Salem Unit 2 DCS-Stack-up Seismic Lateral Restraints," Rev. 0.
- 6.78 PSEG Nuclear letter to NRC LR-N12-0194, "HI-STORM 100 Cask Supplemental Cooling System Validation System Testing Using Air Mass Flow Rate," dated June 25, 2012.
- 6.79 Nuclear Fuels Incoming Correspondence NFSI 10-115, "Heat Load Limits Applicable to Vacuum Drying without Annulus Flushing – Analysis Results and Technical Position."
- 6.80 Nuclear Fuels Incoming Correspondence NFSI 11-074, "RRTI-1332-001, Response to Request for Technical Information."

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