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PSEG
NUCLEAR LLC

Hope Creek Generating Station

Independent Spent Fuel Storage Installation

10 CFR 72.212 Evaluation Report

NRC Docket 72-0048

Revision 4

REVISION SUMMARY

REV. NO.	CHANGE AND REASON FOR CHANGE
0	Initial issue.
1	Sections 5.4.1.8.1 and 5.4.1.8.4 are revised to reflect reduction of the minimum ambient operating temperature for the HERMIT from 40°F to 0°F and to add Reference 6.31.5 to the list of procedures. Section 5.4.1.10.1 is revised to indicate a slightly lower minimum pressure pulse required to tip over the cask. References 6.31.4, 6.31.5, and 6.31.6 are revised to reflect the revision levels that incorporate this change into the DCS operating procedures. Reference 6.47 is revised to reflect the revision level of the analysis that addresses the revised temperature limit.
2	**72.212 Section** — **Description of Change**
	5.2.1.1 — Corrected the reference cited for the 35 ft separation between rows of casks for transporter access.
	5.3.1.2, last paragraph — Added "A" after "Appendix."
	5.4.1.1, 2nd paragraph — Clarified that the SER section cited is from the Amendment 0 SER for the cask.
	5.4.1.3 — Added a paragraph to address compliance with the 15 ft/sec maximum flood water velocity from the CoC
	5.4.1.7 — Revised the subsection to more clearly describe the burial under debris event in the cask FSAR as a bounding analysis for the Artificial Island site.
	5.4.1.8.3 — Revised the subsection to define the use of soil temperature in the cask thermal analysis and further support the fact that the generic value used by the cask vendor is bounding for the Artificial Island site.
	5.4.1.10, 1st paragraph — Corrected typo: "primer" to "prime"
	5.4.1.10, 3rd paragraph — Added specific value and reference for the cask crawler pressure loading and provided a reference for the heavy haul path design.
	5.4.1.11.2 — Added reference for the cooling tower collapse evaluation results.
	Table 5.4.1.12-1 — Added ECOs 1024-126, 1026-33, 1026-41, 5014-131, and 5014-132 to the list and added revision numbers to other ECOs. Corrected revision number for ECO 1021-63.
	Table 5.4.1.12-2 and preceding text — Added references and discussion of pad repair for ISFSI Pad No. 1.
	5.5.1 — Added discussion pertaining to the receipt of NRC approval of amendment 169 to the Hope Creek license and corrected a typo in the DCP number.
	6.0 — Added Calculation A-5-DCS-CDC-1963 as Reference 6.28. Corrected procedure title of Reference 6.31.10. Corrected/added revision levels for several references. Corrected VTD number for reference 6.32.7. Corrected procedure number for Reference 6.33.5.

REV. NO.	CHANGE AND REASON FOR CHANGE	
2 (cont'd)	**72.212 Section**	**Description of Change**
	Appendix 1, Table 3, Section 2.1.2 and 2.1.3, 2nd paragraph	Revised description of the type of fuel verification performed to accurately use the terms "independent" and "concurrent" in three places to be consistent with terminology in procedure HU-AA-101.
	Appendix 1, Table 3, Section 3.4.6, 5th paragraph	Revised text to reflect resolution of ponding repair on ISFSI pad No. 1.
	Appendix 2	Added ECO 1024-126, 1026-33, and 1026-41, to the list and deleted the row pertaining to FSAR changes not specifically associated with cask hardware. Corrected the dates for the initial loading campaign to reflect actual information.
3	Revised throughout to adopt Amendment 3 to the HI-STORM 100 System CoC and Revision 5 to the HI-STORM 100 FSAR for the second Hope Creek loading campaign, and to reflect cask loading procedure revisions and re-numbering. Editorial improvements and typographical corrections are also made. See 72.48 Screening 08-01 for a detailed listing of the changes made in this revision.	
4	Revised throughout to adopt Amendment 5 to the HI-STORM 100 System CoC and Revision 7 to the HI-STORM 100 FSAR for Hope Creek. Editorial improvements and typographical corrections are also made. See 72.48 Coversheet/Screening 10-01 for a detailed listing of the changes made in this revision.	

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1.0 INTRODUCTION

The United States Department of Energy (DOE) did not meet their legal obligation to begin removing spent nuclear fuel from domestic commercial nuclear reactor sites by January 31, 1998. Therefore, PSEG Nuclear is required to provide additional on-site interim storage for spent fuel from the Salem and Hope Creek nuclear power plants until such time as DOE does begin taking the fuel. PSEG began moving spent fuel from the Hope Creek Generating Station (HCGS) spent fuel pool into dry storage in 2006 to create sufficient wet storage capacity to support safe power operations and maintain full core offload capability in the spent fuel pool. In the future, spent fuel from Salem Units 1 and 2 will also need to be moved to the Independent Spent Fuel Storage Installation (ISFSI). At this time, this report only addresses spent fuel from HCGS being placed into dry storage and will require revision when the Salem plant spent fuel needs to be moved into dry storage at the ISFSI.

PSEG Nuclear operates an ISFSI facility for interim storage of HCGS spent fuel in dry casks under the general license provision of 10 CFR 72, Subpart K at the Salem and Hope Creek Generating Stations' Artificial Island site. Interim dry cask storage of HCGS spent fuel at the ISFSI occurs in NRC-certified dry storage casks. The Holtec International HI-STORM 100 System has been selected for the storage of spent fuel from Hope Creek at the ISFSI. Nuclear Regulatory Commission (NRC) Certificate of Compliance (CoC) No. 72-1014 (Reference 6.1) confers NRC approval of the HI-STORM 100 System design for use by Part 72 general licensees and the HI-STORM 100 System is listed as an NRC-approved dry spent fuel storage cask system in 10 CFR 72.214. The design and licensing basis for the HI-STORM 100 System is provided in the CoC and the supporting HI-STORM 100 System FSAR (Reference 6.2).

Spent nuclear fuel from both the Salem and Hope Creek Generating Stations will eventually be stored at the ISFSI. However, the initial casks deployed at the ISFSI will contain only spent fuel from Hope Creek. Therefore, this 10 CFR 72.212 evaluation report only addresses the storage of spent fuel from Hope Creek Generating Station at the ISFSI using the HI-STORM 100 System. The HI-STORM 100 System is comprised of the Multi-Purpose Canister (MPC), the HI-STORM overpack, the HI-TRAC transfer cask, and necessary ancillary equipment described in the cask FSAR.

2.0 PURPOSE

The purpose of this report is to document the written evaluations required by 10 CFR 72.212(b) for use of a dry cask storage system to store spent fuel at an on-site ISFSI under a 10 CFR 72 general license. For the first dry fuel storage campaign, the written evaluations were based on HI-STORM 100 System 10 CFR 72 CoC Number 1014, Amendment 2 and HI-STORM FSAR Revision 3, including applicable interim changes (e.g., those authorized under 10 CFR 72.48). As ISFSI operations continue over time, the applicable CoC amendment and/or FSAR revision may change. This report will be revised, at a minimum, for each dry fuel storage campaign to list the applicable CoC amendment, FSAR revision, and interim changes for the MPC and overpack serial numbers to be added to the ISFSI and for general changes to the HI-STORM FSAR (see Section 5.4.1.12 and Appendix 2 of this report). Because the HI-TRAC transfer cask is re-useable, only one has been fabricated and its design basis is not expected to change. Certification of the transfer cask for use with later CoC amendments and FSAR revisions is

tracked in the HI-STORM FSAR, Section 1.0.2.

Revision 3 to this report adopted HI-STORM CoC Amendment 3 and FSAR Revision 5 for the casks deployed in the 2008 cask loading campaign at Hope Creek (casks 5 through 12). The licensing basis for the first four casks loaded in 2006-07 remains CoC Amendment 2 and FSAR Revision 3, with certain 72.48 changes. See Appendix 2 for details.

Revision 4 to this report adopts HI-STORM CoC Amendment 5 and FSAR Revision 7 for the casks deployed in the 2010 cask loading campaign at Hope Creek and future casks. The licensing bases for previously deployed Hope Creek casks 1-12 remain as they were at the time the casks were loaded. See Appendix 2 for details.

3.0 BACKGROUND

In order to provide adequate spent fuel storage capacity for the Salem and Hope Creek Generating Stations, PSEG Nuclear operates an onsite ISFSI at the Salem and Hope Creek Generating Station on Artificial Island. The onsite ISFSI is located inside the Salem/Hope Creek protected area near the north boundary of the Hope Creek Generating Station site, west of the existing cooling tower. The ISFSI location is shown in Figure 8.7 of Reference 6.31.3. The ISFSI is comprised of three concrete storage pads designed to provide storage for up to 200 HI-STORM 100 System storage overpacks containing seal-welded MPCs.

The ISFSI pads are sized and structurally designed for storage of Hope Creek and Salem spent fuel in any of the following three dry cask storage systems approved by the NRC:

- Holtec HI-STORM 100 – CoC 1014
- Transnuclear Standard NUHOMS System – CoC 1004
- NAC International UMS Universal Storage System – CoC 1015

PSEG Nuclear has elected to deploy the Holtec HI-STORM 100 System for dry storage of Hope Creek spent fuel at the ISFSI at this time. A subsequent revision to this 72.212 evaluation report must be completed to implement the transfer of Salem spent fuel to the ISFSI. Similarly, deployment of another CoC holder's dry cask storage system design or use of a different HI-STORM 100 System overpack or MPC model than that described herein will require supplemental evaluations and either a revision of this 72.212 evaluation report or the creation of a separate 72.212 evaluation report reflecting the new dry storage system or components.

The Salem/Hope Creek ISFSI is operated under the conditions of the general license granted in accordance with 10 CFR 72.210; the first four casks containing Hope Creek fuel were loaded and deployed at the ISFSI in 2006-07 under the HI-STORM 100 System CoC Amendment 2, its supporting FSAR Revision 3, plus certain changes authorized under 10 CFR 72.48, as shown in Appendix 2 to this report. An additional eight casks containing HCGS fuel were loaded in 2008 in accordance with CoC Amendment 3 and FSAR Revision 5, also as shown in Appendix 2. Casks loaded with Hope Creek fuel after the first 12, are being loaded in accordance with CoC Amendment 5 and FSAR Revision 7. The cask FSAR is updated no less frequently than every two years by the CoC holder in accordance with 10 CFR 72.248. The revision of the cask FSAR upon which this report is based varies by cask serial number as described above and as shown in Appendix 2. The CoC amendment under which casks are loaded remains the applicable CoC

amendment unless altered by an exemption to the Part 72 regulations.

References are identified throughout the body of this report and are listed in Section 6.0. References include analyses, calculation packages, drawings, procedures, correspondence, and other documents. The reference documents are intended to provide supporting or background information and additional detail that the reader may refer to in order to learn more about a particular topic presented in this document, but are generally not considered part of this report. A referenced document shall be considered to be a part of this report only if it is clearly annotated as being "incorporated by reference" in this report. Documents incorporated by reference into this report are subject to the same administrative controls and regulatory requirements as the main report (i.e., changes are controlled by 10 CFR 72.48).

The spent fuel stored at the ISFSI will eventually be shipped offsite to a federal repository or Monitored Retrievable Storage (MRS) installation in casks approved for shipment of spent fuel in accordance with 10 CFR 71. The HI-STORM 100 System is the storage-only counterpart of the Holtec HI-STAR 100 System, which uses an identical MPC design. The HI-STAR 100 System is the canister-based, 10 CFR 71-certified transportation package (CoC 71-9261). Because the MPC is designed to meet the requirements of both 10 CFR 71 and 10 CFR 72 for transportation and storage, respectively, the HI-STORM 100 System allows rapid decommissioning of the ISFSI by simply transferring the fuel-loaded MPCs directly into HI-STAR 100 overpacks for offsite transport without re-packaging.

4.0 REGULATORY REQUIREMENTS AND LICENSE CONDITIONS

10 CFR 72.210 grants a general license for the storage of spent fuel at an onsite ISFSI to holders of a 10 CFR 50 license at the associated reactor site. 10 CFR 72.212 establishes the conditions for use of a Part 72 general licensee.

One of the general license conditions is to prepare and maintain a written evaluation demonstrating compliance with certain regulatory requirements, as discussed in 10 CFR 72.212(b)(2). The "Evaluation" section of this report summarizes the written evaluations and analyses performed to ensure that the generic HI-STORM 100 System design criteria bound the site-specific design criteria at the Artificial Island site. This report addresses the five regulations required by 10 CFR 72.212(b) to be included, plus, for completeness, two additional regulations pertaining to program enhancements (e.g., 10 CFR 50.54 programs). Compliance with other 10 CFR 72 regulatory requirements applicable to general licensees pursuant to 10 CFR 72.13 is controlled via the associated implementing procedures and programs. The seven regulations addressed in this report are:

- 10 CFR 72.212(b)(2)(i)(A) - Certificate of Compliance Conditions
- 10 CFR 72.212(b)(2)(i)(B) - Cask Storage Pad Design
- 10 CFR 72.212(b)(2)(i)(C) - Dose Analyses Pursuant to 10 CFR 72.104
- 10 CFR 72.212(b)(3) - Review of the Cask FSAR and SER
- 10 CFR 72.212(b)(4) - Review of Part 50 Facility Impact (10 CFR 50.59)
- 10 CFR 72.212(b)(5) - Security Plan
- 10 CFR 72.212(b)(6) - Programs

5.0 EVALUATION

5.1 10 CFR 72.212(b)(2)(i)(A) - Certificate of Compliance Conditions

10 CFR 72.212(b)(2)(i)(A) states that the general licensee shall perform written evaluations, prior to use, that establish that:

"...conditions set forth in the Certificate of Compliance have been met"

5.1.1 Evaluation

The NRC confers approval of a dry spent fuel cask storage system by issuance of a CoC in accordance with Subpart L of 10 CFR 72. The HI-STORM 100 System CoC permits the storage of a wide range of BWR and PWR nuclear power plant spent fuel and non-fuel hardware. Therefore, portions of the CoC are not applicable to the Hope Creek ISFSI. Use of the HI-STORM 100 System at the ISFSI is conditioned upon fulfilling the applicable conditions set forth in the CoC. The conditions in HI-STORM 100 System Certificate of Compliance No. 72-1014, Amendments 2, 3, and 5 that are applicable to storing Hope Creek spent fuel at the ISFSI have been evaluated. These evaluations are documented in Appendix 1 to this report, Tables 1 through 3. Appendix 2 to this report shows the licensing basis (CoC amendment and FSAR revision) for each licensed component deployed at the Salem/Hope Creek ISFSI.

5.1.2 Conclusion

As documented in Appendix 1 to this report, PSEG Nuclear has evaluated HI-STORM 100 System Certificate of Compliance No. 72-1014, including Appendices A and B, against the HCGS fuel and site-specific conditions and determined that the applicable conditions in the CoC are met. Therefore, PSEG Nuclear complies with the requirements of 10 CFR 72.212(b)(2)(i)(A).

5.2 10 CFR 72.212(b)(2)(i)(B) - Cask Storage Pad Design

10 CFR 72.212(b)(2)(i)(B) states that the general licensee shall perform written evaluations, prior to use, that establish that:

"Cask storage pads and areas have been designed to adequately support the static and dynamic loads of the stored casks, considering potential amplification of earthquakes through soil-structure interaction, and soil liquefaction potential or other soil instability due to vibratory ground motion."

5.2.1 Evaluation

The following evaluation is specific to the design of the ISFSI pad for the Holtec HI-STORM 100S Version B-218 overpack model. Use of other HI-STORM overpack models or a different certified dry storage system will require re-evaluation and a revision to this report.

5.2.1.1 ISFSI Storage Pad General Description

The primary function of the ISFSI storage pad is to provide a stable foundation for supporting the storage casks under all normal, off-normal and credible accident conditions of storage, including natural phenomena such as earthquakes and tornadoes. Section 3.1.2.3 of the NRC Safety Evaluation Report for Amendment 1 to the HI-STORM 100 CoC (Reference 6.5) states that when the HI-STORM 100 System is deployed in the free-standing mode, the ISFSI pad/basemat is considered not important-to-safety (NITS). If the HI-STORM 100 System is deployed in the anchored condition, the ISFSI pad/basemat is considered important-to-safety (ITS). As shown in the evaluation below, the seismic accelerations at Artificial Island are sufficiently low to permit deployment of the HI-STORM System casks in the free-standing mode. Nonetheless, the ISFSI pad is classified as ITS, Category B (ITS-B) to assure an appropriate level of quality assurance is applied to activities associated with pad design, construction, testing, inspection, and records management.

The ISFSI storage facility is comprised of three separately constructed, reinforced structural concrete pads[1]. Two have approximate dimensions of 36 inches thick, 91 feet wide and 260 feet long, and the third differs in length only; it is approximately 248 feet, 8 inches long (Reference 6.18). The three pads are oriented with their long dimension in the north-south direction, approximately 14 feet apart edge-to-edge along their length. The west and middle pads will be used to store 68 casks each, and the east pad will be used to store 64 casks for a total ISFSI capacity of 200 casks. The west and middle pads each support 68 casks in two 2x17 arrays. The east pad supports 64 casks in two 2x16 arrays. The casks are approximately 11'-2" in diameter (Reference 6.32.6). The center-to-center spacing between each cask in an array is 15 feet. There is a 35-foot separation distance along the center of each pad between arrays for crawler access (Reference 6.14, Figure 2).

The pad foundations are designed to accommodate storage of fuel-loaded HI-STORM 100S Version B-218 overpacks and the other NRC-approved dry storage casks listed in Section 3.0 above. The size and layout of the ISFSI storage pads were chosen to be compatible with operation of the vertical cask transporter (VCT). The pads are essentially flush with the surrounding grade, where needed, in order to permit the VCT to be driven directly onto the pad surface. The area surrounding the ISFSI storage pad is compacted gravel (References 6.18 and 6.37).

5.2.1.2 Storage Pad Design

Each of the three ISFSI storage pads is designed to adequately support the static weight of the maximum capacity of fuel-loaded HI-STORM casks (defined in Section 5.2.1.1) in accordance with 10 CFR 72.212(b)(2)(i)(B). In addition, the pads are designed for appropriate combinations of the effects of normal, off-normal and accident conditions, including the effects of natural phenomena in accordance with 10 CFR 72.122(b). The design of the ISFSI storage pad meets the requirements of 10 CFR 72 for the loads and load combinations specified in the HI-STORM FSAR, NUREG-1567, NUREG-1536, and ACI 349-01 (References 6.2, 6.6, 6.7, and 6.8). The structural analysis of the pad considered the sequential, partial and total load of fuel-loaded HI-STORM overpacks and the VCT loads. The live load on the pad due to operation of the VCT was also considered in the analysis (Reference 6.18).

[1] Throughout this document, the text may refer to the ISFSI "pad" or "pads" interchangeably.

The ISFSI storage pad is designed to remain functional under earthquake loading conditions so as to preclude a cask tip-over event or excessive cask sliding. According to 10 CFR 72.102(f), the ISFSI design basis earthquake (DBE) must be equivalent to the safe shutdown earthquake (SSE) for the nuclear power plant. Therefore, the ISFSI storage pads are designed to remain functional under the influence of the SSE for the Artificial Island site.

Details of the ISFSI pad design, design criteria, and supporting analyses may be found in References 6.18 through 6.20 and 6.37.

5.2.1.3 Geotechnical Investigation

The site-specific investigations of the ISFSI site, laboratory soils analysis, and foundation structural analysis demonstrate that soil conditions are adequate for the foundation loading to limit total and differential settlements due to both static and dynamic loading conditions once the subsoil has been improved (References 6.18, 6.19, 6.20, and 6.26). See also Section 5.2.1.6 below.

5.2.1.4 Cask Handling Accident and Cask Tip-Over Evaluation

The ISFSI pad and subgrade are designed and constructed to provide adequate support for the dry storage casks under all applicable load combinations. Two sets of design criteria for the ISFSI pad were used in the design basis cask drop and tipover analyses performed by the CoC holder as shown in HI-STORM FSAR Table 2.2.9. The Salem/Hope Creek ISFSI used the Set 'A' criteria as the original basis for design:

a. Concrete thickness: $\leq$ 36 inches
b. Concrete compressive strength: $\leq$ 4,200 psi at 28 days
c. Reinforcement top and bottom (both directions)
   Reinforcement area and spacing determined by analysis
   Reinforcement shall be 60 ksi yield strength ASTM material
d. Soil Effective Modulus of Elasticity: $\leq$ 28,000 psi

The ISFSI pad is designed and was constructed to be 36 inches thick (maximum) and is placed on compacted engineered fill (soil thickness greater than 36 inches per Reference 6.19). The pad is designed to be structurally adequate with a minimum concrete compressive strength of 3,000 psi. As-built concrete compressive strength has been determined by test to be less than 4,200 psi, in all cases. Steel reinforcing is placed in both directions at the top and bottom faces of the pad, and is designed in accordance with ACI 349-01. The steel reinforcement used is ASTM A516 Grade 60 (60 ksi yield strength). However, the soil effective modulus of elasticity was determined to be greater than 28,000 psi (Reference 6.18, Attachment J).

Because the ISFSI pad design does not meet all of the criteria for either ISFSI pad Set 'A' or 'B' from HI-STORM FSAR Table 2.2.9, a site-specific cask tipover analysis was performed (Reference 6.36). The results of this analysis show that the deceleration value at the top of the fuel assemblies is 39.2 g's. This deceleration value is less than the design basis value of 45 g's and is, therefore, acceptable per HI-STORM CoC, Appendix B, Section 3.4.6.a. A cask drop is not

required to be postulated or analyzed because the VCT is designed in accordance with ANSI N14.6 and has redundant drop protection features (Reference 6.8).

5.2.1.5 Cask Sliding and Overturning Evaluation

Normal, Dry Conditions

The loaded HI-STORM 100 System cask is designed to withstand a seismic event defined by three orthogonal, statistically independent acceleration times-histories as described in Section 3.4.7 of the HI-STORM 100 System FSAR. The HI-STORM 100 System FSAR states that for the purpose of performing a conservative analysis to determine the maximum zero period acceleration (ZPA) that will not cause incipient tipping, the cask is considered as a rigid body subject to a net horizontal quasi-static inertia force and a vertical quasi-static inertia force. The analysis used in the design of the HI-STORM 100 System uses a finite element model representing the cask, pad, and engineered backfill supported on existing substrata. The input motion used in the following discussion corresponds to the safe shutdown earthquake (SSE) for the Hope Creek Generating Station, which is the design basis earthquake for the ISFSI. Strain-dependent soil modulus and damping values (compatible to strains developed during the SSE) are used.

The calculated peak seismic vertical ZPA, G_V, and horizontal ZPA, G_H, expressed as fractions of 'g' at the top of the ISFSI storage pad are as follows (Reference 6.20):

$$G_V = 0.23\ g$$
$$G_{H,\ Longitudinal} = 0.36\ g$$
$$G_{H,\ Transverse} = 0.32\ g$$

The vectorial sum of the two horizontal components is given as:

$$G_{H(R)} = ((0.36)^2 + (0.32)^2)^{1/2}$$
$$G_{H(R)} = 0.482\ g$$

HI-STORM 100 System CoC, Appendix B, Section 3.4.3.a provides the seismic requirements for deploying the HI-STORM 100 System in the free-standing mode. The following inequality must be met using the above ZPAs:

$$G_H + \mu G_V \leq \mu$$

Where: μ is the Coulomb friction coefficient for the cask/ISFSI pad interface (for sliding).

AND

μ is also the ratio r/h, where 'r' is the radius of the cask and 'h' is the height of the cask center-of-gravity (CG) above the ISFSI pad surface (for tipover).

The inequality must be met for both definitions of μ.

For μ as the coefficient of friction:

In accordance with HI-STORM CoC Appendix B, Section 3.4.3.a, absent testing to demonstrate a higher value is appropriate for use, μ as the coefficient of friction is set equal to 0.53 (References 6.29 and 6.30).

$$0.482 + (0.53)(0.23) = 0.60, \text{ which is greater than } 0.53$$

The inequality is not met.

For μ as the ratio of cask radius to CG height:

There are several values of overpack radius and center-of-gravity in the HI-STORM 100S and 100S Version B overpack drawings (3669 and 4116) and FSAR Table 3.2.3, respectively. For the HI-STORM 100S-218 Version B overpack design being used at Hope Creek the value of 'μ' is calculated as follows:

r = 132.5"/2 = 66.25" (for the HI-STORM 100S Version B overpack per Reference 6.32.6, Sheet 3)

h = 111.88" (conservatively high value for the HI-STORM 100S Version B-218 with loaded MPC-32 per Reference 6.2, Table 3.2.3)

Then, r/h = 66.25/111.88 = μ = 0.592

$$0.482 + (0.592)(0.23) = 0.618, \text{ which is greater than } 0.592$$

Again, the inequality is not met.

As an alternative to evaluating the inequality using ZPAs, Section 3.4.3.a of Appendix B of the HI-STORM CoC permits use of acceleration time-histories, in which case the values of G_H and G_V may be the coincident values of the instantaneous net horizontal and vertical accelerations. If instantaneous accelerations are used, the inequality must be evaluated at each time step in the acceleration time-history over the total duration of the seismic event.

For G_V = 0.23 g, the inequality $G_H + \mu (G_V) \leq \mu$ with $\mu = 0.53$ for sliding governs. That is, if the inequality is satisfied with $\mu = 0.53$, it will also be satisfied for the overturning case, with $\mu = 0.592$.

The inequality $G_H + \mu (G_V) \leq \mu$ with $\mu = 0.53$ has been checked with G_H equal to the vectorial sum of two instantaneous horizontal acceleration components and the corresponding instantaneous vertical acceleration, G_V over the total duration of the seismic event. The results show that the inequality is satisfied (Reference 6.20, Section 6.7).

Because the HCGS site-specific seismic criteria are acceptable under both definitions of 'μ' required by the HI-STORM CoC, sliding or tipover of the HI-STORM overpack will not occur under dry ISFSI pad conditions and the casks may be deployed at the Salem/Hope Creek ISFSI in the free-standing mode.

ISFSI Pad Icing (Reference 6.4)

Section 3.4.3.b of the HI-STORM CoC requires an evaluation of a degraded pad/cask interface friction (such as due to icing) to ensure that an earthquake will not result in a cask tipping over or falling off the ISFSI pad. Additionally, the evaluation must ensure any impact between casks results in g-loads no greater than 45 g's.

This evaluation has been performed (Reference 6.20, Appendix K) and the results show that the casks will not tipover, fall off the pad, or experience cask-to-cask impact. Therefore, the HI-STORM 100S Version B overpacks at the Hope Creek ISFSI comply with the HI-STORM CoC in this regard.

5.2.1.6 Soil Liquefaction Evaluation

During a seismic event, the development of additional pore water pressure[2] in saturated, non-cohesive soil reduces the effective confining pressure and the shear strength to a low value. This phenomenon is called liquefaction. The potential for a soil to liquefy depends on the soil classification, its compaction level (relative density), ground water level, and the intensity of the earthquake. 10 CFR 72.212(b)(2)(i)(B) requires that soil liquefaction effects be evaluated for the subgrade underneath ISFSI pads.

The Salem/Hope Creek ISFSI pad is founded on improved subsoil. Directly under the pads there is 3 feet of granular engineered fill compacted to a relative density of 85%. The hydraulic fill below the 3 feet of granular engineered fill has been improved by the use of an array of short and long "soilcrete" columns, each with a cross-sectional area of approximately 34.7 square feet. The bottom ends of the long soilcrete columns are located in the stiff-to-hard clay layer approximately 51 feet below the top of the ISFSI pad. The bottom of short soilcrete columns are located approximately 28 feet below the top of the ISFSI pad. The spacing of the long soilcrete columns is about 16.5 feet center-to-center in the east-west direction and about 7.4 feet center-to-center in the north-south direction. The short soilcrete columns have the same center-to-center spacing as the long columns with rows of short columns placed in between the long columns in the east-west direction (Reference 6.32.9).

The groundwater level in the area of the ISFSI pad was considered in the analysis for the bearing capacity and in the evaluation for liquefaction potential during the postulated design basis SSE. The soil liquefaction evaluation (Reference 6.18) is based on soil data for the existing soil strata at the ISFSI pad site provided in the geotechnical investigation performed for the Salem/Hope Creek ISFSI site (Reference 6.26) and foundation soil improved by the soilcrete columns. The Hope Creek SSE seismic ground motion was used in the soil liquefaction and foundation load-carrying capacity analysis (Reference 6.20). The soil liquefaction and foundation load-carrying capacity analysis for the SSE event concludes that:

[2] Pore water pressure is defined as that part of the total normal stress in a saturated soil that is due to the presence of interstitial water (Glossary of Geology, American Geological Institute, 1972). If pressure is exerted on a soil sample, the water does not flow instantaneously. This pressure results in an excess of water in the remaining void space in the soil, hence an increase in the pore water (neutral) pressure. This increase in water pressure reduces the total pressure on a plane to an effective value. As the pore water pressure increases, the effective stress in the soil decreases. If the neutral pressure is significantly increased, the effective stress could be reduced to zero, i.e. a granular soil will possess no shear strength (Foundation Analysis and Design, 3rd edition, J. E. Bowles, 1982).

1. The 3-foot thick engineered fill directly under the pads does not liquefy.

2. The in-situ soil strata below the engineered fill, from a depth of 3 feet to 24 feet has a potential for liquefaction. However, soil improvement (3 feet thick engineered fill and soilcrete columns below the engineered fill) precludes liquefaction of the foundation soil directly below the ISFSI pads. The foundation load carrying capacity analysis shows that the long soilcrete columns are adequate for supporting the design loads imposed upon them.

3. The soil below 24 feet does not liquefy.

5.2.2 Conclusion

The Salem/Hope Creek ISFSI pads are designed to adequately support the static and dynamic loads of the HI-STORM 100S Version B-218 overpacks. The ISFSI storage pads are designed for the loads and load combinations specified in NUREG-1567, NUREG-1536, and ACI 349-01, and they meet the requirements of 10 CFR 72 and the HI-STORM 100 System FSAR and Certificate of Compliance for sliding and overturning. Therefore, PSEG Nuclear complies with the requirements of 10 CFR 72.212(b)(2)(i)(B).

5.3 10 CFR 72.212(b)(2)(i)(C) – Dose Analyses Pursuant to 10 CFR 72.104

10 CFR 72.212(b)(2)(i)(C) states that the general licensee shall perform written evaluations, prior to use, that establish that:

"...the requirements of §72.104 have been met"

10 CFR 72.104 - "Criteria for radioactive materials in effluents and direct radiation from an ISFSI or MRS," states the following:

"(a) During normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid and 0.25 mSv (25 mrem) to any other critical organ as a result of exposure to:

(1) Planned discharges of radioactive materials, radon and its decay products excepted, to the general environment,

(2) Direct radiation from ISFSI or MRS operations, and

(3) Any other radiation from uranium fuel cycle operations within the region.

(b) Operational restrictions must be established to meet as low as is reasonably achievable objectives for radioactive materials in effluents and direct radiation levels associated with ISFSI or MRS operations.

(c) Operational limits must be established for radioactive materials in effluents and direct radiation levels associated with ISFSI or MRS operations to meet the limits given in paragraph (a) of this section."

5.3.1 Evaluation

5.3.1.1 Controlled Area Boundary

The ISFSI is located at the north end of Artificial Island inside the Salem/Hope Creek protected area (PA) at the proposed location of the Hope Creek Unit 2 cooling tower, which was never built. Therefore, the ISFSI controlled area boundary is defined to be the same as the Salem/Hope Creek Generating Station exclusion area boundary. The distance between the ISFSI facility and the nearest point on the controlled area boundary (north direction) is 469 meters (Reference 6.14, Table 38). Therefore, the ISFSI controlled area meets the requirements for a controlled area as defined in 10 CFR 72.3 and 10 CFR 72.106 as being under the authority of the licensee for its use and being at least 100 meters to the nearest boundary. The ISFSI controlled area is not traversed by a highway or railroad. The owner-controlled site access road is a public roadway.. The road permits vehicular access to the site and a small number of private residences, and terminates at the plant site. It is not a throughway. A portion of the Delaware River to the west is within the owner controlled area.

Doses were calculated at the shortest distance from a cask on the storage pad to the controlled area boundary (469 meters north of the ISFSI pads) and at the Delaware River shoreline, located 331 meters west of the ISFSI pads (Reference 6.14, Table 38).

5.3.1.2 Dose due to Normal Operations and Anticipated Occurrences

Compliance with the dose limits specified in 10 CFR 72.104(a) is dependent on site-specific considerations such as the number of casks stored on the ISFSI storage pad, cask array configuration, cask contents, and the distance between the casks on the ISFSI and the controlled area boundary. In addition, an evaluation of compliance with 10 CFR 72.104(a) must include doses from other fuel cycle activities (i.e., Salem and Hope Creek plant operations). PSEG Nuclear performed a dose evaluation for normal plant and ISFSI operations and off-normal cask events based on storage of 200 fully loaded HI-STORM 100S Version B overpacks at the ISFSI (Reference 6.14). Storage of additional casks or a different model cask at the ISFSI will require a revision to that evaluation.

The HI-STORM 100 System is designed with a confinement barrier for the radioactive contents to assure that there is no release of radioactive material to the environment under normal operations and off-normal or accident occurrences. Because the confinement boundary (i.e., MPC) remains structurally intact and provides redundant welded closures, the postulated leakage of radioactive material from the confinement boundary was not assumed, consistent with the licensing basis in Chapter 7 of the HI-STORM FSAR and the "leak tight" acceptance criterion for helium leakage testing of the MPC vent and drain port cover plates. Calculations were performed for only direct exposure from the fuel-loaded casks and no effluent dose was considered from the casks (Reference 6.14, Section 4.5). Inhalation (internal) exposures at the ISFSI controlled area boundary due to plant effluents were taken from the Salem/Hope Creek Annual Radiological Effluent Release Report.

The ISFSI dose analysis was performed assuming 200 fully loaded HI-STORM 100S Version B casks in a manner that bounds loading of any fuel authorized by the HI-STORM 100 CoC, with a

certain fraction of the casks containing BWR fuel from Hope Creek and the balance containing PWR fuel from Salem. One hundred eleven (111) of the casks were assumed to contain MPC-68s filled with Hope Creek fuel assemblies and 89 casks were assumed to contain MPC-32s filled with Salem fuel assemblies. The 200 casks are stored on three pads.

Source Terms

The table below shows the fuel-related information used in the dose analyses (Reference 6.14, Section 3.2).

Table 5.3.1-1

Salem and Hope Creek Fuel Source Term Assumptions

PLANT	COOLING TIME (yrs)	AVERAGE BURNUP (MWD/MTU)	ENRICHMENT (wt % ^{235}U)	URANIUM MASS (kg)
Salem	10	57,000	3.8 – 5.0	455
Hope Creek	5	45,000	3.65	181

Each Salem fuel assembly was assumed to include a burnable poison rod assembly (BPRA), which is conservative because it increases the gamma source term. Dose rates from other PWR non-fuel hardware (e.g., thimble plugs, axial power shaping rods, control rod assemblies, etc.) compared to the fuel and BPRAs is considered negligible and is, therefore, not modeled (Reference 6.14, Section 3.2). While the CoC permits loading fuel cooled to as little as three years and with enrichment and burnup higher than that used in this dose analysis, the direct gamma and neutron dose rates computed with these source terms are considered conservative and will bound the measured dose rates. The fuel and cask loading characteristics are checked during fuel selection to verify that they meet both the CoC and the §72.104 analysis limits. Therefore, Salem and Hope Creek may load fuel up to the limits for enrichment, decay heat, burnup, and cooling time established in the CoC and the dose analysis performed for use of CoC Amendment 2 at the Salem/Hope Creek ISFSI remains bounding for Amendments 3 and 5; any fuel authorized by the CoC may be loaded. See Section 7.0 of Reference 6.14 for a more detailed explanation of the bounding nature of the source terms.

Dose Rate Analyses

The computer code MCNP4C3 was used for all dose analyses (Reference 6.14). Two comparative dose rate analyses were performed first to determine the bounding configuration of overpacks containing PWR (MPC-32) and BWR (MPC-68) canisters at the ISFSI. Uniform loading in the MPC was assumed with a homogeneous source modeled.

The direct dose rates were calculated for two cases with a dose receptor at 100 meters to determine whether the BWR or PWR casks on the outside edge of the ISFSI provided the bounding case. In the first case, the 111 overpacks containing MPC-68s were assumed to be arranged on the west side of the ISFSI. In the second case, the 89 overpacks containing MPC-32s were assumed to be arranged on the west side of the ISFSI (see Figures 3 and 4 of Reference 6.14). Per Table 35 of Reference 6.14, the bounding direct dose rate ISFSI configuration occurs when the overpacks

containing the 111 BWR MPC-68s are located closest to the dose receptor. Therefore, the BWR and PWR casks may be stored in any configuration at the ISFSI.

The second set of MCNP calculations were performed to determine dose rate versus distance at the nearest controlled area boundary for comparison against the regulatory limit. In addition, dose rates were also calculated in the west direction, for a real individual located at the Delaware River east shoreline for 60 hours per year. In each case, the 111 BWR overpacks were modeled nearest the dose receptor based on the results of the first set of analyses. Dose rates were calculated at various distances from the ISFSI, from one meter to 1000 meters. Direct dose rates, converted to annual doses at the site boundary from the ISFSI, were then added to site boundary effluent and direct doses from plant operation for comparison against the regulatory limits in 10 CFR 72.104. Table 5.1.3-2 below shows the annual dose rates at the locations of interest.

In 2006, the CoC holder removed a shop helium leak test of the MPC from the FSAR under the provisions of 10 CFR 72.48 and manufactured a number of MPCs without performing the leak test. Eight of those untested MPCs were loaded with HCGS spent fuel in 2008 and are currently being used to store HCGS fuel at the ISFSI. In August 2009, the NRC cited the CoC holder for removing the test from the FSAR without prior NRC approval (Reference 6.39). As part of its corrective actions for the violation, the CoC holder committed to restore the test to the FSAR and begin testing all future MPCs. The eight affected MPCs in service at the ISFSI (Serial Numbers 1021-147 through -154), while not having been leak tested at the shop, are still assumed to have no credible leakage. This is based on the MPC fabrication process (i.e., welding and non-destructive examination, including radiography) being no different for these eight MPCs than the hundreds manufactured before them that were leak tested. In addition, the eight untested MPCs were successfully hydrotested in the plant after fuel loading and MPC lid welding. Lastly, observations of dose over time at the TLDs located near the ISFSI give no indication of any effluent from any of the MPCs. Therefore, there is no impact to the 10 CFR 72.104 doses presented in Table 5.3.1-2 as a result of having eight untested MPCs in service. See Reference 6.55 for additional information.

Table 5.3.1-2
Annual Calculated Doses Due to ISFSI and Plant Operations*

LOCATION	CALCULATED WHOLE BODY DOSE (mrem/yr)	WHOLE BODY LIMIT (mrem/yr)	CALCULATED ORGAN DOSE (mrem/yr)	ORGAN DOSE LIMIT (mrem/yr)	CALCULATED THYROID DOSE (mrem/yr)	THYROID DOSE LIMIT (mrem/yr)
NORTH SITE BOUNDARY (full time occupancy)	ISFSI: 1.35E+01 PLANT: 2.56E-02 **TOTAL: 13.5**	25	ISFSI: 0 PLANT: 1.95E-02 **TOTAL: 0.02**	25	ISFSI: 0 PLANT: 3.43E-01 **TOTAL: 0.34**	75
EAST SHORE OF DELAWARE RIVER (60 hours/yr occupancy)	ISFSI: 5.35E-01 PLANT: 2.56E-02 **TOTAL: 0.56**	25	ISFSI: 0 PLANT: 1.95E-02 **TOTAL: 0.02**	25	ISFSI: 0 PLANT: 3.43E-01 **TOTAL: 0.34**	75

* Reference 6.14, Table 39

The results of the dose evaluation demonstrate that doses at the controlled area boundary due to ISFSI and other fuel cycle facility operations comply with the requirements of 10 CFR 72.104(a). Note that spent fuel from both Salem and Hope Creek is assumed to be stored at the ISFSI in the radiological evaluation. The quantities of spent fuel included in the dose analysis are consistent with the quantities of spent fuel currently planned to be removed from each spent fuel pool and stored at the ISFSI. PSEG Nuclear fuel characterization and selection procedures (References 6.31.14 and 6.31.15) ensure that only fuel authorized by the CoC (and, therefore, bounded by the dose analysis) is loaded into the casks. Furthermore, adherence to the radiation protection program requirements in Section 5.7 of Appendix A to the CoC (i.e., calculation of dose rates for the transfer cask and overpack and measurements of actual dose rates for comparison against those calculated values) will also provide confidence that the offsite doses will be within those computed in this analysis (References 6.31.20 through 6.31.22). Ultimately, the PSEG Nuclear radiological monitoring program, governed by the methodology described in the Hope Creek Offsite Dose Calculation Manual (ODCM), verifies that doses at the controlled area boundary do not exceed applicable regulatory limits.

5.3.1.3 Operational Restrictions to meet ALARA Objectives

The Hope Creek Radiation Protection Program and procedures have been reviewed in accordance with 10 CFR 72.212(b)(6), and appropriate changes have been made to the implementing procedures to address cask loading operations, transportation of the loaded casks to the ISFSI, and operation of the ISFSI (see Section 5.7 of this report). The Hope Creek Radiation Protection Program includes appropriate controls to meet as low as reasonably achievable (ALARA) objectives for radioactive materials in effluents and direct radiation level during cask loading, cask transport, and ISFSI operations.

5.3.2 Conclusion

PSEG Nuclear has demonstrated by analysis that there is reasonable assurance that the annual dose equivalent to any real individual who is located beyond the ISFSI controlled area boundary during normal operations and anticipated off-normal occurrences will not exceed 10 CFR 72.104(a) dose limits, including doses from other fuel cycle facility operations. PSEG Nuclear implements operational restrictions in conjunction with the Hope Creek Radiation Protection Program to meet ALARA objectives for radioactive materials in effluents and direct radiation levels associated with cask loading and storage operations to ensure that 10 CFR 72.104(a) dose limits will be met. Therefore, PSEG Nuclear complies with the requirements of 10 CFR 72.212(b)(2)(i)(C).

5.4 10 CFR 72.212(b)(3) — Review of the Cask FSAR and SER

10 CFR 72.212(b)(3) states the following:

"Review the Safety Analysis Report (SAR) referenced in the Certificate of Compliance and the related NRC Safety Evaluation Report, prior to use of the general license, to determine whether or not the reactor site parameters, including analyses of earthquake intensity and tornado missiles, are enveloped by the cask design bases considered in these reports. The results of this review must be documented in the evaluation made in paragraph (b)(2) of this section."

5.4.1 Evaluation

The Salem/Hope Creek ISFSI is located on the Artificial Island plant site, on which the Salem Unit 1 and 2 and Hope Creek reactors are co-located. As part of the process for obtaining the 10 CFR 50 license, the characteristics of the site and surrounding area were studied and catalogued in detail, and are well defined. The Salem/Hope Creek site parameters are evaluated in this section to ensure that they are enveloped by the HI-STORM 100 FSAR and the NRC Safety Evaluation Report (SER) for the HI-STORM 100 System (References 6.2 and 6.5). The applicable HI-STORM 100 System CoC amendment and FSAR revision, by component serial number, are listed in Appendix 2.

The HI-STORM 100 System structures, systems and components important to safety are designed for normal operations, and to withstand postulated off-normal and accident events (including natural phenomena) without unacceptable consequences. The design criteria for the HI-STORM 100 System are given in Chapter 2 of the HI-STORM 100 System FSAR. Accidents are evaluated in Chapter 11 of the HI-STORM FSAR. The parameters identified in the HI-STORM design criteria are evaluated in this section to ensure that they envelope Salem/Hope Creek site-specific conditions. Unique site parameters and events are evaluated as outliers, as required.

5.4.1.1 Fire and Explosion

Fire

The HI-STORM 100 System is designed to withstand the effects of fire as described in HI-STORM 100 System FSAR, Sections 2.2.3.3 and 11.2.4, and the effects of explosion as described in Section 2.2.3.10 and 11.2.11. The fire analyses described in the HI-STORM FSAR evaluate the effects of a fire on the HI-STORM overpack and on the HI-TRAC transfer cask, each containing an MPC loaded with fuel at design basis maximum heat load. The fire durations were estimated assuming 50 gallons of transporter fuel distributed in a pool of one meter width around the periphery of the cask. The different diameters of the overpack and transfer cask result in slightly different fire durations (3.6 minutes and 4.8 minutes, respectively). No credit is taken for personnel actions that could suppress the fire.

The generic fire analysis assumes an engulfing fire performed with a conservative 1475°F flame temperature for the duration of the fire, calculated based on the fuel volume and pool size. This flame temperature is taken from the NRC's radioactive material transportation regulations (10 CFR 71.73(c)(4)) and was found to be acceptable by the NRC for use in Part 72 storage fire analyses (Reference 6.5, Section 11.2.12.2 of the SER for the original CoC). This method of analysis is applicable and bounding for the Hope Creek site and only a comparison of fuel sources is required for this 72.212 evaluation.

Because the MPC transfer from the HI-TRAC transfer cask to the HI-STORM overpack takes place in the Hope Creek Reactor Building, there is no transporter fuel fire threat to the loaded HI-TRAC transfer cask. The fuel tank on the prime mover used to pull the loaded overpack out of the Reactor Building on the low profile transporter is limited to 50 gallons of diesel fuel (Reference 6.43) and is therefore bounded by the design basis fire analysis for the overpack described in the HI-STORM FSAR. This design feature also ensures compliance with Section 3.4.5 of Appendix B to the HI-STORM CoC, which limits the cask transporter to 50 gallons of diesel fuel, as discussed below.

The vertical cask transporter (VCT) fuel volume must be no more than 50 gallons of diesel fuel, in accordance with Section 3.4.5 of Appendix B to the HI-STORM CoC. The amount of fuel in the Hope Creek VCT's fuel tank is controlled by design. The volume of the fuel tank on the VCT ensures this limit is not exceeded (Reference 6.32.7). The hydraulic fluid in the VCT was also evaluated as a potential source of fuel for the fire. The hydraulic fluid for the VCT has a flash point of 580°F and a fire point of 650°F (Reference 6.49).

Based on the National Fire Protection Association's guidance, liquids with flash points greater than 100°F are considered non-flammable (Reference 6.38). Liquids with flash points above 200°F are considered Class IIIB combustible liquids (Reference 6.38). Based on the Diablo Canyon site-specific ISFSI licensing review, because the hydraulic fluid is not flammable, it is not considered a fire or explosion threat (Reference 6.24). Therefore, fire and explosion events involving the VCT hydraulic fluid are not postulated or considered further in this evaluation. Because the fuel tank on the VCT is limited to 50 gallons, the generic fuel fire described in the HI-STORM FSAR is bounding and no site-specific analysis of a fire involving the VCT fuel is required.

The VCT receives the loaded HI-STORM overpack outdoors and just south of the Reactor Building receiving bay door. The VCT moves a short distance south, then west, then north along the heavy haul path to the ISFSI site. Both the ISFSI facility and the heavy haul path are evaluated as new fire zones in Reference 6.11. There are no fixed sources of combustible material along the ISFSI route (heavy haul path) fire zone and no transient combustible material is permitted to be stored at the ISFSI (Reference 6.11, Section 7.2).

There are no automatic fire suppression or detection systems at the ISFSI or along the heavy haul path. As required by procedures (References 6.31.3 and 6.31.8), trained personnel will accompany the cask during on-site transport between the Reactor Building and the ISFSI, along with portable fire suppression equipment, to extinguish any fires that may occur before they jeopardize the cask system. Spatial separation between the overpacks and the fire hazards in the yard area is the primary means of minimizing the effects of fire on the fuel-loaded overpacks. There are no rated or non-rated fire barriers provided in the yard area near the ISFSI or along the heavy haul path for protection of the overpacks.

ISFSI

Reference 6.11, Section 7.1 evaluates combustible materials and other potential fire hazards in and around the ISFSI. Reference 6.15 determines the thermal effects of the sources of combustion. The ISFSI is a fenced-in area comprised of the three concrete pads, surrounding gravel, the overpacks, and conduit and control boxes associated with the overpack temperature monitoring instrumentation and security equipment. Cabling in rigid metal conduit exists, but does not contribute to the combustible load for the ISFSI fire area. There are no mechanical piping systems carrying potentially combustible, flammable, or explosive fluids either above ground or underground at the ISFSI. Transient combustibles at the ISFSI are controlled by procedure (Reference 6.54.1). Fixed and transient combustibles in the yard area near the ISFSI have been evaluated and found to be acceptable.

The ISFSI Electrical Interface/Security Building is located within the ISFSI and contains numerous cables and electrical cabinets. No fire detection or alarm system is installed in this building. However, portable fire extinguishers are located there. Although a large fire in the Electrical Interface/Security Building is unlikely due to the limited quantity of combustibles and fire detection and protection controls, an evaluation of the effect on the casks of a fire in this building was performed. The results were acceptable provided the building is at least 20 feet away from the nearest overpack (Reference 6.11), which it is. Other yard area buildings in the vicinity of the ISFSI were also evaluated for fire impact on the ISFSI and found to be acceptable.

Heavy Haul Path

Reference 6.11, Section 7.2 identifies the combustible materials and other potential fire hazards near the heavy haul path. Reference 6.15 determines the thermal effects of the sources of combustion. Permanent and transient fire hazards due to structures, tanks, and other fire sources near the heavy haul path have been evaluated and found to be acceptable.

Explosion

No particular explosion analysis was performed generically for the HI-STORM 100 System because of the difficulty in determining a generic explosion hazard that would bound most or all ISFSI sites. Instead, the HI-STORM 100 System MPC and overpack are designed for specific external pressures that are compared to the site-specific explosion hazards, if any. The MPC is designed for 60 psig external pressure and the ventilated HI-STORM overpack is designed for 10 psig instantaneous and 5 psig steady-state external pressure (Reference 6.2, Table 2.2.1).

Reference 6.15 calculates the overpressure effects of the sources of explosion on the HI-STORM overpack as it travels along the heavy haul path and during storage operations at the ISFSI. The sources of explosion include hydrogen, gasoline, diesel fuel and fuel oil in storage containers and in parked and driven vehicles. All calculated overpressures are less than 1.0 psig (Reference 6.15, Table 6.1-1). Therefore, the design basis external pressures for the MPC and overpack are not exceeded.

5.4.1.2 Tornado

The HI-STORM 100 System is designed to withstand pressures, wind loads, and missiles generated by a tornado as described in HI-STORM 100 System FSAR, Sections 2.2.3.5 and 11.2.6. HI-STORM FSAR Table 2.2.4 provides the wind speeds and pressure drops that the HI-STORM overpack is designed to withstand while maintaining kinematic stability.

The generic HI-STORM 100 System design basis tornado has a rotational wind speed of 290 MPH and a translational wind speed of 70 MPH for a total effective wind speed of 360 MPH. The assumed pressure drop due to a tornado is 3.0 psi. These design criteria are consistent with those specified for Region I sites in Regulatory Guide (RG) 1.76 (Reference 6.3). The Hope Creek site-specific design basis tornado characteristics are described in Hope Creek UFSAR Section 3.3.2.1 and are identical to the generic HI-STORM 100 System design values. Therefore, the generic tornado wind design criteria and analysis bounds the site specific tornado design basis winds.

HI-STORM FSAR Table 2.2.5 provides the tornado missile data used in the analysis of the HI-STORM overpack and HI-TRAC transfer cask. Information from FSAR Table 2.2.5 is repeated in the following table:

Table 5.4.1.2-1

HI-STORM 100 System Design Basis Tornado Missiles

Missile Description	Mass (kg)	Velocity (MPH)
Automobile (large missile)	1,800	126
Rigid solid steel cylinder (8 inch diameter) (intermediate missile)	125	126
Solid sphere (1 inch diameter) (small missile)	0.22	126

These postulated tornado missiles are consistent with the "Spectrum I" missiles in NRC NUREG-0800, Standard Review Plan (SRP) 3.5.1.4 (Reference 6.21). The large missile was evaluated for its ability to tip over the cask. The intermediate missile was evaluated for penetration through the cask. The small missile was evaluated for damaged due to its passage through a penetration in the cask (i.e., an inlet or outlet air duct).

The Hope Creek site-specific design basis tornado missile characteristics are described in Hope Creek FSAR Table 3.5-12 and are repeated in the following table. Weights (masses) have been converted from pounds to kilograms and velocities have been converted from feet per second to miles per hour for comparison with the generic cask design basis missiles in Table 5.4.1.2-1.

Table 5.4.1.2-2

Hope Creek Site Design Basis Tornado Missiles

Missile Description	Mass (kg)	Velocity (MPH)
Automobile	1,814	131.7
Utility Pole	511	122.3
12-inch diameter Schedule 40 pipe	340.7	104.9
6-inch diameter Schedule 40 pipe	130.3	116.3
Wood Plank	52.1	185.7
1-inch diameter steel rod	4.0	114.1

The Artificial Island site is located in tornado Region I as defined in RG 1.76. The missiles listed in Table 5.4.1.2-2 above are consistent with the "Spectrum II" missiles for tornado Region I listed in SRP 3.5.1.4. SRP 3.5.1.4 permits the use of Spectrum I or II missiles in performing design work. Therefore, the generically analyzed missiles are appropriate examples of the types of tornado missiles that could impact the dry storage casks at the Salem/Hope Creek ISFSI. The NRC's Safety Evaluation Report (SER) for the HI-STORM 100 System CoC (original issue) states in Section 3.4.2 (Reference 6.5):

"The staff concludes that the tornado and tornado missile analyses are adequate and acceptable. The phenomena analyzed are considered to envelop the corresponding phenomena at all points on U.S. territory."

This SER statement applies to the original HI-STORM 100 overpack design, which is not being used at the Salem/Hope Creek ISFSI. In SER Section 3.4.2.2 for HI-STORM CoC Amendment 1, the NRC affirms that the tornado missile analysis performed for the HI-STORM 100 overpack design remains bounding for the HI-STORM 100S design. The HI-STORM 100S Version B design being used at the Salem/Hope Creek ISFSI, which is a variation of the HI-STORM 100S overpack design, was authorized by Holtec under the provisions of 10 CFR 72.48. The 10 CFR 72.48 evaluation for the HI-STORM 100S Version B overpack design concludes that the Version B overpack design continues to provide adequate tornado missile protection as discussed in HI-STORM FSAR Section 3.4.8.1. Therefore, the HI-STORM 100S Version B overpack design is governed by the CoC Amendment 1 SER statement approving the tornado missile protection design features of the 100S overpack design.

Based on a comparison of the quantity mv^2/d, where 'm' is the mass of the missile, 'v' is the velocity of the missile, and 'd' is the equivalent diameter of the missile, the automobile and the 8-inch diameter steel cylinder analyzed generically in the HI-STORM FSAR are not bounding evaluations for Hope Creek. Therefore, a site-specific analysis of the Hope Creek large and intermediate missiles was performed (Reference 6.50). The results of that analysis are:

- The large missile will not cause the cask to tip over
- The intermediate missile will not penetrate the one-inch outer steel shell of the overpack
- The intermediate missile will not penetrate the 3-inch vent shield lid of the overpack
- Away from impact locations, the stresses in the overpack are less than ASME Code Level D limits

The results of the site-specific tornado missile analysis show that the spent fuel is adequately protected and the overpack will not tipover. Therefore, the tornado missile analysis is acceptable.

5.4.1.3 Flood

The HI-STORM 100 System is designed to be capable of withstanding pressure and moving water forces associated with a flood as described in HI-STORM FSAR Sections 2.2.3.6 and 11.2.7. Table 2.2.8 of the HI-STORM 100 System FSAR shows that the MPC enclosure vessel is designed for a 125 foot static head of water without collapsing, buckling, or otherwise allowing water to intrude into the confinement boundary. The cask system, including the overpack and the MPC is also designed to withstand the forces of flood water up to a velocity of 15 feet per second without sliding or tipping over.

Based on Section 2.4 of the Hope Creek UFSAR, PSEG plant datum is 89 feet above Mean Sea Level (MSL). UFSAR Table 2.4-6 indicates that the maximum still water level at the power block due to the probable maximum hurricane is 24.8 ft. MSL, or 113.8 ft. PSEG plant datum.

According to Section 3 of Reference 6.45, elevation 113.8 ft. PSEG plant datum equals elevation 23.96 ft. NAVD 1988 Datum, the frame of reference on which the ISFSI flood analyses are based.

The top of the ISFSI pad is located at elevation 15.0 ft. NAVD 1988 Datum (References 6.32.8 and 6.45) or 104.84 ft. PSEG plant datum. The HI-STORM 100S-218 Version B overpack is 18 feet 2-1/2 inches tall (Reference 6.32.6), placing the top of the cask at just over elevation 33 feet NAVD 1988 Datum when on the ISFSI pad. The Hope Creek site-specific design basis flood results in flood water to an elevation of about elevation 24 ft. NAVD 1988 Datum, as discussed above. Therefore, the design basis flood would submerge about half of the height of the cask. Because the depth of submergence is less than 125 ft., the MPC confinement boundary will remain intact by design.

The design basis flood would block all air flow through the overpack until such time as the flood waters recede and uncover the inlet air ducts. Section 3.4.9 of Appendix B to the CoC provides the requirements for evaluating site-specific flooding events. The cooling provided by the water at maximum flood height being in contact with the MPC outer shell would compensate for the loss of air flow.

An evaluation of an external flood was performed to determine the maximum water level at the ISFSI due to a probable maximum hurricane and the duration that the water level would be above the ISFSI grade (Reference 6.17). This information was used to estimate the amount of time the overpack inlet vents would be submerged by flood water. This evaluation, performed before the ISFSI design was finalized, considers an ISFSI elevation of 102.5 feet PSEG plant datum, which is lower than the actual ISFSI as-built elevation of about 105 feet and is, therefore, a conservative evaluation. The total duration of the event is estimated to be 24 hours.

The HI-STORM FSAR includes, as an accident condition, the total blockage of all inlet air ducts. Section 11.2.13 and Table 11.2.9 of Reference 6.2 show that the fuel cladding and all cask component temperatures remain below their respective accident allowables for up to 72 hours with full air vent blockage, which provides a bounding case for the 24-hour flood at the Hope Creek ISFSI. Therefore, the Artificial Island site-specific design basis flood event is bounded by the generic blocked duct analysis and does not jeopardize safe spent fuel storage at the ISFSI.

The forces on the storage casks at the ISFSI caused by moving floodwater from a Probable Maximum Hurricane (PMH) have been calculated. The calculated water flow velocity is 4.38 ft/sec (Reference 6.45, Section 5.0.B). This value is less than the design basis value of 15 ft/sec per Reference 6.1, Appendix B, Section 3.4.4 and is, therefore, acceptable.

5.4.1.4 Tsunami and Hurricane

Tsunami

The Artificial Island site in southern New Jersey is not located near the ocean and is not otherwise located in an area subject to significant magnitude tsunamis due to the relatively low seismicity of the northern Atlantic Ocean, the Northeast United States in general, and the southern New Jersey area in particular. Hope Creek UFSAR Table 2.4-6 states that the maximum tsunami wave height is 18.1 ft. MSL, or 107.1 ft. NAVD. Therefore, the flood effects of tsunami water height are bounded by the design basis flood water height discussed in Section 5.4.1.3 above.

Hurricane

Wave action on the cask resulting from a postulated design basis hurricane moving up the Delaware Bay has been evaluated as a site-specific hazard (References 6.45 and 6.48). The factors of safety against sliding and overturning due to wave action are 1.43 and 3.18, respectively, per Reference 6.48. Therefore, the casks will not slide or turn over due to design basis wave action at the ISFSI caused by the probable maximum hurricane.

5.4.1.5 Earthquake

The HI-STORM 100 System is required to withstand loads due to a seismic event in accordance with HI-STORM 100 System FSAR, Sections 2.2.3.7 and 11.2.8. In particular, the HI-STORM overpack is required to resist overturning and sliding on the ISFSI storage pad due to a seismic event. The inequality shown in HI-STORM FSAR Table 2.2.8 is not met for the Hope Creek ISFSI site seismic accelerations. However, the cask is shown not to slide or tip over using the alternative time-history analysis permitted by the CoC and described in Section 5.2.1.5 of this report. The ISFSI pad is designed to withstand the dynamic effects of an earthquake, including soil-structure interaction and soil liquefaction, as discussed in Sections 5.2.1.2 and 5.2.1.6 of this report. Therefore, the free-standing HI-STORM 100 System and the ISFSI pad are qualified for use at the Salem/Hope Creek ISFSI.

5.4.1.6 Lightning

HI-STORM 100 System overpacks are stored on an unsheltered ISFSI storage pad. The Hope Creek ISFSI is located adjacent to the Hope Creek Unit 1 cooling tower, which is over 500 feet high, compared to the cask height of approximately 18 feet. Therefore, the cooling tower is the most probable lightning strike target in the vicinity of the ISFSI and a strike on a cask at the ISFSI is unlikely. Nevertheless, there is a small potential for lightning to strike the HI-STORM overpacks. Sections 2.2.3.11 and 11.2.12 of the HI-STORM 100 System FSAR address the lightning strike as an accident event. The HI-STORM FSAR indicates that the HI-STORM overpack steel outer shell provides a direct path to ground, and the cask can safely conduct lighting strikes without the need for any supplemental protection against lightning strikes. Because of the mass of steel in the overpack, there is adequate protection for the MPC and the confinement boundary is unaffected.

Administrative controls are used to prohibit cask transportation on site during severe weather (Reference 6.31.3). Therefore, while the cask system is designed to withstand a lightning strike, a lightning strike on the cask transporter while carrying a loaded HI-STORM overpack between the fuel building and ISFSI is considered very unlikely.

5.4.1.7 Burial Under Debris

Section 2.2.3.12 of the HI-STORM 100 System FSAR states that "the HI-STORM System must withstand burial under debris," and "siting of the ISFSI pad shall ensure that the storage location is not located near shifting soil." Section 5.2 of this report discusses the ISFSI pad design and the subsoil, including liquefaction, and finds the Hope Creek ISFSI pad design acceptable. The referenced HI-STORM FSAR section also states that "such debris may result from floods, wind storms, or mud slides." It goes on to state that "mud slides, blowing debris from a tornado, or debris in flood water may result in duct blockage, which is addressed in Subsection 2.2.3.13

[100% Blockage of Air Inlets]." Short term cask duct blockage can be caused by a flood at the Hope Creek ISFSI and is addressed in Section 5.4.1.3 of this report.

Section 11.2.14 of the HI-STORM FSAR describes the evaluation of the burial under debris accident and states that "burial of the HI-STORM System under debris is not a credible event" and provides justification for this statement. However, complete thermal isolation of the cask is analyzed in the FSAR assuming the material covering the cask acts as a perfect insulator and the contents of the cask undergo a transient heat up under adiabatic conditions.

The Hope Creek ISFSI is sited on a man-made island, surrounded by the Delaware River, that does not have any nearby mountains, significant size hills, mounds of soil, or other accumulated debris that could cause a burial-under-debris event. There are no active volcanoes in this region of the world. Therefore, burial of the casks under debris at the Hope Creek ISFSI due to these events is not credible.

No analysis has been performed to determine the potential for debris build-up around the casks as a result of a flood or tornado. However, any debris that would build up due to a flood or tornado at the ISFSI would likely not completely cover the casks in a thermally insulating manner, based on engineering judgment. In the case of the flood, this is supported by the fact that the maximum flood water only reaches about the half height of the cask, per Section 5.4.1.3. For a tornado, the debris field would be comprised of various types, sizes, and shapes of items such as loose lumber, trees, and other small, solid objects. Based on these arguments, debris from a flood or tornado would not create the complete coverage and thermal insulation of the casks as described in the HI-STORM accident analysis. Therefore, the burial under debris accident analyzed in the HI-STORM FSAR is bounding for the casks at the Hope Creek ISFSI.

5.4.1.8 Environmental Temperatures

5.4.1.8.1 Minimum Air Temperature During Handling Operations

Section 2.2.1.2 of the HI-STORM 100 System FSAR specifies that handling operations of the loaded HI-TRAC transfer cask or HI-STORM overpack is limited to working area ambient temperatures greater than or equal to 0°F. This limitation is specified to ensure that a sufficient safety margin exists before brittle fracture might occur during handling operations with the HI-TRAC transfer cask. At Hope Creek, a site-specific component (the HERMIT[3]), used to prevent cask tipover inside and for a short distance just outside the Reactor Building during a seismic event (see Reference 6.34 for details), also has a minimum operating temperature requirement of 0°F. Applicable cask loading and handling procedures (References 6.31.3, 6.31.5, 6.31.7, 6.31.8, and 6.31.9) ensure that the working area temperatures are within the required ranges for the components involved in the particular cask handling operations.

5.4.1.8.2 Normal Air Temperature

The HI-STORM 100 System was designed and analyzed assuming a specific ambient temperature in order to establish a normal condition thermal design basis for the storage system that ensures long-term fuel integrity. The design basis normal ambient temperature (annual average) for the HI-STORM 100 System is 80°F per HI-STORM 100 System FSAR Section 2.2.1.4, Table 2.2.2,

[3] "HERMIT" is an acronym for Holtec EaRthquake MITigator.

and Section 3.4.1 of Appendix B to the HI-STORM CoC. Short-term daily exceedance of this value (e.g., during summer months) is acceptable because the thermal inertia of the cask system is so large that it precludes any significant effect on the fuel caused by these daily temperature swings. The annual mean ambient temperature at the Hope Creek site is 11.7°C (53.1°F) per Hope Creek UFSAR Table 2.3-9. Therefore, the design basis normal ambient temperature for the HI-STORM 100 System bounds the site value.

The normal ambient (annual average) temperature for operations involving the HI-TRAC transfer cask is not permitted to exceed 80°F per Table 2.2.2 of the HI-STORM 100 System FSAR. This value bounds the annual site mean temperature of 53.1°F and is therefore, acceptable. Administrative controls ensure that the working area ambient temperature inside the HCGS Fuel Building remain less than 100°F during transfer cask operations. Ambient temperatures during all phases of cask loading operations, both indoors and outdoors, are checked in accordance with procedures (References 6.31.3, 6.31.5, 6.31.7, 6.31.8, and 6.31.9).

5.4.1.8.3 Soil Temperature

Section 2.2.1.4 and Table 2.2.2 of the HI-STORM 100 System FSAR limit the annual average normal soil temperature to 77°F. In the thermal analysis, this is the temperature assumed for the soil underneath the ISFSI pad (Reference 6.2, Section 2.2.1.4). This temperature was chosen by Holtec as a conservative maximum value based on the average annual soil temperature for Key West, Florida. It is conservative because lower soil temperature would result in higher heat transfer from the cask through the ISFSI pad. The location of the Artificial Island site is over 1,000 miles north of Key West, Florida. Therefore, by simple geographic comparison, the average annual soil temperature below the ISFSI pad at Artificial Island, NJ is lower than that of Key West. However, a second check was also performed to try to quantify this value, as described below.

No site-specific soil temperature is available for the Artificial Island site. Because the Hope Creek ISFSI pad is approximately 36 inches thick, the ground water temperature for the appropriate region of the United States was used for comparison with the limit. Approximate groundwater temperature in the Artificial Island area is in the mid- 50 degrees Fahrenheit (Reference 6.27, pp. 31.18 – 31.20), which is well below 77°F and is, therefore, acceptable for meeting this soil temperature limit.

5.4.1.8.4 Off-Normal Environmental Temperature

The HI-STORM 100 System is designed to withstand the effects of off-normal environmental temperatures as described in HI-STORM FSAR Section 11.1.2. Table 2.2.2 of the HI-STORM 100 System FSAR specifies upper and lower bound off-normal temperature limits for the HI-STORM overpack and the HI-TRAC transfer cask. The upper bound off-normal temperature limit for the HI-STORM overpack, and for the HI-TRAC transfer cask, is defined as a 3-day average maximum ambient temperature of 100°F. The lower bound off-normal ambient temperature is -40°F for the overpack and 0°F for the transfer cask.

The maximum measured hourly temperature at the Hope Creek site is 34.5°C (94.1°F) per Hope Creek UFSAR Table 2.3-9. Therefore, the design basis maximum off-normal ambient temperature for the HI-STORM 100 System bounds the site value. The minimum measured hourly temperature at the Hope Creek site is -18.5°C (-1.3°F) per Hope Creek FSAR Table 2.3-9.

Therefore, the design basis minimum off-normal ambient temperature for the HI-STORM overpack bounds the site value.

At Hope Creek, a site-specific component (the HERMIT) also has a minimum operating temperature requirement of 0°F. Applicable cask loading and handling procedures (References 6.31.3, 6.31.5, 6.31.7, 6.31.8, and 6.31.9) ensure that the working area temperatures are within the required ranges for the components involved in the particular cask handling operations.

5.4.1.8.5 Extreme Environmental Temperature

The HI-STORM 100 System is designed to withstand extreme environmental temperatures as an accident condition as described in HI-STORM FSAR Section 11.2.15. The accident level environmental temperature (3-day average) for the HI-STORM overpack is 125°F per Section 2.2.3.14 and Table 2.2.2 of the HI-STORM 100 System FSAR. The maximum measured hourly temperature at the Hope Creek site is 34.5°C (94.1°F) per Hope Creek UFSAR Table 2.3-9. Therefore, the design basis maximum extreme ambient temperature for the HI-STORM 100 System bounds the site value.

5.4.1.9 Snow and Ice

The HI-STORM 100 System is designed to withstand pressure loads due to snow and ice. Section 2.2.1.6 and Table 2.2.8 of the HI-STORM 100 System FSAR state that the HI-STORM 100 System is designed for snow pressure loading of 100 pounds per square foot (psf). From Section 2.3.1.2.2 of the Hope Creek UFSAR, the extreme snow load on the ground at Hope Creek site is 123 psf. Therefore, a site-specific analysis of the 123 psf snow loading on the cask was performed (Reference 6.50). The results of this analysis show that this snow load on the overpack body and lid is bounded by the loads imposed by the transfer cask stack-up during MPC transfer operations and the design-basis vertical end drop, respectively, and is therefore, acceptable. Hope Creek UFSAR Tables 2.3-2 and 2.3-3 indicate that the maximum measured snowfall in the area is on the order of two feet. A snow event of this magnitude in southern New Jersey is not common. Even several major snow storms in series would result in less than the equivalent snow loading used in the generic analysis. Lastly, due to the heat generated by the fuel, the overpack lid top plate remains warm (190°F for design basis heat load per Table 4.4.7 of Reference 6.2) and will prevent the accumulation of any significant amount of snow or ice on top of the cask.

A significant snowfall event could result in an accumulation of snow in front of the air inlet ducts at the bottom of the overpack. Procedural guidance is in place (Reference 6.31.24, Condition M) to monitor snow accumulation and remove snow to prevent any extended duration blockage of the air inlet vents.

An evaluation of the effect of ISFSI pad icing per NRC Information Notice 2003-16 (Reference 6.4) has been performed and is summarized in Section 5.2.1.5 of this report.

5.4.1.10 Cask Transport Route (Heavy Haul Path)

The heavy haul path is shown in Figure 8.7 of Reference 6.31.3. The loaded HI-STORM overpack, resting atop the HERMIT device and low profile transporter (LPT), exits the HCGS Reactor Building through the receiving bay door to the south. The LPT includes a number of Hilman rollers to facilitate movement along two parallel rails running from inside the receiving

bay to the egress pad just outside the Reactor Building receiving bay door. The LPT is pulled to the egress pad by a prime mover (similar to an airplane "tugger" vehicle).

The overpack is moved to the egress pad and the overpack lid is installed. The cask is attached to the vertical cask transporter (VCT) at a point approximately 50 feet south of the Reactor Building receiving bay door. The VCT is a tracked vehicle that lifts the overpack off the ground only as high as necessary to clear any undulations in the haul path between the Reactor Building and the ISFSI pad. The VCT turns 90 degrees west and travels for approximately 100 feet and turns 90 degrees north. At this point, it travels straight to the ISFSI and to the pre-determined pad location for each cask. The normal speed for the transporter is 0.4 MPH (Reference 6.32.7).

The heavy haul path is primarily an asphalt roadway with concrete turning pads at certain locations, including an "egress pad" south of the Reactor Building receiving bay door. Between the Reactor Building and the egress pad, the path is designed to support the loaded overpack on either the LPT (with the HERMIT) or suspended from the cask transporter. From the egress pad to the ISFSI, the roadway is designed to support the weight of a loaded overpack suspended from the VCT. The maximum road pressure from the tracked VCT is 50 lb/in^2 (Reference 6.28). The heavy haul path has been appropriately designed for this pressure load and the expected number of VCT and semi-truck trips over the life of the ISFSI (Reference 6.35).

5.4.1.10.1 Cask Movement to the Egress Pad

During its movement from the Reactor Building to the egress pad, the overpack is supported by the LPT and HERMIT, and is pulled by the prime mover along rails embedded in the floor of the Reactor Building receiving bay and the roadway just outside. During this movement, the overpack lid is not installed. An analysis has been performed (Reference 6.47) to verify that the overpack will not tip over as a result of the following events:

- Sudden LPT/HERMIT deceleration from its design velocity of 10 ft./min.
- Sudden LPT/HERMIT deceleration and cask tipping caused by the failure of four of the six Hilman rollers attached to the bottom of the LPT

In both cases, the analysis demonstrates that the overpack will not tip over, preventing discharge of the fuel-loaded MPC. The minimum pressure pulse required to cause tipover of the cask on the LPT/HERMIT was also calculated to be 104,250 lb-sec. This value bounds all explosive overpressure events at the egress pad and is therefore acceptable.

5.4.1.11 Collapse of Site Structures

Potential interactions between site structures near the ISFSI and along the heavy haul path and the DCS storage casks have been evaluated (Reference 6.44). There are two tornado or earthquake-induced collapse hazards evaluated for the ISFSI pad: 1) collapse of a utility pole or high mast light pole and 2) collapse of the Hope Creek cooling tower. There are no collapse hazards identified or evaluated along the heavy haul path.

5.4.1.11.1 High-Voltage Transmission Line Towers

The onsite heavy haul path and the ISFSI are located on the opposite side of the power plant from the switchyard and associated transmission towers and high voltage power lines. Therefore, there is no threat of a transmission tower collapse or transmission line drop onto a loaded overpack.

5.4.1.11.2 Effect of a Postulated Collapse of Structures Near the ISFSI Pad

The consequences of the collapse of a utility pole or high mast light pole onto a HI-STORM cask is enveloped by the cask's design basis tornado missile evaluation and is, therefore, acceptable. The consequences of a postulated collapse of the Hope Creek Unit 1 cooling tower were evaluated in Reference 6.44. The closest estimated distance between the storage casks at the ISFSI and the collapsed part of the cooling tower is 242 feet. Hence, there is no impact of debris from a collapsed cooling tower on a storage cask at the ISFSI. The ground acceleration shock produced by the collapse of the cooling tower is approximately 0.08 g (horizontal) and 0.02 g (vertical). These acceleration values are much smaller than the design basis values for the cask system (0.25 g horizontal and 0.17 g vertical) and are, therefore, acceptable.

5.4.1.12 Deviations from the Dry Storage System FSAR

Revisions 3 and 5 of the HI-STORM FSAR were the licensing basis for the first two loading campaigns at the Salem/Hope Creek ISFSI. Certain changes to Revision 3 of the HI-STORM FSAR were implemented by Holtec International on a generic basis after FSAR Revision 3 was issued. These changes were evaluated in accordance with the Holtec 10 CFR 72.48 program and are listed in prior revisions to this report, which governed previous cask loading campaigns. No CoC amendments as a result of these deviations were identified. Those changes were incorporated into subsequent revisions to the HI-STORM FSAR. No changes to FSAR Revision 5 were made by Holtec that affected the second loading campaign.

The specific details of the changes and the technical (e.g., Holtec Engineering Change Order (ECO)) and regulatory (72.48 screening or evaluation) documentation approving the changes are controlled as separate documents by Holtec. Appendix 2 to this report provides a table that lists the specific serial numbers for the cask components affected by ECO changes affecting the FSAR revision to which the hardware is certified. FSAR Revision 7 is being used for the 2010 and future loading campaigns. The changes to FSAR Revision 7 approved by Holtec under their 10 CFR 72.48 program (or as a result of a CoC amendment) are listed in Table 5.4.1.12-1 and the impacts of the changes on PSEG, if any, are described.

Table 5.4.1.12-1

Holtec-Implemented Changes to HI-STORM FSAR Revision 7*

Source Document	Description and Impact of Changen
ECO 5014-124, Rev. 1	This ECO originally removed the fabrication shop helium leakage test of the MPC from the FSAR. Revision 1 to the ECO added an exemption to testing for MPCs with a heat load less than 20 kW. However, as a result of NRC enforcement action on removal of the test (Reference 6.39), the test was restored under ECO 5014-174. The four MPCs delivered to Hope Creek for the 2010 loading campaign were not leak tested in the shop. These MPCs will be leak tested on site prior to use.

Table 5.4.1.12-1

Holtec-Implemented Changes to HI-STORM FSAR Revision 7*

Source Document	Description and Impact of Changen
ECO 5014-162	This ECO makes editorial changes to add a definition of "MPC Transfer" to conform with CoC Amendment 5 and to add MPC transfer as a potential function of the VCT. MPC transfer at Hope Creek is performed with the Reactor Building crane. There is no impact on PSEG site implementation documents or the evaluations summarized in this report.
ECO 5014-164	This ECO makes an editorial change to MPC Enclosure Vessel Licensing Drawing 3923 to add missing ECO numbers to the drawing revision log. There is no impact on PSEG site implementation documents or the evaluations summarized in this report.
ECO 5014-166, Rev. 1	This ECO modifies the HI-STORM FSAR to permit the use of as-rolled SA 516 Grade 70 carbon steel in fabricating the overpacks in addition to normalized steel of the same grade. This change affects material procurement and fabrication under the control of the CoC holder and does not affect PSEG site implementation documents or the evaluations summarized in this report.
ECO 5014-167	This ECO makes two sets of corrections to Chapter 4 of the HI-STORM FSAR, "Thermal Evaluation." The first set makes the text consistent with changes made in CoC Amendments 3 and 5. FSAR Chapter 4 was completely revised and sections re-numbered in Revision 7 of the FSAR as a result of the increased heat load permitted in CoC Amendment 5. The corrections in this ECO include clarifications of the description of the thermal evaluation of the various HI-TRAC transfer cask models, which has no impact on PSEG site implementation documents or the evaluations summarized in this report. The second set of changes in this ECO involves MPC unloading and affects a PSEG implementation procedure. FSAR Revision 7, Section 4.5.4 is completely replaced with the text from FSAR Revision 6, Section 4.5.1.1.6 (Section 4.5.1.1.6 was previously deleted in FSAR Revision 7). New Section 4.5.4 of FSAR Revision 7 pertains to direct re-flooding of the MPC for unloading operations as permitted by CoC Technical Specification LCO 3.1.3, which was revised in CoC Amendment 3 and retained in CoC Amendment 5. The FSAR now identifies an example of a limiting re-flooding rate of 3715 lb/hr to prevent overpressurization of the MPC during direct re-flooding, without pre-cooling, at design basis heat load. PSEG may use this limiting re-flooding rate or calculate a site-specific re-flooding rate based on a lower MPC heat load for the MPC being unloaded. This limiting re-flooding rate will be included in the MPC unloading procedure. The information removed from FSAR Section 4.5.4 by this ECO includes discussion of the methods for pre-cooling the MPC cavity gas prior to re-flooding. CoC Amendment 5 does not require pre-cooling of MPCs to be unloaded prior to re-flooding. FSAR Revisions 3 and 5 apply to previously loaded casks and they retain this pre-cooling requirement.
ECO 5014-168	This ECO makes changes to the HI-STORM 100U storage system design, which was under NRC review at the time the ECO was issued. PSEG does not use the HI-STORM 100U design. Thus, there is no impact on PSEG site implementation documents or the evaluations summarized in this report.
ECO 5014-169	This ECO changes the word "crawler" to Vertical Cask Transporter in several locations in the FSAR. This is an editorial change and has no impact on PSEG site implementation or the evaluations summarized in this report.

Table 5.4.1.12-1

Holtec-Implemented Changes to HI-STORM FSAR Revision 7*

Source Document	Description and Impact of Changen
ECO 5014-170, Rev. 1	This ECO allows the use of pre-cast lead sections or sheets in lieu of poured molten lead for shielding in the HI-TRAC 125D transfer cask. PSEG uses the HI-TRAC 100D model and the PSEG HI-TRAC was fabricated with poured lead before this ECO was issued. There is no impact on PSEG site implementation documents or the evaluations summarized in this report.
ECO 5014-171	This ECO adds the details of how to perform the thermal air flow test required by CoC Condition 9 to FSAR Chapter 8. The heat loads of the four casks to be loaded at Hope Creek in 2010 do not exceed the 20 kW threshold where this testing would be required. Therefore, these changes have no impact on PSEG site implementation or the evaluations summarized in this report.
ECO 5014-172	This ECO deletes a fuel rod buckling analysis from FSAR Section 3.5, and replaces it with an alternate method of predicting fuel cladding behavior under g-loads that is described in NUREG 1864. This is an internal licensing matter between Holtec and the NRC that does not affect use of the cask in the field. There is no impact on PSEG site implementation documents or the evaluations summarized in this report.
ECO 5014-173	This ECO replaces a suggestion to use MPC water flushing with a requirement to do so, in the event the time-to-boil is approached during MPC preparation operations. Reference 6.31.6 ensures that MPC flushing will be performed if the time-to-boil is approached or exceeded by using the word "shall" for this operation.
ECO 5014-174	This ECO restores shop helium leakage testing of all MPCs to the FSAR and deletes the exemption canisters with heat loads $\leq$ 20 kW. This is related to the resumption of leakage testing described in the discussion of ECO 5014-124 R.1, above. All four Hope Creek MPCs delivered without having been shop-tested will be tested at the site prior to use. This is being tracked in the PSEG corrective action program.
ECO 5014-175	This ECO revises FSAR Section 3.1.2.1.1.4 so that the description of the consideration of explosions and their pressure waves is consistent with the Technical Specifications in Appendix A the CoC. The hazards analysis performed for the PSEG ISFSI is consistent with the CoC for explosion/overpressure consideration. Therefore, there is no impact on PSEG site implementation documents or the evaluations summarized in this report.
ECO 5014-176	This ECO changes descriptions of the impact limiter for the HI-STAR transportation cask. Therefore it has no implications for the HI-STORM storage system. There is no impact on PSEG site implementation documents or the evaluations summarized in this report.
ECO 5014-179	This ECO revises the FSAR to add constraints to use of the Supplemental Cooling System that were made necessary by the increase in allowed maximum canister heat load approved in CoC Amendment 5. While Hope Creek is committed to CoC Amendment 5, the maximum heat load for all canisters in the 2010 dry storage campaigns does not rise to the point that requires use of the Supplemental Cooling System in accordance with TS LCO 3.1.4. Therefore this ECO has no immediate impact on PSEG site implementation documents or the evaluations summarized in this report. Use of the SCS in the future will require a revision to procedures, training, and this report.

Table 5.4.1.12-1

Holtec-Implemented Changes to HI-STORM FSAR Revision 7*

Source Document	Description and Impact of Changen
ECO 5014-180	This ECO clarifies information in FSAR Section 3.5 regarding fuel cladding under g-loads that was introduced by ECO 5014-172. This is an internal licensing matter between Holtec and the NRC that does not affect use of the cask in the field. There is no impact on PSEG site implementation documents or the evaluations summarized in this report.

* Does not include one-time fabrication deviations addressed via the Holtec Supplier Manufacturer Deviation Report process. These are documented in the Holtec Component Completion Record for the affected cask component(s) or other document, such as a Field Deviation Report (FDR) for the ISFSI.

PSEG needed to implement two deviations from Revision 3 to the HI-STORM FSAR for the 2006-07 loading campaign that also carry over to all subsequent campaigns. They involved moving the loaded overpack outside of the Reactor Building without the lid installed and a repair of a ponding problem on one of the ISFSI pads. The location of overpack lid installation is not specifically addressed in the HI-STORM FSAR. Therefore, this evolution was addressed as a deviation under the PSEG 10 CFR 72.48 program and found to be acceptable. The repair of the ponding problem is discussed in more detail in Appendix 1, Table 3, Section 3.4.6. Both of these deviations also apply to FSAR Revision 5. One additional deviation from FSAR Revision 5 was required that permits a periodic inspection of the HI-TRAC lifting trunnions in lieu of a load test. This deviation is consistent with ANSI N14.6, which governs the trunnion design.

Table 5.4.1.12-2

PSEG-Implemented Deviations From the HI-STORM FSAR

Description of Deviation	FSAR Revision	Source Document
Installation of HI-STORM overpack lid outdoors	3, 5, 7	DCP 80088459
Ponding Repair for ISFSI Pad No. 1	3, 5, 7	SMDR 1410, R2
Inspection of HI-TRAC lifting trunnions in lieu of load testing	5, 7	Procedure NC.MD-PM.DCS-0013

5.4.1.13 CoC Holder Approval of Cask Operating Procedures

Holtec International has reviewed and approved the site cask operating procedures as required by HI-STORM FSAR Section 8.0, as documented in Reference 6.52.

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. elevation. Thus, a unique thermal analysis, based on elevation, is not required for the Salem/Hope Creek ISFSI.

5.4.2 Conclusion

PSEG Nuclear complies with 10 CFR 72.212(b)(3)

5.5 10 CFR 72.212(b)(4) — Review of Part 50 Facility Impact (10 CFR 50.59)

10 CFR 72.212(b)(4) states the following:

"Prior to use of the general license, determine whether activities related to storage of spent fuel under this general license involve a change in the facility Technical Specifications or require a license amendment for the facility pursuant to §50.59(c)(2) of this chapter. Results of this determination must be documented in the evaluation made in paragraph (b)(2) of this section."

5.5.1 Evaluation

Several plant modifications required for ISFSI implementation have been performed pursuant to 10 CFR 50.59 using the PSEG Design Change Package (DCP) process. In addition, an over-arching DCP documenting the acceptance of certain Holtec-generated qualification analyses and otherwise authorizing the conduct of dry cask loading activities in the Hope Creek Reactor Building has been developed. DCP 80088459, "Dry Cask Storage Operations" (Reference 6.34) summarizes cask loading activities and their impact on plant operations, including analyses required to ensure the building structures remain qualified for the expected loads. It also identifies the other DCPs for physical modifications required for ISFSI implementation such as ISFSI pad installation, heavy haul path upgrades, and security modifications. DCP 80088459 also addresses changes made to the Hope Creek UFSAR as a result of ISFSI operations and evaluates these changes under 10 CFR 50.59 (50.59 No. HC 06-006).

A review of the Hope Creek operating license (OL) was performed that indicated an administrative change to OL condition 2.C.(6) was required for ISFSI operations to proceed. That review revealed that Subpart 'a' of OL Condition 2.C.(6) prohibited more than three fuel assemblies to be out of an approved shipping container, the spent fuel racks, or the reactor at any one time. Because the dry storage system being used contains up to 68 fuel assemblies, this OL Condition could not be met during cask loading operations. License Change Request (LCR) H-06-01 (Reference 6.40) was submitted to the NRC on February 23, 2006 to request approval of a change to Subpart 'a' of the license condition to include NRC-approved dry spent fuel storage systems in the list of permissible locations for more than three fuel assemblies. In response to this LCR, Hope Creek operating license amendment 169 was granted by the NRC on August 28, 2006, lifting the three-assembly restriction.

5.5.2 Conclusion

Activities related to storage of spent fuel under the 10 CFR 72 general license were evaluated pursuant to 10 CFR 50.59 under a variety of design change packages and none of these activities resulted in the need to request NRC approval. However, a review of the Hope Creek operating license determined that an administrative change to the operating license was required to permit ISFSI operations to proceed. That amendment has been requested and approved (Hope Creek operating license amendment 169). No other activities or modifications related to ISFSI implementation required prior NRC approval as documented in the associated 10 CFR 50.59 evaluations. Therefore, PSEG Nuclear complies with the requirements of 10 CFR 72.212(b)(4).

5.6 10 CFR 72.212(b)(5) — Physical Security

10 CFR 72.212(b)(5) states the following:

"Protect the spent fuel against the design basis threat of radiological sabotage in accordance with the same provisions and requirements as are set forth in the licensee's physical security plan pursuant to §73.55 of this chapter with the following additional conditions and exceptions.

(i) The physical security organization and program for the facility must be modified as necessary to assure that activities conducted under this general license do not decrease the effectiveness of the protection of vital equipment in accordance with § 73.55 of this chapter.

(ii) Storage of spent fuel must be within a protected area, in accordance with § 73.55(c) of this chapter, but need not be within a separate vital area. Existing protected areas may be expanded or new protected areas added for the purpose of storage of spent fuel in accordance with this general license.

(iii) For purposes of this general license, searches required by § 73.55(d)(1) of this chapter before admission to a new protected area may be performed by physical pat-down searches of persons in lieu of firearms and explosives detection equipment.

(iv) The observational capability required by § 73.55(h)(6) of this chapter as applied to a new protected area may be provided by a guard or watchman on patrol in lieu of closed circuit television.

(v) For the purpose of this general license, the licensee is exempt from §§ 73.55(h)(4)(iii)(A) and 73.55(h)(5) of this chapter."

5.6.1 Evaluation

The Hope Creek physical security plan and procedures were reviewed and modified, as necessary, to reflect spent fuel cask loading and transport operations on site, as well as storage operations at the ISFSI. The ISFSI is located inside the site protected area. Procedural and design modifications have also been undertaken to implement ISFSI-related security interim compensatory measures. Those measures were described to the NRC and NRC provided their approval via letter in 2005 (Reference 6.41). The details of the physical security plan and procedures are necessarily security safeguards information and cannot be discussed in this report.

The site security fence and intrusion detection system have also been modified to encompass the ISFSI inside the protected area.

5.6.2 Conclusion

Based on the changes to the Salem/Hope Creek physical security plan and procedures, as well as modifications to the protected area fence, PSEG complies with 10 CFR 72.212(b)(5) for protection of the spent fuel against the design basis threat of radiological sabotage in accordance with the same provisions and requirements as are set forth in the Salem/Hope Creek physical security plan pursuant to §73.55.

5.7 10 CFR 72.212(b)(6) — Programs

10 CFR 72.212(b)(6) states the following:

"Review the reactor emergency plan, quality assurance program, training program, and radiation protection program to determine if their effectiveness is decreased and, if so, prepare the necessary changes and seek and obtain the necessary approvals."

5.7.1 Evaluations

Each of the above-mentioned programs and the HCGS Fire Protection Plan (HC Operating License Condition 2.C.(7)) has been evaluated for impact by the implementation of ISFSI operations. The evaluation of each program plan is summarized below with appropriate cross-references to the plan documents and implementing procedures.

5.7.1.1 Emergency Plan

The Hope Creek Event Classification Guide (ECG) and Emergency Action Levels (EAL) were reviewed for impact as a result of implementing dry cask storage at Hope Creek. The ECG was revised appropriately to address ISFSI operations, through the creation of new EAL 6.4.1.c and associated bases.

Any significant increase in the dose rate from a cask would indicate a loss of shielding effectiveness rather than change to the source term inside the cask. This is because the amount of radioactive material in the cask is fixed at the time of loading and cannot increase (although it could re-locate due to gravity effects after a cask drop or other dynamic event). In fact, due to radioactive decay, the source term in the cask will decrease over time and dose rates would be expected to decrease, given the same amount of shielding with the source in approximately the same location inside the MPC.

The Reportability Action Levels (RALs) in the ECG were also reviewed and revised to take into consideration new reportability requirements in the HI-STORM CoC and the Part 72 regulations. Based on the changes to the PSEG ECG and the new ISFSI RALs and EAL, the requirements of 10 CFR 72.212(b)(6) pertaining to the reactor emergency plan are met.

5.7.1.2 Quality Assurance Program

Cask design, fabrication, assembly, and related activities are performed under Holtec's NRC-approved quality assurance program as described in Chapter 13 of the HI-STORM FSAR.

As allowed by 10 CFR 72.140(d), the existing PSEG Nuclear NRC-approved 10 CFR 50, Appendix B Quality Assurance Program for Salem and Hope Creek is being applied to ISFSI activities (Reference 6.10). The description of PSEG's Quality Assurance program in the PSEG Quality Assurance Topical Report (Reference 6.33.2) has been revised to include activities related to ISFSI operations as described in Appendices A and E. It was determined that these changes did not reduce the effectiveness of the QA program and could be implemented without prior NRC approval.

The graded approach to quality for ISFSI and dry cask storage structures, systems, and components and activities is implemented consistent with the guidance in NUREG/CR-6407 (Reference 6.23) and the HI-STORM FSAR for classifying structures, systems and components associated with cask loading, on-site transport, and ISFSI operations. Procedural controls are in place to appropriately classify ISFSI-related structures, systems, and components (SSCs) according to the NUREG/CR-6407 guidance (Reference 6.54.2). These classifications are then used to govern the applicable quality requirements for activities involving these SSCs.

Based on the Holtec QA Program and the PSEG Nuclear Appendix B QA Program, and Reference 6.54.2, the requirements of 10 CFR 72.212(b)(6) pertaining to quality assurance are met.

5.7.1.3 Training Program

The Hope Creek Training program is summarized in Reference 6.33.4. Important-to-Safety operations for the cask system are conducted by trained and qualified personnel under the direction of trained supervisors. Training is performed under the existing station training program utilizing the Systematic Approach to Training, as described in Reference 6.33.4. Specific Fuel Handler training courses have been developed to cover the cask system. Welding system operations (MPC lid installation, NDE, and weld removal) and helium leak testing for the cask system are performed by qualified outside specialty vendor(s) under procedures approved by PSEG.

Support activities for the cask systems are performed by Design Engineering, System Engineering, Reactor Engineering, Maintenance, Radiation Protection and Security personnel. The scope of training applicable to these personnel is covered under lesson plans created by PSEG training personnel with support from dry cask storage subject matter experts.

There are no unique physical or health requirements applicable to Hope Creek ISFSI operations compared to other activities at the plant. Supervision by a first line supervisor is adequate to ensure activities are performed within the capability of the crew.

Prior to first use, PSEG performed dry run training exercises that meet the requirements of Condition 10 of the HI-STORM 100 CoC, with certain exceptions. The bases for those exceptions are discussed in Table 1 of Appendix 1 to this report.

Based on the modifications made to the PSEG training program and associated implementation of classroom training and dry run exercises, the requirements of 10 CFR 72.212(b)(6) pertaining to training are met.

5.7.1.4 Radiation Protection Program

Radiation protection personnel have been trained and procedures revised to support dry cask storage loading operations in the plant and ISFSI operation. The radiation protection program (Reference 6.33.1) and relevant implementing procedures have been revised or news ones created to support cask loading, on-site transportation, and storage operations in an ALARA manner.

Based on the modifications made to the PSEG radiation protection program and associated implementation of new and revised procedures that support cask loading, transport, and storage operations, the requirements of 10 CFR 72.212(b)(6) pertaining to radiation protection are met.

5.7.1.5 Fire Protection Plan

The fire hazards analysis for the Hope Creek Generating Station has been revised to address cask loading activities inside the Reactor Building, at the ISFSI, and during on-site cask transportation activities between the Reactor Building and the ISFSI. Based on the findings of the fire hazards analysis, appropriate changes have been made to the fire protection implementing procedures to assure adequate protection of the plant and dry storage casks during all phases of cask loading, transport, and storage operations (Reference 6.33.1). This includes control of transient combustible material both at the ISFSI and along the heavy haul path, as well as during fuel transfer operations in the Reactor Building. In addition, fire suppression equipment and personnel trained in its use accompany the cask while in transit from the Reactor Building to the ISFSI. The specific fire and explosion hazards associated with dry cask storage at Hope Creek are discussed in more detail in Section 5.4.1.1 of this report. The fire protection programmatic standard (Reference 6.33.5) was reviewed and no changes were required.

Based on the modifications made to the PSEG fire protection program and associated implementation procedures that support cask loading, transport, and storage operations, the requirements of 10 CFR 72.212(b)(6) pertaining to fire protection are met.

5.7.2 Conclusion

All relevant program plans have been reviewed and evaluated for ISFSI impact and modified as necessary to include changes to reflect ISFSI operations. The details of those changes are maintained in the program plan documents and associated change packages (i.e., evaluations pursuant to 10 CFR 50.54)

6.0 REFERENCES

The reference documents listed below provide the bases for the factual statements in the body of this report.

6.1 HI-STORM 100 Cask System 10 CFR 72 Certificate of Compliance No. 1014, Amendments 2, 3, and 5, PSEG VTD No. 400004, Sheets 001, 002, and 003, respectively.

6.2 HI-STORM 100 Cask System Final Safety Analysis Report, Holtec Report No. HI-2002444, Revisions 3, 5, and 7, Docket No. 72-1014, PSEG VTD No. 400006, Sheets 001, 002, and 003, respectively.

6.3 NRC Regulatory Guide 1.76, "Design Basis Tornado for Nuclear Power Plants," April 1974.

6.4 NRC Information Notice 2003-16, "Icing Conditions Between Bottom of Dry Storage System and Storage Pad," October 2003.

6.5 NRC Safety Evaluation Report for the HI-STORM 100 Cask System (through Amendment No. 5 to CoC No. 1014), PSEG VTD No. 400004, Sheet 003.

6.6 NUREG-1567, "Standard Review Plan for Spent Fuel Dry Storage Facilities," March 2000.

6.7 NUREG-1536, "Standard Review Plan for Dry Cask Storage Systems," January 1997.

6.8 Holtec International Letter to PSEG, "Hope Creek VCT Compliance with the HI-STORM CoC," Holtec Document ID 1332046, dated June 19, 2006, PSEG VTD No. 400002, Sht. 001.

6.9 PSEG Nuclear Contract with Holtec International SCM-09-NUC-391, Attachment 5, Exhibit 3, Item 10.

6.10 PSEG Nuclear Letter to NRC, "Notification of Intent to Apply the 10 CFR 50 Appendix B Quality Assurance Program to Independent Spent Fuel Storage Installation Activities," dated May 12, 2003, Dockets 50-272, 50-311, and 50-354.

6.11 PSEG Engineering Evaluation A-5-DCS-FEE-1766, "Hope Creek Generation Station Independent Spent Fuel Storage Installation Fire Hazard Analysis," PSEG Rev. 0.

6.12 Holtec Report No. HI-2043195, "HI-STORM 100 System Overpack Air Temperature Rise at 17.1 kW, Rev.0;" Holtec letter No. 9042868 to Energy Northwest, "HI-STORM Thermal Validation Test Results," dated July 12, 2004; and Energy Northwest Letter No. G02-04-134 to the NRC, "Columbia Generating Station Validation of HI-STORM 100 System Heat Transfer Characteristics," dated July 28, 2004, Docket 72-35.

6.13 PSEG Calculation No. A-5-DCS-MDC-1958, "Source Term Analysis for the Salem & Hope Creek ISFSI," Rev. 0.

6.14 PSEG Calculation No. A-5-DCS-MDC-1957, "Direct Dose Rates in the Vicinity of the Salem & Hope Creek ISFSI," Rev. 0.

6.15 PSEG Calculation No. A-5-DCS-CDC-1986, "ISFSI Fire Radiant Heat and Explosion Overpressure Analysis," Rev. 0.

6.16 Docket No. 50-354, PSEG Nuclear LLC Hope Creek Generating Station Facility Operating License No. NPF-57, through Amendment 169.

6.17 Sargent & Lundy Letter to PSEG Nuclear, "ISFSI Design and Support, External Flood Events," dated May 30, 2003, PSEG VTD No. 400066.

6.18 PSEG Calculation No. A-5-DCS-CDC-1960, "ISFSI Pad Design," Rev. 0.

6.19 PSEG Calculation No. A-5-DCS-CDC-1978, "Soil Parameters for the ISFSI Pad Area," Rev. 1.

6.20 PSEG Calculation No. A-5-DCS-CDC-1964, "Soil Structure Interaction and Time History Calculation," Rev. 0.

6.21 NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 3.5.1.4, "Missiles Generated By Natural Phenomena," Rev. 2, July 1981.

6.22 NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," July 1980.

6.23 NUREG/CR-6407, "Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety," February 1996.

6.24 NRC Safety Evaluation Report for Diablo Canyon ISFSI license, SNM-2511, Section 15.1.2, dated March 22, 2004.

6.25 ANSI N14.6-1993, "Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 pounds (4500 kg) or more for Nuclear Materials."

6.26 URS Report, "Geotechnical Investigation for Salem/Hope Creek ISFSI," Report Submitted by Steven D. Coppola of URS Corporation to Ms. Shelly Kugler of PSEG, August 13, 2003, PSEG VTD No. 325972.

6.27 ASHRAE Applications Handbook, 1999 Edition, Chapter 31.

6.28 PSEG Calculation No. A-5-DCS-CDC-1963, "Underground/Above Ground Utilities Evaluation," Rev. 0.

6.29 Holtec International Project Procedure HPP-5014-22, "Cask Storage Pad/HI-STORM Interface Friction Coefficient Determination," Rev. 1, PSEG VTD No. 400062.

6.30 Holtec International Letter No. 1332044 to PSEG Nuclear, "ISFSI Pad Broom Finish," dated May 24, 2006, PSEG VTD No. 400064.

6.31 Procedures

6.31.1 HC.MD-FR.DCS-0001, "HI-STORM System Receipt Inspection," Rev. 0.

6.31.2 HC.MD-FR.DCS-0002, "Offloading and Receiving Dry Storage Components," Rev. 0.

6.31.3 HC.MD-FR.DCS-0003, "Transport Loaded and Unloaded HI-STORM and HI-TRAC," Rev. 1.

6.31.4 HC.MD-FR.DCS-0004, "MPC Preparation for Loading," Rev. 1.

6.31.5 HC.MD-FR.DCS-0005, "Handling and Loading MPC," Rev. 1.

6.31.6 HC.MD-FR.DCS-0006, "Sealing, Drying, and Backfilling of a Loaded MPC," Rev. 4.

6.31.7 HC.MD-FR.DCS-0007, "Stack-up and Transfer of Loaded MPC," Rev. 1.

6.31.8 HC.MD-FR.DCS-0008, "Transporting and Transferring a Loaded MPC for Unloading," Rev. 1.

6.31.9 HC.MD-FR.DCS-0009, "Unloading a Loaded MPC," Rev. 1.

6.31.10 NC.MD-AB.DCS-0008, "Responding to Emergency Conditions," Rev. 1.

6.31.11 NC.MD-PM.DCS-0013, "Dry Cask Storage Special Lifting Device Inspection," Rev. 0.

6.31.12 Not Used.

6.31.13 HC.OP-AB.MISC-0004, "ISFSI-Spent Fuel Storage Cask (SFSC) Heat Removal System," Rev. 1.

6.31.14 HC.RE-FR.DCS-0001, "Dry Cask Storage Fuel Characterization," Rev. 0.

6.31.15 HC.RE-FR.DCS-0002, "Dry Cask Storage Fuel Selection for Cask Loading," Rev. 2.

6.31.16 HC.RE-FR.ZZ-0001, "Hope Creek Special Nuclear Material and Core Component Movement," Rev. 37.

6.31.17 HC.RE-FR.ZZ-0008, "Verification of Fuel Location," Rev. 19.

6.31.18 HC.OP-AR.DCS-0001, "Dry Cask Storage System Thermal Monitoring System Alarm Response Procedure," Rev. 1.

6.31.19 Not Used.

6.31.20 RP-HC-303, "HI-TRAC Radiation Survey," Rev. 1.

6.31.21 RP-HC-304, "HI-STORM Radiation Survey," Rev. 2.

6.31.22 RP-HC-305, "ISFSI Radiation Survey," Rev. 1.

6.31.23 Not Used.

6.31.24 HC.OP-AB.MISC-0001, "Acts of Nature," Rev. 14.

6.31.25 HC.OP-DL.ZZ-0026, "Surveillance Log," Rev. 119.

6.31.26 Holtec Procedure HPP-1746-600, "Procedure for MPC Cooldown and Weld Removal for MPC Unloading at Hope Creek and Salem Plants," Revision 0.

6.31.27 PCI procedure PI-900995-01, "Closure Welding of Multi-Purpose Canisters at Hope Creek," Revision 0.

6.32 Drawings

6.32.1 Not used.

6.32.2 Not used.

6.32.3 Holtec Drawing 3928, "MPC-68/68F/68FF Basket Assembly [Licensing Drawing]," Section 1.5 of PSEG VTD No. 400006 (applicable revision per component CCR).

6.32.4 Holtec Drawing 3923, "MPC Enclosure Vessel [Licensing Drawing]," Section 1.5 of PSEG VTD No. 400006 (applicable revision per component CCR).

6.32.5 Holtec Drawing 4128, "HI-TRAC 100D Assembly [Licensing Drawing]," Rev. 5, (Section 1.5 of PSEG VTD No. 400006, Sheet 002.

6.32.6 Holtec Drawing 4116, "HI-STORM 100S, Version B [Licensing Drawing]," Section 1.5 of PSEG VTD No. 400006 (applicable revision per component CCR).

6.32.7 Lift Systems Drawing CT201064, "210 Ton Transporter (Hope Creek)," Rev. A, PSEG VTD No. 400036, Sht. 5.

6.32.8 PSEG Drawing No. 700002, "Cask Storage Pad Sections and Details," Rev. 0.

6.32.9 Holtec Drawing No. 4532, "Soil Mixing As-Built," Rev. 2, PSEG VTD No. 400001.

6.33 Plan Documents

6.33.1 RP-AA-300, "Radiological Survey Program, Revision 3.

6.33.2 Salem and Hope Creek Generating Stations Quality Assurance Topical Report (QATR), NO-AA-10, Revision 80.

6.33.3 Hope Creek Event Classification Guide (ECG), Emergency Action Level 6.4.1.c.

6.33.4 Training Procedures and T&RMs TQ-AA-210,"TSD Process Activities," TQ-AA-103, "Instructor Training and Development Program," TQ-SH-210-9001 "Training System Development," and TQ-SH-103-9001, "Salem/Hope Creek Instructor Training and Development Program."

6.33.5 NC.DE-PS.ZZ-0001, "Programmatic Standard for Fire Protection," Rev. 3.

6.34 PSEG Design Change Package 80088459, "Dry Cask Storage Operations," Rev. 0.

6.35 PSEG Calculation A-5-DCS-CDC-1977, "Design for the ISFSI Heavy Haul Road," Rev. 0.

6.36 Holtec Report No. HI-2043226, "Non-mechanistic Tipover of HI-STORM 100B at Hope Creek ISFSI Pad," Rev. 6, PSEG VTD No. 400012.

6.37 PSEG Design Change Package 80057739, "ISFSI Pad," Rev. 2.

6.38 NFPA-30, "Flammable and Combustible Liquids Code," National Fire Protection Association, 2000.

6.39 Letter from D. Pstrak, NRC, to T. Morin, Holtec International, EA 09-0190, "Exercise of Enforcement Discretion – Holtec International," August 5, 2009.

6.40 PSEG Nuclear letter LR-N06-0025 to the NRC, License Change Request H06-01, "Request for Change to Operating License Condition 2.C.(6) for Hope Creek Generating Station," dated February 23, 2006.

6.41 Letter from P. Harris, NRC, to B. Levis, PSEG Nuclear, "Response to Orders Requiring Implementation of Interim Security Compensatory and Access Authorization Measures for Hope Creek and Salem Generating Stations Independent Spent Fuel Storage Installation," dated September 29 2005.

6.42 PSEG Calculation HCP.6-0207, "Verification of Hope Creek Cycles 1-12 Bundle Characteristics Against Holtec CoC Amendment 2," August 4, 2005.

6.43 PSEG Purchase Specification A-5-DCS-NDS-0457, "Dry Cask Storage Project Prime Mover," Rev. 1.

6.44 PSEG Calculation A-5-DCS-CDC-1965, "Adjacent Facilities Evaluation," Rev. 0.

6.45 PSEG Calculation A-5-DCS-SDC-1961, "PMH Forces on Storage Cask," Rev. 0.

6.46 Holtec Report No. HI-2043319, Rev. 9, "Seismic Analyses of the Crawler, HI-STORM, and LPT on the Egress Pad," PSEG VTD No. 400016.

6.47 Holtec Report No. HI-2063502, Rev. 4, "Miscellaneous Analyses Supporting Cask Loading at Hope Creek," PSEG VTD No. 400051.

6.48 Holtec Report No. HI-2043197, Rev. 0, "Evaluation of Kinematic Stability of HI-STORM Version B Under the Postulated Probable Maximum Hurricane," PSEG VTD No. 400035.

6.49 Houghton International Product Data Sheet for Cosmolubric® Hydraulic Fluid (included in cask transporter operating and maintenance manual), PSEG VTD No. 400022.

6.50 Holtec Report No. HI-2043313, Rev. 2, "Design Basis Wind, Tornado, and Snow Load Evaluation for Hope Creek Generating Station," Revision 2, PSEG VTD 400021.

6.51 PSEG Notification No. 20249856 and FCR No. 310 to Order 60035559.

6.52 Holtec letter to B. Gustems, PSEG dated July 26, 2006, "Holtec Review of Hope Creek Dry Cask Storage Procedures," PSEG Design Input Record No. H-1-DCS-NDI-0126.

6.53 USNRC Division of Spent Fuel Storage and Transportation Interim Staff Guidance 22, "Potential Rod Splitting due to Exposure to an Oxidizing Atmosphere during Short-Term Cask Loading Operations in LWR or Other Uranium Oxide-Based Fuel," Revision 0.

6.54 **Nuclear Common Procedures**

6.54.1 FP-AA-001, "Precautions Against Fire," Rev. 0

6.54.2 CC-AA-103-1001, "Implementation of Configuration Changes," Rev. 3

6.55 PSEG Notification No. 2042611 and Order 70100870, MPC Shop Leakage Testing.

APPENDIX 1

HI-STORM 100 CASK SYSTEM CERTIFICATE OF COMPLIANCE EVALUATION

INTRODUCTION

This appendix provides an evaluation of compliance with the HI-STORM 100 System Certificate of Compliance for HCGS spent fuel and site-specific conditions. This evaluation is presented in the following three compliance evaluation tables:

Table	Title
Table 1	CoC Conditions
Table 2	CoC Appendix A — Technical Specifications
Table 3	CoC Appendix B — Approved Contents and Design Features

The evaluation of compliance with the conditions set forth in the Certificate of Compliance presented in this appendix provides the basis for the conclusion reached in the compliance evaluation of 10 CFR 72.212(b)(2)(i)(A) discussed in Section 5.1 of the main body of this report for HCGS spent nuclear fuel. In the 2006-07 loading campaign, four casks were loaded in accordance with Amendment 2 of the HI-STORM CoC. In the 2008 loading campaign, eight casks were loaded in accordance with Amendment 3 of the HI-STORM CoC. Differences between Amendments 2 and 3 of the CoC, if applicable to Hope Creek, are noted in the following table and the compliance statement is revised, as necessary, to recognize the two amendments as they apply to different casks in accordance with the table in Appendix 2 of this report.

In the 2010 loading campaign at Hope Creek, Amendment 5 of the HI-STORM CoC was adopted as the governing CoC amendment. Amendment 5 will continue to be used for loading campaigns until such time as this 212 Report is revised to adopt a later amendment. Amendment 4 of the HI-STORM CoC pertained only to Indian Point Unit 1. The Amendment 4 changes were not retained in Amendment 5 and are therefore not discussed here. Differences between Amendments 3 and 5 of the CoC, if applicable to Hope Creek, are noted in the following table and the compliance statement is revised, as necessary, to recognize the two amendments as they apply to different casks in accordance with the table in Appendix 2 of this report.

Table 1, CoC Conditions

Condition	Evaluation
1. CASK a. Model No.: HI-STORM 100 Cask System b. Description	This CoC condition describes the major HI-STORM 100 System components. PSEG Nuclear uses the HI-STORM 100 System components as described in Paragraphs 'a' and 'b' of this CoC condition. The specific components used to store HCGS spent fuel at the ISFSI are: 1. The HI-STORM 100S-218 Version B overpack. The "218" modifier designates that the 218-inch tall model of the Version B overpack is being used. See Section 1.2.1.2.1 of Reference 6.2. 2. The MPC-68 or MPC-68FF canister may be used. 3. MPC loading, preparation, and transfer activities in the Reactor Building are performed using the 100-ton HI-TRAC 100D transfer cask. Amendment 3 to the CoC made editorial clarifications to Section 1.b that have no effect on the compliance statements above. Amendment 5 to the CoC made editorial clarifications to Section 1.b that have no effect on the compliance statements above.
2. OPERATING PROCEDURES	Chapter 8 of the HI-STORM 100 System FSAR outlines the loading, unloading, and recovery procedures for the HI-STORM 100 Cask System. The procedures provided in the HI-STORM FSAR are prescriptive to the extent that they provide the basis and general guidance for plant personnel in preparing detailed, written, site-specific, loading, handling, storage and unloading procedures. Users are permitted to add, modify the sequence of, perform in parallel, or delete steps as necessary provided that the intent of the guidance given in Chapter 8 is met, and the requirements of the Technical Specifications in Appendix A to Certificate of Compliance No. 1014 are met (Reference 6.2, Section 8.0). PSEG Nuclear uses site-specific written operating procedures for implementation of cask loading, handling, movement, onsite transportation, surveillance, and maintenance of the HI-STORM 100 Cask System at the ISFSI. The site-specific operating procedures are consistent with the technical bases described in HI-STORM 100 System FSAR, Chapter 8 and the CoC.

Table 1, CoC Conditions

Condition	Evaluation
3. ACCEPTANCE TESTS AND MAINTENANCE PROGRAM	This CoC condition requires that written cask acceptance tests and maintenance program [implementation] shall be prepared consistent with the technical basis described in Chapter 9 of the FSAR. The acceptance tests and inspections required during component fabrication are carried out and documented by the certificate holder under his quality assurance program. PSEG Nuclear uses site-specific procedures to implement the performance of maintenance, tests and inspections applicable to use of the storage system in accordance with the technical bases of HI-STORM 100 System FSAR, Chapter 9. Acceptance tests are performed by the CoC holder and PSEG Nuclear under the applicable QA program and procedures. Normal maintenance of the HI-STORM 100 System is limited to periodic touch-up repairs of the cask coating due to minor nicks and scratches. Maintenance of the cask temperature monitoring system is performed on an as-needed basis.
4. QUALITY ASSURANCE	Activities important to safety are conducted under the appropriate Quality Assurance program having jurisdiction over the activity. Cask and important-to-safety ancillary component design, fabrication, inspection, and testing activities are conducted under the Holtec International 10 CFR 72, Subpart G Quality Assurance Program. Holtec's implementation of quality activities is monitored by PSEG Nuclear via controls imposed through the safety-related procurement for the cask system. On site activities are governed by the applicable portions of either the PSEG Nuclear 10 CFR 50, Appendix B Quality Assurance Program, as augmented to include Part 72 activities, or the QA program of the pool-to-pad services provider. See also Section 5.7.1.2 of the main body of this report.
4. HEAVY LOADS REQUIREMENTS	Changes to the Hope Creek Part 50 UFSAR have been made to address HI-STORM 100 Cask System loading operations performed inside the Hope Creek Reactor Building. Each lift of a HI-STORM 100 System MPC, HI-TRAC transfer cask, HI-STORM overpack, or other heavy load associated with dry cask operations that is performed inside Hope Creek structures governed by 10 CFR 50, is made in accordance with approved PSEG Nuclear procedures that have been evaluated in accordance with the requirements of 10 CFR 50.59 and comply with the site heavy load handling program. The 10 CFR 50.59 evaluation performed in accordance with 10 CFR 72.212(b)(4) addresses the heavy load handling aspects of ISFSI implementation. These activities are addressed in more detail in the 10 CFR 50.59 evaluation for the Design Change Package (DCP) documented under PSEG Order No. 80088459, "Dry Cask Storage Operations" (Reference 6.34).

Table 1, CoC Conditions

Condition	Evaluation
5. HEAVY LOADS REQUIREMENTS (cont'd)	Movement of a loaded HI-STORM overpack is performed in accordance with approved PSEG Nuclear procedures, and in compliance with HI-STORM 100 Cask System Certificate of Compliance, Appendix A, Section 5.5 (see Table 2 of this appendix). Lifting of a fuel-loaded HI-TRAC transfer cask and MPC is not performed outside of Hope Creek structures governed by 10 CFR 50. Therefore, HI-STORM 100 Cask System Certificate of Compliance 1014, Appendix B, Section 3.5, is not applicable to Hope Creek ISFSI operations (see also Table 3 of this appendix).
6. APPROVED CONTENTS	Procedural controls are used to ensure that the contents of the HI-STORM 100 Systems at the ISFSI meet the applicable fuel specifications and other requirements in HI-STORM Certificate of Compliance, Appendix B, Section 2.0. The detailed evaluation of compliance with CoC Condition 6 is provided in Table 3 of this appendix, which addresses compliance with the Approved Contents section of CoC Appendix B.
7. DESIGN FEATURES	Features or characteristics for the design and operation of the Hope Creek ISFSI, cask system, and ancillary equipment are in accordance with HI-STORM 100 System Certificate of Compliance, Appendix B, Section 3.0. The detailed evaluation of compliance with CoC Condition 7 is provided in Table 3 of this appendix, which addresses compliance with the Design Features section of CoC Appendix B.
8. CHANGES TO THE CERTIFICATE OF COMPLIANCE	Certificate of Compliance Condition No. 8 states the 10 CFR 72.244 regulatory requirement that the holder of the certificate who desires to make changes to the CoC, including appendices, must submit an application for amendment of the CoC to the NRC. This condition applies only to the CoC holder. Therefore, no action or implementing procedures are required by PSEG Nuclear.
9. SPECIAL REQUIREMENTS FOR FIRST SYSTEMS IN PLACE	**CoC Amendments 2 and 3:** CoC Condition 9 was not modified from Amendment 2 to Amendment 3. The CoC requirements were as follows in Amendment 2/3: The heat transfer characteristics of the cask system will be recorded by temperature measurements for the first HI-STORM Cask Systems (for each thermally unique MPC basket design – MPC-24/24E/24F, MPC-32/32F, and MPC-68/68F/68FF) placed into service by any user with a heat load equal to or greater than 10 kW. An analysis shall be performed that demonstrates the temperature measurements validate the analytic methods and predicted thermal behavior described in Chapter 4 of the FSAR. Validation tests shall be performed for each subsequent cask system that has a heat load that exceeds a previously validated heat load by more than 2 kW (e.g., if the initial test was conducted at 10 kW, then no additional testing is needed

Table 1, CoC Conditions

Condition	Evaluation
9. SPECIAL REQUIREMENTS FOR FIRST SYSTEMS IN PLACE (cont'd)	until the heat load exceeds 12 kW). No additional testing is required for a system after it has been tested at a heat load equal to or greater than 16 kW. Each first time user of a HI-STORM 100 Cask System Supplemental Cooling System (SCS) that uses components or a system that is not essentially identical to components or a system that has been previously tested, shall measure and record coolant temperatures for the inlet and outlet of cooling provided to the annulus between the HI-TRAC and MPC and the coolant flow rate. The user shall also record the MPC operating pressure and decay heat. An analysis shall be performed, using this information, that validates the thermal methods described in the FSAR which were used to determine the type and amount of supplemental cooling necessary. Letter reports summarizing the results of each thermal validation tests and SCS validation test and analysis shall be submitted to the NRC in accordance with 10 CFR 72.4. Cask users may satisfy these requirements by referencing validation test reports submitted to the NRC by other cask users. **CoC Amendments 2 and 3 Compliance Evaluation:** The first part of this condition requires temperature monitoring and reporting to the NRC for HI-STORM 100 Systems loaded with between 10 kW and 16 kW decay heat to confirm the heat removal system is operating as designed. Other HI-STORM 100 System users have fulfilled this CoC condition by loading MPC-68-series canisters (including MPC-68 and -68FF) up to and over 16 kW. Specifically, Energy Northwest loaded an MPC-68-series canister with heat load greater than 16 kW at Columbia Generating Station and fulfilled this CoC condition for all other users (Reference 6.12). The second part of this CoC requirement pertaining to the Supplemental Cooling System (SCS) applies only to general licensees using the Holtec HI-STORM 100 System to load high burnup (HBU) fuel (burnup > 45,000 MWD/MTU). CoC Appendix A, LCO 3.1.4 requires the SCS to be used only if HBU fuel is loaded into the MPC. PSEG Nuclear did not load any MPCs in accordance with CoC Amendment 2 or 3 that contained HBU fuel. Therefore, this requirement of the CoC is not applicable to the first 12 casks loaded and placed into storage at the ISFSI in accordance with CoC Amendments 2 and 3. **CoC Amendment 5:** In CoC Amendment 5, Condition 9 was revised to replace the first two paragraphs with one new first paragraph. The first paragraph of Condition 9 now reads as follows:

Table 1, CoC Conditions

Condition	Evaluation
9. SPECIAL REQUIREMENTS FOR FIRST SYSTEMS IN PLACE (cont'd)	The air mass flow rate through the cask system will be determined by direct measurements of air velocity in the overpack cooling passages for the first HI-STORM Cask Systems placed into service by any user with a heat load equal to or greater than 20 kW. The velocity will be measured in the annulus formed between the MPC shell and the overpack inner shell. An analysis shall be performed that demonstrates the measurements validate the analytic methods and thermal-performance predicted by the licensing-basis thermal models in Chapter 4 of the FSAR. The previous third paragraph of this CoC condition (now the second paragraph) was not changed in CoC Amendment 5. **CoC Amendment 5 Compliance Evaluation** Hope Creek is not loading any high burnup fuel and none of the casks have a heat load above the thresholds requiring air mass flow rate measurements or use of the SCS. Therefore, this CoC condition does not apply at this time. A revision to this report and a re-evaluation of compliance with this CoC condition will be required for storage of high burnup fuel and/or casks with heat loads exceeding the thresholds requiring air mass flow rate measurements or use of the SCS.

Table 1, CoC Conditions

Condition	Evaluation
10. PRE-OPERATIONAL TESTING AND TRAINING EXERCISE	Dry run training is conducted using the same procedures that are used in loading casks with actual spent nuclear fuel. The dry run training program addresses each of the items in CoC Condition 10.a through 10.k, except as follows: • Condition 10.h, which pertains to transfer cask upending and downending, is not demonstrated because the cask loading procedures at Hope Creek do not require the fuel-loaded HI-TRAC transfer cask to be upended or downended. • Condition 10.g, which pertains to use of the Supplemental Cooling System (SCS), is not demonstrated because the SCS is not required to be used at this time (see also discussion under CoC Condition 9, and LCO 3.1.4). • **CoC Amendment 2 (applicable to casks 1 - 4):** Condition 10.k, which pertains to fuel cooldown and unloading was not demonstrated at Hope Creek because this evolution has been previously demonstrated on the HI-STORM 100 System at other plants. By design, an MPC is never expected to have to be unloaded. If some unforeseen event requires the unloading of an MPC, PSEG has the administrative controls in place to acquire the necessary equipment and trained personnel to perform these operations (Reference 6.9). • **CoC Amendment 3 (applicable to casks 5 – 12):** Condition 10.k was revised to delete the phrase "cooling fuel assemblies" to reflect the revision of LCO 3.1.3, which no longer requires pre-cooling of the MPC cavity before re-flooding. No action is required for this revised CoC condition. • **CoC Amendment 5 (applicable to casks 13 and higher):** Condition 10.g, which pertains to SCS training was revised to add "if applicable" to the training requirement to clarify that no training is required if the system is not being used. The system is not being used at Hope Creek based on the fuel selected for dry storage. PSEG will provide appropriate training if the SCS is required to be used in the future.
11. EXEMPTION FROM 10 CFR 72.236(f) FOR SUPPLEMENTAL COOLING SYSTEM	This CoC condition pertains to the use of the Supplemental Cooling System (SCS) for on-site loading and transportation of high burnup (HBU) spent fuel (burnup > 45,000 MWD/MTU) in the HI-TRAC transfer cask. The NRC has granted an exemption from the 10 CFR 72.236(f) requirement that adequate heat removal capacity must be provided without reliance on an active cooling system. Because this is a simple statement acknowledging the exemption, no action to demonstrate compliance is required for this CoC condition.

Table 1, CoC Conditions

Condition	Evaluation
12. AUTHORIZATION	By virtue of holding a 10 CFR Part 50 license, PSEG Nuclear also holds a general license for the storage of spent fuel at an ISFSI pursuant to 10 CFR 72.210. This CoC condition states that general licensees are authorized to use the HI-STORM 100 System under a 10 CFR 72 general license and provides direction regarding use of previously approved amendments to the CoC. PSEG Nuclear used Amendment 2 to CoC 1014 to load the four casks in the 2006-07 loading campaign and Amendment 3 to load the eight casks in the 2008 loading campaign. CoC Amendment 5 was used to load casks from Hope Creek in 2010 and later. Revisions to this report will address the use of future CoC amendments, as necessary. See Appendix 2 to this report for the CoC amendment, FSAR revision, and approved interim design and licensing basis changes applicable to each cask loading campaign and licensed storage system component serial number.

Table 2, CoC Appendix A — Technical Specifications

Technical Specification	Evaluation
1.0 USE AND APPLICATION	The Use and Application section of Appendix A to the HI-STORM 100 CoC provides definitions of terms used in the technical specifications (TS) in Section 1.1, and explanatory information on the interpretation of logical connectors (e.g., AND and OR), completion times, and frequency in Sections 1.2, 1.3, and 1.4, respectively. This section provides the necessary information on how to interpret and implement the requirements in the TS and is used in training. No other compliance actions are required.
2.0 INTENTIONALLY BLANK	None
3.0 LIMITING CONDITIONS FOR OPERATION (LCO) APPLICABILITY	The HI-STORM 100 System CoC technical specification Limiting Conditions for Operation (LCOs) specify the minimum capability or level of performance that is required to assure that the HI-STORM 100 System can fulfill its safety functions. LCOs 3.0.1 through 3.0.5 provide the over-arching rules for complying with LCOs located elsewhere in the TS. HI-STORM 100 System Technical Specification LCOs and the Required Actions and Completion Times to be performed if an LCO is not met, are implemented through approved Hope Creek procedures (see procedures listed under Reference 6.31).
3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY	The HI-STORM 100 System TS Surveillance Requirements (SRs) specify actions to be taken and acceptance criteria to be met to verify that equipment important to safety is operable. SRs 3.0.1 through 3.0.4 provide the over-arching rules for complying with the SRs elsewhere in the TS. HI-STORM 100 System Technical Specification SRs are implemented through approved Hope Creek procedures (see procedures listed under Reference 6.31).
3.1 SFSC INTEGRITY	This section of CoC Appendix A provides LCOs for ensuring the long-term integrity of the MPC confinement boundary and the stored fuel. Each LCO is discussed individually below.
3.1.1 Multi-Purpose Canister (MPC)	The MPC is required to be dried, backfilled with helium, and the vent and drain port cover plates helium leak tested before declaring the system ready for MPC transfer to the HI-STORM overpack, and subsequent onsite transportation to the ISFSI. LCO 3.1.1 requires the MPC to be dry and helium filled during transport operations and storage operations. Surveillance Requirements (SRs) 3.1.1.1, 3.1.1.2, and 3.1.1.3 are used to assure that the MPC is dried and backfilled with helium in accordance with the applicable acceptance criteria in TS Tables 3-1 and 3-2, and leak-tested per ANSI N14.5-1997 before being declared ready for storage operations. Several changes to this TS were made in CoC Amendment 5.

Table 2, CoC Appendix A — Technical Specifications

Technical Specification		Evaluation
3.1.1	Multi-Purpose Canister (MPC) (cont'd)	**CoC Amendment 5:** 1) The LCO was revised to add a 40-hour limit for vacuum drying time of casks with heat loads between 23 kW and 28.74 kW and prohibit use of the vacuum drying system (VDS) on canisters with heats loads exceeding 28.74 kW (TS Table 3-1 further restricts VDS use to 26 kW). 2) Required Action A.2 was revised to replace "return the MPC to an analyzed condition" to "return the MPC to compliance with Table 3-1." 3) New Condition B and Action B.1 were added to reflect the time limit on vacuum drying. The remaining Conditions and Required Actions were re-lettered appropriately. 4) Required Action C.2 (previously B.2) was revised to add "by adding helium to or removing helium from the MPC" to the end of the action statement. 5) New Required Action C.2.2 was added to permit an option to Action C.2 to demonstrate by analysis that all limits for cask components and contents can be met in the event the helium backfill limit is not met. 6) Required Action D.2 (previously C.2) was revised to replace "return the MPC to an analyzed condition" to "return the MPC to compliance with SR 3.1.1.3." 7) SR 3.1.1.1 was revised to refer to the vacuum drying time limits for higher heat load casks. 8) SR 3.1.1.2 was revised to add a statement that re-performance of the SR is not required after successful completion of Required Action C.2.2. 9) SR 3.1.1.3 was revised to make a grammatical correction. The above changes to this technical specification have been reflected, as appropriate, in revised cask loading procedures. At Hope Creek, the acceptance criteria for the MPC-68/68FF are applicable, and compliance with the MPC drying and backfilling acceptance criteria is demonstrated by procedure (Reference 6.31.6). Helium leakage testing of the vent and drain port cover plates is performed in accordance with ANSI N14.5 with a "leaktight" acceptance criterion, and is also demonstrated in the same procedure.
3.1.2	SFSC Heat Removal System	LCO 3.1.2 requires the natural ventilation heat removal system of the HI-STORM 100 System to be operable at all times during storage operations at the ISFSI. Surveillance Requirement 3.1.2.1 requires periodic inspection of the overpack inlet and outlet air ducts to verify that they are free of blockage. Alternately, a periodic check of the temperature rise of the air from the cask air inlet (or ambient) to a

Table 2, CoC Appendix A — Technical Specifications

Technical Specification	Evaluation
3.1.2 SFSC Heat Removal System (cont'd)	minimum of two cask air outlets may be performed to verify heat removal system operability. Several changes to this TS were made in CoC Amendment 5. **CoC Amendment 5:** 1) A note was added to the Applicability to clarify that the SFSC heat removal system is operable provided 50% or more of the inlet and outlet vent areas are unblocked and available for flow or when air temperature measurements are met. 2) A new Condition A and Required Action A.1 were added to remove partial blockage less than 50%. No completion time is applicable because the heat removal system is still considered operable. Previous Condition A and Required Action A.1 were changed to B and B.1, respectively. Previous Condition B and Required Actions B.1, B.2.1, and B.2.1 were changed to C, C.1, C.2.1 and C.2.2, respectively. 3) The Completion Times for Required Actions C.2.1 and C.2.2 (previously B.2.1 and B.2.2) were revised to be heat load-dependent. 4) SR 3.1.2.1 was changed to SR 3.1.2. 5) The visual inspection part of the SR was revised to add "from solid debris or floodwater." 6) The temperature monitoring part of the SR was revised to separate the acceptance criterion for PWR and BWR fuel and increase the value from 126°F for all fuel to 155°F for PWR fuel and 137°F for BWR fuel. The casks at the Hope Creek ISFSI are equipped with the instrumentation needed to use the temperature monitoring option as the primary means of verifying heat removal system operability. Visual inspection of the inlet and outlet air ducts may be used as a backup method for meeting the LCO if the temperature monitoring system is inoperable or otherwise unavailable. Procedural controls are used to implement the SR and verify whether LCO 3.1.2 is met (Reference 6.31.25). An alarm response procedure is used to respond to any alarms from the temperature monitoring system (Reference 6.31.18). If the alarm is determined to be valid, an abnormal procedure is used to implement the Required Actions for not meeting the LCO (Reference 6.31.13).

Table 2, CoC Appendix A — Technical Specifications

Technical Specification	Evaluation
3.1.3 Fuel Cool-Down (for MPCs loaded in accordance with CoC Amendment 2)	By design, the HI-STORM 100 System is never expected to be required to be unloaded of fuel. However, if MPC unloading is required for some unforeseen reason, LCO 3.1.3 requires the MPC cavity bulk helium temperature to be less than a specific value before re-flooding of the MPC is permitted in preparation for fuel removal in the spent fuel pool. Meeting this LCO precludes significant fuel quenching or MPC pressurization due to water flashing during re-flooding. Procedural controls are used to verify whether LCO 3.1.3 is met via implementation of SR 3.1.3.1 (Reference 6.31.9) and are also used to implement the Required Actions if the LCO is not met (Reference 6.31.26). SR 3.1.3.1 allows establishing the MPC cavity bulk helium temperature prior to re-flooding by analysis or by direct measurement. If the predicted or measured bulk helium temperature is above the LCO limit, any appropriate cooling method is acceptable to reduce the bulk helium temperature to below the LCO limit to allow re-flooding operations to proceed. See also Reference 6.9.
3.1.3 MPC Cavity Re-flooding (for MPCs loaded in accordance with CoC Amendment 3 or 5)	This LCO requires MPC cavity pressure to be less than 100 psig prior to, and during re-flooding. Meeting this LCO precludes significant fuel quenching or MPC pressurization due to water flashing during re-flooding. Procedural controls are used to verify that LCO 3.1.3 is met via implementation of SR 3.1.3.1 (Reference 6.31.9) and are also used to implement the Required Actions if the LCO is not met (Reference 6.31.26). SR 3.1.3.1 allows ensuring the MPC cavity pressure prior to re-flooding meets the LCO limit by analysis or by direct measurement. If the predicted or measured pressure is above the LCO limit, re-flooding must be stopped and cannot resume until the pressure is within the LCO limit and the MPC vent port is verified not to be blocked. Because there are casks at the ISFSI that were loaded to Amendments 2, 3 and 5 to the CoC, References 6.31.9 and 6.31.26 contain instructions for meeting both sets of requirements. See Appendix 2 for the CoC amendment applicable to each cask component serial number.
3.1.4 Supplemental Cooling System	**CoC Amendments 2 and 3 (applicable to casks 1 – 12):** The Supplemental Cooling System (SCS) is required to be operable when high burnup (HBU) fuel (> 45,000 MWD/MTU) is in an MPC inside the HI-TRAC transfer cask. Use of the SCS ensures the HBU fuel cladding temperature remains below the applicable limit during onsite transfer cask operations. The SCS is not required for onsite transfer cask operations if all of the fuel in the MPC is burned less than or equal to 45,000 MWD/MTU. No HBU fuel was placed into dry storage in the first 12 casks. Thus this LCO is not applicable to the first 12 casks of Hope Creek fuel in storage at the ISFSI. **CoC Amendment 5 (applicable to casks 13 and higher):** The applicability of this LCO was modified to require SCS use for casks with a heat load greater than 28.74 kW in addition to any cask containing at least one high burnup fuel assembly. In the 2010 cask loading campaigns at Hope Creek, no HBU fuel will be placed in storage nor will any casks exceed 28.74 kW heat load.

Table 2, CoC Appendix A — Technical Specifications

Technical Specification	Evaluation
3.2 SFSC RADIATION PROTECTION	This section of CoC Appendix A provides one LCO that addresses radiological controls for the HI-TRAC transfer cask.
3.2.1 Deleted	None.
3.2.2 Transfer Cask Surface Contamination	LCO 3.2.2 establishes limits on loose radioactive contamination for the HI-TRAC transfer cask if MPC transfer operations occur outside of the "Fuel Building." The "Fuel Building" is defined in the HI-STORM technical specifications as the "site-specific power plant facility, governed by the regulations of Part 50, where the loaded overpack or transfer cask is transferred to or from the transporter." At Hope Creek, the "Fuel Building" is the secondary containment of the Reactor Building, where MPC transfer from the HI-TRAC transfer cask to the HI-STORM overpack takes place on elevation 102 ft. This LCO includes a note that states the LCO is not applicable to the transfer cask if MPC transfer operations occur inside the "Fuel Building." Because MPC transfer operations take place in the Hope Creek Reactor Building (the "Fuel Building" for this LCO), this LCO does not apply to the transfer cask, but does apply to the MPC. SR 3.2.2.1 is used to verify that the LCO limits on loose contamination are met for accessible portions of the MPC prior to transport operations. Procedural controls are used to implement the SR and ensure that LCO 3.2.2 is met. Procedural controls are also used to implement Required Actions if the LCO is not met (References 6.31.5, 6.31.20 through 22, and 6.33.1).
3.2.3 Deleted	No action required.
3.3 SFSC CRITCALITY CONTROL	This section of CoC Appendix A provides an LCO to assure the physical environment in the MPC is consistent with the supporting criticality analysis.
3.3.1 Boron Concentration	LCO 3.3.1 establishes minimum soluble boron concentration requirements for the water in the MPC during loading and unloading of PWR fuel in the plant spent fuel pool. This LCO is not applicable to Hope Creek dry cask storage operations because Hope Creek is a BWR plant. No action is required for Hope Creek spent fuel storage campaigns. This LCO will require re-evaluation and appropriate administrative controls put into place, as necessary, before Salem plant PWR spent fuel is moved into dry storage in the HI-STORM 100 System.

Table 2, CoC Appendix A — Technical Specifications

Technical Specification	Evaluation
Table 3-1	CoC Table 3-1 augments LCO 3.1.1 by providing the maximum permissible heat loads for use of the vacuum drying system (VDS), above which the Forced Helium Dehydration (FHD) system must be used for MPC drying. The FHD System is also required to dry any MPCs containing one or more HBU fuel assemblies. In CoC Amendment 5 the table was revised: 1) Different heat load thresholds for the various MPC models are established to require FHD System use for MPCs containing no HBU fuel. Below these heat load thresholds, MPCs containing no HBU fuel may be dried using the VDS. (Note that the VDS threshold of 26 kW in Table 3-1 is lower than the VDS threshold of 28.74 kW in LCO 3.1.1 – PSEG uses the more conservative limit of 26 kW.) 2) A new maximum heat load value of 36.9 kW is provided for any MPC. 3) A new Note 3 is added to the table that requires the HI-TRAC-to-MPC annulus to either be filled or continuously flushed with water during vacuum drying operations, based on heat load thresholds. The PSEG Hope Creek cask loading procedure implementing these requirements has been revised, as required, to reflect these new requirements when vacuum drying is used (Reference 6.31.6).
Table 3-2	CoC Table 3-2 augments LCO 3.1.1 by providing the required helium backfill pressure ranges based on MPC model and heat load. The Hope Creek cask loading procedure has been appropriately revised to reflect these requirements (Reference 6.31.6).
4.0 INTENTIONALLY BLANK	None.
5.0 ADMINISTRATIVE CONTROLS AND PROGRAMS	This section of CoC Appendix A provides requirements for certain programmatic controls necessary to ensure the dry storage system is used on site in a manner consistent with the regulations and the generic cask design. Each program is addressed individually below.
5.1 Deleted	None.
5.2 Deleted	None.
5.3 Deleted	None.

Table 2, CoC Appendix A — Technical Specifications

Technical Specification	Evaluation
5.4 Radioactive Effluent Control Program	CoC Administrative Program 5.4 requires the general licensee to maintain a radioactive effluent control program in accordance with 10 CFR 72.44(d), including an environmental monitoring program and annual reports. The HI-STORM 100 System does not release any radioactive materials or require any radioactive waste treatment systems because the MPC is leak tight. The design of the MPC and the surveillance requirements of LCO 3.1.1, "Multi-Purpose Canister (MPC)," provide assurance that there are no radioactive effluents from the ISFSI under all normal, off-normal, and credible accident conditions. Therefore, specific operating procedures for control of radioactive effluents and maintenance of radioactive waste treatment systems are not required for the ISFSI. The Radiological Environmental Monitoring Program (REMP) requirements of the Salem and Hope Creek Generating Station have been expanded to include the ISFSI. The Radiological Effluent Controls (REC) program, as part of the Offsite Dose Calculation Manual (ODCM), implements the procedural details of the REMP. Because the casks used at the onsite ISFSI provide confinement yielding no radioactive gaseous or liquid effluents, assessment of offsite collective dose due to ISFSI storage operations is limited to direct and reflected radiation. Thermoluminescent dosimeters (TLDs) or equivalent will be used to monitor direct gamma radiation levels in and around the Salem and Hope Creek ISFSI site. Placement of environmental monitoring station TLDs is in accordance with the approved REC and ODCM. PSEG Nuclear submits dry cask storage effluent reports for the ISFSI in accordance with 10 CFR 72.44(d)(3) requirements. Annual Radioactive Effluent Release Reports (ARERRs) for the reactor site are submitted to the NRC to meet 10 CFR 50 requirements. Radioactive effluent release information related to dry cask storage activities at the ISFSI is incorporated in the ARERR.

Table 2, CoC Appendix A — Technical Specifications

Technical Specification	Evaluation
5.5 Cask Transport Evaluation Program	CoC Administrative Program 5.5 requires the general licensee to evaluate the conditions pertaining to transporting the fuel-loaded cask between the Part 50 facility and the ISFSI. The purpose of this program is to ensure one of two things: 1. The combination of the physical characteristics of the heavy haul path and the carry height for the cask are such that a cask drop event would be bounded by the design basis cask drop event described in the FSAR, or: 2. The cask transporter design features meet certain requirements that allow a drop event to be considered non-credible. Movement of a fuel-loaded HI-STORM overpack and MPC outside of Hope Creek structures governed by 10 CFR 50 is performed in accordance with approved PSEG Nuclear procedures (References 6.31.3 and 6.31.8). The HI-STORM CoC requirement for a Cask Transport Evaluation Program (CTEP) is implemented by the cask transportation procedure and the design attributes of the vertical cask transporter (VCT) used to move the fuel-loaded overpack from the Hope Creek Reactor Building to the ISFSI. The HI-STORM overpack containing a loaded MPC is moved outside of the Hope Creek Reactor Building receiving bay on a low profile transporter (LPT) to a location where the VCT can access the cask. The LPT supports the HI-STORM overpack from underneath. Therefore, consistent with Technical Specification 5.5, the Cask Transport Evaluation Program does not apply to movement of a loaded HI-STORM overpack and MPC on the LPT while in the Reactor Building receiving bay and just outside the receiving bay door. The HI-STORM overpack is moved out of the Reactor Building without its lid installed due to receiving bay door clearance limitations. The lid is installed as soon as possible after the overpack exits the Reactor Building while the cask is still on the LPT. The lid installation occurs within approximately 50 feet of the Reactor Building door and is expected to be complete in approximately 1-2 hours. Procedures and training include instructions to complete the lid installation without interruption (Reference 6.31.3). The outdoor lid installation is not addressed in the HI-STORM 100 System FSAR except for MPC transfers conducted in a Cask Transfer Facility. Therefore, as part of the Design Change Package for dry cask loading operations, a 10 CFR 72.48 screening was performed to authorize the implementation of this operating evolution as a deviation from the HI-STORM 100 System FSAR (Reference 6.34).

Table 2, CoC Appendix A — Technical Specifications

Technical Specification	Evaluation
5.5 Cask Transport Evaluation Program (cont'd)	The loaded overpack is moved out of the Reactor Building on the LPT, outfitted with a Holtec Earthquake Mitigator (HERMIT). The HERMIT ensures that a seismic event will not cause the cask to tip over in the receiving bay or on its journey to the egress pad. The HI-STORM overpack and MPC are moved from just outside the Hope Creek Reactor Building to the ISFSI pads using the VCT. The VCT is designed in accordance with ANSI N14.6 and has redundant drop protection design features (Reference 6.8). Therefore, in accordance with Technical Specification 5.5, no maximum lift height is established and a cask drop need not be postulated along the heavy haul path. Therefore, Technical Specification 5.5 does not apply to movements of a fuel-loaded HI-STORM overpack and MPC with the VCT. As a defense-in-depth measure, the heavy haul path between the HC Reactor Building receiving bay and the ISFSI pad has been evaluated to determine whether the hardness of the path surface is more energy absorptive (i.e., as hard or less hard) than the surface modeled in the design basis cask drop analysis in the HI-STORM FSAR. That evaluation (Reference 6.35) revealed that the entire haul path, except for the egress pad, is bounded by the surface modeled in the FSAR analysis (Reference 6.2, Table 2.2.9). Therefore, the 11-inch cask drop analysis described in the FSAR is bounding for all locations on the heavy haul path. Even though a cask drop is not required to be postulated, the lift height of the cask during transport to the ISFSI pad is maintained by procedure as low as practicable above the surface below for prudence (References 6.31.3 and 6.31.8). A fuel-loaded HI-TRAC transfer cask is never moved outside of Hope Creek structures that are governed by 10 CFR 50. Therefore, Technical Specification 5.5 does not apply to movements of a fuel-loaded HI-TRAC transfer cask and MPC.
5.6 Deleted	None.
5.7 Radiation Protection Program	The Hope Creek Generating Station Radiation Protection Program has been augmented to address fuel loading, cask handling, and ISFSI operations. Implementing procedures ensure that each of the elements of the program required by Technical Specification 5.7 is addressed (References 6.31.20 through 22 and 6.33.1). Programmatic changes to the PSEG radiation protection program (Reference 6.33.1) are discussed in Section 5.7.1.4 of this report.

Table 3, CoC Appendix B — Approved Contents and Design Features

Approved Contents and Design Features	Evaluation
1.0 DEFINITIONS	This section of CoC Appendix B provides definitions of terms used elsewhere in the appendix. Defined terms are shown in capitalized text.
2.0 APPROVED CONTENTS	This section of CoC Appendix B provides the limits for the material permitted to be stored in the HI-STORM 100 System. It includes limits on such things as fuel physical parameters, cooling time, enrichment, burnup, decay heat, and location of assemblies and non-fuel hardware in the MPC.
2.1 Fuel Specifications and Loading Conditions	**Specification 2.1.1.a** Specification 2.1.1.a requires that all fuel assemblies and non-fuel hardware from the Hope Creek plant to be loaded into HI-STORM 100 casks and deployed at the onsite ISFSI meet the limits in Table 2.1-1 and other referenced tables. For Hope Creek spent fuel, the limits specified for the BWR MPC-68 and –68FF apply. These requirements are implemented through the fuel selection procedures (References 6.31.14 and 6.31.15). Procedural controls are used to ensure that the spent fuel assemblies stored in the HI-STORM 100 Cask System casks include only those fuel assemblies that meet the fuel limits specified in CoC Appendix B, Section 2.1.1 and associated tables (References 6.31.14 and 6.31.15). Control and verification of the movement and location of fuel assemblies in the MPC is also controlled by procedure (References 6.31.16 and 6.31.17). Past and (to the extent it is known) future Hope Creek spent fuel has been evaluated for storage in the HI-STORM 100 System. Hope Creek spent fuel physical parameters are bounded by the following array/classes as shown in HI-STORM CoC Appendix B, Table 2.1-3: • GE7 (8x8 with two water rods): Array/Class 8x8C • GE9 (8x8 with one central water rod): Array/Class 8x8D • SVEA-96+: Array/Class 10x10C • GE14: Array/Class 10x10A The fuel selection procedures (References 6.31.14 and 6.31.15) are used to ensure the initial enrichment, cooling time, decay heat, and burnup of the assemblies chosen for dry storage comply with the limits in the CoC. **Specification 2.1.1.b** Specification 2.1.1.b establishes loading requirements for stainless steel clad fuel mixed with zirconium-based clad fuel. This requirement is not applicable to the

Table 3, CoC Appendix B — Approved Contents and Design Features

Approved Contents and Design Features	Evaluation
2.1 Fuel Specifications and Loading Conditions (cont'd)	Hope Creek ISFSI because Hope Creek fuel rods are all clad with zirconium-based material. **Specification 2.1.1.c** Specification 2.1.1.d establishes loading requirements for BWR fuel in the 6x6A, 6x6B, 6x6C, 7x7A, and 8x8A array/classes. These requirements are not applicable to the Hope Creek ISFSI because the specified array/classes do not apply to Hope Creek spent fuel. See the discussion for CoC Section 2.1.1.a above for the array/classes applicable to Hope Creek spent fuel. **Specification 2.1.1.d** Specification 2.1.1.e establishes loading requirements for BWR fuel in array/classes 10x10D and 10x10E with stainless steel channels. These requirements are not applicable to the Hope Creek ISFSI because all Hope Creek 10x10 fuel is in array/class 10x10A or 10x10C as discussed above for CoC Section 2.1.1.a. **Specifications 2.1.2 and 2.1.3** These requirements pertain to uniform fuel loading and regionalized fuel loading in the MPC, respectively. The location of each spent fuel assembly in the MPC is documented by fuel assembly identification number and MPC storage location to verify compliance with the applicable uniform or regionalized storage requirements. Each spent fuel assembly that is to be loaded into an MPC is concurrently verified to be the correct fuel assembly prior to moving the assembly, and the storage location in the MPC is concurrently verified to be the correct location prior to inserting the fuel assembly into the MPC. A final independent verification of the fuel assembly identification and the MPC fuel storage location is made prior to MPC lid installation. All cask fuel selection and loading activities, including verification of location in the MPC, are governed by procedures (References 6.31.14 through 6.31.17).
2.2 Violations	Procedures are used to comply with the requirements of CoC Appendix B, Section 2.2 in the event that a fuel loading violation occurs. Fuel loading violations have been incorporated into the site Reportability Action Level (RAL) process to ensure such violations are reported in accordance with this CoC requirement (Hope Creek Event Classification Guide, RAL 11.1.3.a).
2.3 Not Used	None required.

Table 3, CoC Appendix B — Approved Contents and Design Features

Approved Contents and Design Features	Evaluation
2.4 Decay Heat, Burnup, and Cooling Time Limits for ZR-Clad Fuel	This section of CoC Appendix B specifies the limits on decay heat, burnup, and cooling time for fuel permitted to be loaded into the HI-STORM 100 System. All cask fuel selection and loading activities, including verification of these fuel limits, are governed by procedure (Reference 6.31.15).
3.0 DESIGN FEATURES	This section of CoC Appendix B establishes requirements on site conditions and certain cask and ancillary equipment design features important to safe spent fuel storage at the ISFSI using the generically certified HI-STORM 100 System.
3.1.1 Site Location	Specification 3.1.1 is a simple statement that reiterates the permission granted in 10 CFR 72, Subpart K for 10 CFR 50 license holders to operate an ISFSI under a Part 72 general license using an NRC-certified cask. No further evaluation is required.
3.2 Design Features Important for Criticality Control	This CoC section establishes limits for certain design features deemed important to criticality control by the NRC for the various HI-STORM 100 System MPC models. Specifications 3.2.1, 3.2.4, and 3.2.5 apply to PWR MPCs and are not evaluated further at this time because Hope Creek is a BWR plant. The PWR MPC models will be addressed in a revision to this report, as applicable, when the Salem plant spent fuel is evaluated for storage at the ISFSI. Specification 3.2.3 also does not apply to Hope Creek fuel because these requirements apply to a specialty BWR MPC (MPC-68F), which was custom-designed for a particular type of BWR fuel not used at Hope Creek. Hope Creek fuel may be stored in the MPC-68 and/or -68FF model canisters governed by Specification 3.2.2 as discussed below. Specifications 3.2.6 through 3.2.8 apply to all MPC models used for storage of spent fuel in the HI-STORM 100 System and are evaluated below for use at Hope Creek. Hope Creek exclusively uses MPCs equipped with METAMIC™ neutron absorber. Therefore, CoC requirements related to Boral neutron absorber are not applicable and Boral-equipped MPCs may not be used to store HCGS fuel without a revision to this report.
3.2.2 MPC-68 and MPC-68FF	This specification establishes the following limits on the MPC-68/68FF model fuel basket design and fabrication: 1. Fuel cell pitch: $\geq$ 6.43 inches 2. ^{10}B loading in the METAMIC™ neutron absorber: $\geq$ 0.0310 g/cm^2 The fuel cell pitch and ^{10}B loading of the METAMIC™ neutron absorbers in the MPC are verified as part of MPC fabrication. Certification that each MPC meets these technical specification limits is provided by the CoC holder (Holtec International) in the Component Completion Record (CCR) for each serial number MPC. Each fabricated MPC-68/68FF is quality-control checked to ensure that it meets the specific design features for criticality and certified as such. A CCR cannot be issued if an as-built MPC does not meet these CoC design feature requirements. CCRs for each loaded MPC are part of the quality document file for the hardware provided by the CoC holder.

Table 3, CoC Appendix B — Approved Contents and Design Features

Approved Contents and Design Features	Evaluation
3.2.6 Fuel Spacers	Specification 3.2.6 requires that fuel spacers be sized to ensure that the active fuel region of intact fuel assemblies remains within the neutron poison region of the MPC basket with water in the MPC. All Hope Creek fuel nominally ranges from 176.2 to 176.4 inches in length (Reference 6.42). Therefore, consistent with HI-STORM FSAR Table 2.1.10, no fuel spacers are required to maintain the active fuel region of Hope Creek spent fuel in the appropriate location in the MPC with respect to the neutron absorber.
3.2.7 Boron Carbide Content	Specification 3.2.7 requires the boron carbide (B_4C) content in the METAMIC™ neutron absorber to be $\leq$ 33.0 wt. %. Similar to the fuel basket design requirements in Specification 3.2.2, the boron carbide content in the METAMIC™ neutron absorbers is verified as part of MPC fabrication. Certification that each MPC meets this technical specification limit is provided by Holtec in the CCR for each serial number MPC.
3.2.8 Neutron Absorber Tests	Specification 3.2.8 incorporates the language in HI-STORM FSAR Section 9.1.5.3 pertaining to neutron absorber testing into the CoC by reference. Neutron absorber testing is verified to meet these requirements by the CoC holder and documented in the CCR for each serial number MPC and/or maintained in Holtec's records management system.
3.3 Codes and Standards	This specification establishes the governing codes for the HI-STORM 100 System. The governing code for the construction and structural design of the HI-STORM 100 System MPC, HI-TRAC transfer cask, and the metal components in the HI-STORM overpack is the 1995 edition of the ASME Boiler and Pressure Vessel Code (ASME Code), with addenda through 1997, except for Sections V and IX. The latest effective editions of Sections V and IX may be used for activities governed by those sections (NDE and welding). The governing code for the concrete in the HI-STORM overpack is American Concrete Institute (ACI) 349-1985, as clarified in cask FSAR Appendix 1.D. NRC-approved alternatives to the ASME Code are listed in Table 3-1 of this CoC section. New or revised alternatives must be submitted to the NRC for approval prior to implementation in accordance with CoC Section 3.3.2. Alternatives to the ASME Code are requested by the CoC holder. Holtec assures that all applicable Code requirements are met during fabrication of the cask components. No PSEG action or further evaluation is required.
3.4 Site-Specific Parameters and Analyses	This CoC section establishes various requirements to be evaluated against site-specific conditions at the plant to ensure the generic cask design is bounding for the site. Each parameter is discussed separately below.

Table 3, CoC Appendix B — Approved Contents and Design Features

Approved Contents and Design Features	Evaluation
3.4.1 Average Site Temperature	The maximum average yearly temperature on site must not exceed 80°F. As documented in Table 2.3-12 of the Hope Creek UFSAR, the mean maximum average yearly annual temperature at the Hope Creek site is 53.1°F, which is less than the 80°F acceptance criterion, and is therefore in compliance with the CoC.
3.4.2 Extreme Site Temperature	The 3-day average temperature extremes must be greater than -40°F and less than 125°F. The lowest and highest hourly temperatures measured at the Hope Creek site are -1°F and 94°F, respectively, as stated in Hope Creek UFSAR Table 2.3-12. The low temperature extremes at the Hope Creek site (averaged over a 3 day period) are greater than –40°F, and the high temperature extreme is less than 125°F. Therefore, the Hope Creek site temperature extremes are in compliance with the CoC.
3.4.3 Seismic Criteria	The seismic criteria in Section 3.4.3 of Appendix B to the HI-STORM CoC are presented first as a test to determine whether the site seismic accelerations require the HI-STORM casks to be anchored to the ISFSI pad. If yes, specific criteria for the cask anchorage design must be met. If no, the casks may be deployed in a free-standing configuration, subject to meeting a specific inequality pertaining to cask sliding and overturning on the ISFSI pad. The design basis earthquake (DBE) resultant horizontal and vertical accelerations at the onsite ISFSI storage pad are less than the values in Specification 3.4.3.c.i, as discussed in Section 5.2.1.5 of this report. Therefore, the casks may be deployed in the free-standing mode at the Hope Creek ISFSI. The site seismic accelerations do not meet the inequality for free-standing casks in Specification 3.4.3.a. The detailed evaluation of DBE effects at the ISFSI storage pad, including a discussion of the alternative to meeting the inequality and the evaluation of degraded pad/cask interface friction (such as due to icing) is provided in Section 5.2.1.5 of this report.
3.4.4 Flooding	A flood water velocity of 15 ft/sec at the cask location and a submergence depth of 125 feet of water must not be exceeded. The HI-STORM 100 System casks at the ISFSI storage pads are not subject to submergence due to flooding to a depth in excess of 125 feet. The 15 fps flood water velocity is also not exceeded. A detailed description of the evaluation of flooding conditions at the Hope Creek site, including hurricane-induced wave action, is provided in Section 5.4.1.3 of this report.

Table 3, CoC Appendix B — Approved Contents and Design Features

Approved Contents and Design Features	Evaluation
3.4.5 Fire and Explosion	The potential for fire and explosion shall be addressed based on site-specific considerations. This includes the condition that the on-site transporter fuel tank will contain no more than 50 gallons of diesel fuel while handling a loaded overpack or transfer cask. The vertical cask transporter (VCT) that is used to move a loaded cask to the onsite ISFSI storage pad and the prime mover used to pull the HI-STORM overpack out of the Reactor Building on the low profile transporter both have fuel tanks that are limited by design to hold no more than 50 gallons of diesel fuel (References 6.32.7 and 6.43). The potential for fires and explosions, based on Hope Creek site-specific hazards and the transport route between the Reactor Building and the ISFSI considerations are addressed in Section 5.4.1.1.
3.4.6 Cask Drop and Tipover	For free-standing casks, the ISFSI pad shall be verified by analysis to limit cask deceleration during design basis drop and non-mechanistic tip-over events to less than or equal to 45 g's at the top of the MPC fuel basket. Analyses shall be performed using methodologies consistent with those described in the HI-STORM 100 FSAR. A lift height above the ISFSI pad is not required to be established if the cask is lifted with a device designed in accordance with ANSI N14.6 and having redundant drop protection features. The ISFSI pad thickness, concrete compressive strength, and reinforcing bar design meet the limits for Set 'A' in HI-STORM FSAR Table 2.2.9. However the ISFSI pad subgrade modulus of elasticity exceeds the 28,000 psi limit in the HI-STORM FSAR (Reference 6.18, Attachment J). This CoC specification permits a site-specific drop and tipover analysis to be performed if this is the case. Because the VCT is designed in accordance with ANSI N14.6 with redundant drop protection features (Reference 6.8), a cask drop is not postulated or analyzed. However, the non-mechanistic tipover must be analyzed. The site-specific analysis of a HI-STORM 100S Version B overpack tipover onto the ISFSI pad was performed. The results of the analysis show that the deceleration at the top of the fuel for this event is 39.2 g's (Reference 6.36). This value is less than the HI-STORM 100 System design basis value of 45 g's. Therefore, this CoC requirement is met. Because the HI-STORM overpacks will be handled with a device designed in accordance with ANSI N14.6 and having redundant drop protection features (Reference 6.8), there is no lift height restriction above the ISFSI pad. However, as a defense-in-depth measure, the cask will be carried no higher and no longer than necessary above the pad surface. During construction of the ISFSI pads, a section of the west pad (Pad No.1, Section 1A) was found to have a problem with water ponding. The repair for this problem was performed with grout, which has a compressive strength greater

Table 3, CoC Appendix B — Approved Contents and Design Features

Approved Contents and Design Features	Evaluation
3.4.6 Cask Drop and Tipover (cont'd)	than the maximum permitted value of 4,200 psi. This repair has been evaluated by Holtec as a supplier manufacturing deviation report (SMDR No. 1410, Rev. 2) and found to be acceptable as-is via Holtec 72.48 No. 778, Revision 2. Therefore, this section of pad may be used to deploy casks.
3.4.7 Berms and Shield Walls	In cases where engineered features (i.e., berms and shield walls) are used to ensure that the requirements of 10CFR72.104(a) are met, such features are to be considered important to safety and must be evaluated to determine the applicable Quality Assurance category. No engineered features such as berms or shield walls are credited in the dose analysis performed to demonstrate compliance with the dose limits of 10 CFR 72.104(a) for the Salem/Hope Creek ISFSI. Therefore, this requirement is not applicable.
3.4.8 Working Area Ambient Temperature	Loading operations, transport operations, and unloading operations shall only be conducted with working area ambient temperatures greater than or equal to 0°F. Procedures are used to ensure that the working area ambient temperature is greater than or equal to 0° F during loading operations, transport operations, and unloading operations (References 6.31.3, 6.31.5, 6.31.7, 6.31.8, and 6.31.9).
3.4.9 Site-Specific Events	For those users whose site-specific design basis includes an event or events (e.g. flood) that result in the blockage of any overpack inlet or outlet air ducts for an extended period of time (i.e., longer than the total Completion Time of LCO 3.1.2), an analysis or evaluation may be performed to demonstrate adequate heat removal is available for the duration of the event. Adequate heat removal is defined as fuel cladding temperatures remaining below the short-term temperature limit. If the analysis or evaluation is not performed, or if fuel cladding temperature limits are unable to be demonstrated by analysis or evaluation to remain below the short-term temperature limit for the duration of the event, provisions shall be established to provide alternate means of cooling to accomplish this objective. The evaluation of flooding at the Hope Creek ISFSI site that could submerge any overpack inlet or outlet air ducts for an extended period of time is discussed in Sections 5.4.1.3 and 5.4.1.4 of this report. In summary, adequate heat removal is maintained for the duration of the flood event.
3.4.10 Fuel Cladding Exposure to Air (CoC Amendment 3)	Fuel cladding, while in the MPC, must be covered at all times with water or an inert gas. This requirement reflects a fuel-in-air degradation phenomenon described in Reference 6.53. Except for draining a small amount of water from the MPC for lid welding operations, the HI-STORM FSAR operating procedures (ALARA Warning preceding Step 8.1.5.2.b) and applicable Hope Creek cask loading procedures (References 6.31.3 and 6.31.6) require inert gas in the MPC. In this "welding" configuration, water continues to cover the fuel cladding. When the water is completely drained for canister drying, helium is used to assist with blowdown and the canister cavity is never exposed to air during drying. Therefore, this CoC requirement is met.

Table 3, CoC Appendix B — Approved Contents and Design Features

Approved Contents and Design Features	Evaluation
3.5 Cask Transfer Facility (CTF)	Lifting of a loaded HI-TRAC transfer cask and MPC is not performed outside of Hope Creek structures governed by 10 CFR 50. Therefore, no CTF is required and CoC Appendix B, Section 3.5 is not applicable to the Salem/Hope Creek ISFSI.
3.6 Forced Helium Dehydration System	This specification establishes requirements for the Forced Helium Dehydration (FHD) System, if used for canister drying instead of vacuum drying. PSEG Nuclear is not using the FHD System. Therefore, this CoC requirement is not applicable and no evaluation is required under this subsection. This evaluation will require revision in the future if PSEG chooses to use the FHD System in lieu of vacuum drying.
3.7 Supplemental Cooling System	The Supplemental Cooling System (SCS) is a water circulation system for cooling the MPC inside the HI-TRAC transfer cask during on-site transport. Use of the SCS is required by LCO 3.1.4 for HI-TRAC operation with an MPC containing one or more high burnup (> 45,000 MWD/MTU) fuel assemblies or if the MPC has a total heat load greater than 28.74 kW. The HI-STORM casks loaded at the Salem/Hope Creek ISFSI will not contain any fuel assemblies burned greater than 45,000 MWD/MTU at this time. Thus, the supplemental cooling system is not required at this time. Therefore, this CoC requirement is not applicable and no evaluation is required under this subsection. This report will require revision to address the use of a supplemental cooling system prior to loading any fuel assemblies classified as high burnup fuel.
3.8 Combustible Gas Monitoring During MPC Lid Welding	During MPC lid welding operations, combustible gas monitoring of the space under the MPC lid is required, to ensure that there is no combustible mixture present in the welding area. This requirement is implemented by procedure (Reference 6.31.27).

APPENDIX 2

CASK CoC AND FSAR APPLICABILITY

The table below documents the applicable HI-STORM 100 System Certificate of Compliance (CoC) amendment and Final Safety Analysis Report revision (including approved interim changes[4]) for each serial number Multi-purpose Canister (MPC), HI-STORM overpack, and HI-TRAC transfer cask. This is a living table, updated for each fuel loading campaign.

FUEL LOADING CAMPAIGN	PLANT	COMPONENT MODEL AND SERIAL NUMBER	HI-STORM COC AMNDT	HI-STORM FSAR REVISION	APPROVED INTERIM CHANGES*
2006-07	HC	HI-TRAC 100D Transfer Cask Serial No. 1026-4***	2	3	1026-30R0/670R0 1026-31R0/670R0 1026-32R0/670R0 1026-33R0 1026-40R0/760R0 1026-41R0/766R0
2006-07	HC	MPC-68 Serial Nos. 1021-143 through –146**	2	3	1021-63R2/718R0 1021-67R0/739R0
2006-07	HC	HI-STORM 100S-218 Version B Overpack Serial Nos. 1024-189 through -192	2	3	1024-126R0/822R0
2008	HC	MPC-68 Serial Nos. 1021-147 through –154	3	5	None
2008	HC	HI-STORM 100S-218 Version B Overpack Serial Nos. 1024-193 through -200	3	5	None
2010	HC	MPC-68Serial Nos. 1021-155 through -158	5	7	1021-96R1
2010	HC	HI-STORM 100S-218 Version B Overpack Serial Nos. 1024-201 through -204	5	7	None

* Holtec Engineering Change Order (ECO) number and associated 72.48 number, if applicable (e.g., 1026-30R0/670R0 indicates ECO 1026-30, Revision 0 and 72.48 No. 670, Revision 0).

[4] The term "interim changes" is used here to identify approved, permanent changes to the HI-STORM 100 System licensing and/or design basis made by PSEG Nuclear and/or the CoC holder between formal cask FSAR updates submitted pursuant to 10 CFR 72.248. These changes may have been authorized under the provisions of 10 CFR 72.48 if that regulatory process was determined to be applicable, or under another process (e.g., editorial or administrative change, or program controlled under 10 CFR 50.54). This list does not include one-time changes to address manufacturing deviations that do not result in a change to the generic component design.

** The Component Completion Records for these serial number MPCs also include ECOs 1021-50, -56, 61, and 62. However, all of these ECOs were incorporated into the revisions of the MPC enclosure vessel and MPC-68 fuel basket licensing drawings included in FSAR Revision 3 (Drawings 3923, Rev. 13 and 3928, Rev. 7).

*** Re-certified by Holtec as compliant with all performance requirements in CoC Amendment 3/FSAR Revision 5 and CoC Amendment 5/FSAR Revision 7 (Reference 6.2, Section 1.0.2).

FORM 1

212 REPORT CHANGE REQUEST

Change Request Initiator: Brian Gutherman Change Request Number: 10-01

Change Request Date: 4/8/10 Current 212 Report Revision: 3

212 Report Interim Change _____ OR Full Revision x (Check one)

Description of Change:

Changes are made throughout the document to reflect adoption of HI-STORM CoC Amendment 5 and FSAR Revision 7. Specific changes are listed in 72.48 Coversheet/Screening 10-01.

Reason for Change:

PSEG is choosing to adopt a later CoC amendment and FSAR revision for casks loaded after the first 12. The later amendment allows, among other things, higher heat load fuel to be loaded.

Reference Documents:

DCS Procedures HC.MD-FR.DCS-0001 through -0009

Regulatory Review Documents:

HI-STORM CoC, Amendment 5 (VTD 400004, Sheet 3)
HI-STORM FSAR, Revision 7 (VTD 400006, Sheet 3)

Activities Awaiting Revision:

None.

Initiator Signature	Department	Date
	Licensing	5/17/10

FORM 2

DISPOSITION OF 212 REPORT CHANGE REQUEST

Regulatory Assurance Review Change Request Approved? ☒ Yes ☐ No

10 CFR 72.48: ☒ Screening ☐ Evaluation 72.48 Evaluation* Number: 10-01

PORC Review Required? ☐ Yes ☒ No

SAP Operation for Completing 212 Report Revision (if this is an interim change): NA

Remarks:

*72.48 review only required screening, not full evaluation.

Tim Devik	ext. 3108		5-24-10
Reg. Assur. Reviewer	Phone	Signature	Date

Other Reviews (as applicable):

B. Gustems	Fuels		5-19-10
Reviewer	Dept.	Signature	Date
S. Baker	HC Reactor En'g	Steve Baker	5/20/10
Reviewer	Dept.	Signature	Date

Concurrence:

Pete Macconi	ext. 2396		5/24/10
DCS PM	Phone	Signature	Date
Michael Gaffney	ext. 1224		5/25/10
Reg. Assur. Mgr.	Phone	Signature	Date

72.48 REVIEW COVERSHEET FORM

Station/Unit(s): Hope Creek

Activity/Document Number: PSEG 10 CFR 72.212 Report **Revision Number:** 4

Title: PSEG 10 CFR 72.212 Report

NOTE: For 72.48 Evaluations, information on this form will provide the basis for preparing the biennial summary report submitted to the NRC in accordance with the requirements of 10 CFR 72.48(d)(2).

Description of Activity:
(Provide a brief, concise description of what the proposed activity involves.)

The 212 Report is revised throughout to adopt HI-STORM CoC Amendment 5 and FSAR Revision 7. This entails documenting compliance with all new and revised requirements in these cask licensing basis documents that are applicable to the storage of Hope Creek spent fuel in the HI-STORM 100 System at the ISFSI. Each change is listed in the table below by 212 Report section.

Change No.	212 Report Section	Description of Change
1	1.0, 1st para.	Editorial changes in the 3rd sentence to reflect the fact that, since 2006, PSEG has had casks in storage at the ISFSI and to delete "loss of," and in the 4th sentence, to define "ISFSI."
2	1.0, 2nd para.	Editorial change to delete "Independent Spent Fuel Storage Installation" (it was previously defined) and to delete the words "as updated" for the reference to the cask FSAR. The term "as updated" does not apply because cask users do not necessarily update the licensing basis for loaded casks to the latest FSAR revision.
3	1.0, 3rd para.	Editorial change in the 1st sentence to delete the phrase "It is anticipated that..." to reflect the fact that it is now known that Salem fuel will be stored at the ISFSI.
4	2.0, 1st para.	Editorial change to the last sentence to reflect the fact that the HI-TRAC transfer cask does not need to be uniquely re-certified by Holtec for each user if they adopt a later CoC amendment. That recertification is now documented generically in the cask FSAR.
5	2.0, 2nd para.	Editorial changes to clarify the licensing basis documents that apply to the casks at the ISFSI. CoC Amendment 2 and FSAR Revision 3 apply to the first four casks. CoC Amendment 3 and FSAR Revision 5 apply to the next eight. CoC Amendment 5 and FSAR Revision 7 apply to the 13th and beyond.
6	2.0, new 3rd para.	Editorial clarification to state that Revision 4 to the report adopts CoC Amendment 5 and FSAR Revision 7 for the 2010 and future loading campaigns.
7	3.0, 2nd para.	Editorial change to add "the" before "NRC."
8	3.0.	a) 4th para: Editorial changes to clarify which licensing basis documents apply to which casks at the ISFSI and to add a reference to Appendix 2. b) 5th para: Editorial change to reformat the definition of "Monitored Retrievable Storage" to match standard convention.
9	5.1.1	Editorial change in the 5th sentence to add Amendment 5.
10	5.2.1.4, 3rd para.	a) Editorial change in the 2nd sentence to change "decelerations" to "deceleration values." b) Editorial change in the 3rd sentence to change "vertical cask crawler" to "VCT" to match HI-STORM FSAR terminology ("VCT" was previously defined).
11	5.2.1.5, 5th para	Editorial change to add "also" after "μ is."
12	5.2.1.6, 3rd para.	Editorial change to delete "safe shutdown earthquake" because it was defined previously in the document.
13	5.3.1.1, 1st para.	Removed discussion of the site access road security checkpoint in the 6th and 9th sentences to reflect the checkpoint being removed from service.
14	5.3.1.2, 5th para.	Editorial change in the text after Table 5.3.1-1 to state that the fuel selection procedure ensures both the CoC fuel limits and the 72.104 dose analysis fuel source term assumptions are met. The sentence discussing the fuel source terms not changing in CoC Amendment 3 is also deleted because it is unnecessary based on how the fuel selection procedures for cask loading make sure the CoC and 72.104 dose analysis assumptions are preserved, regardless of the CoC amendment being used.

72.48 REVIEW COVERSHEET FORM

Station/Unit(s): Hope Creek

Activity/Document Number: PSEG 10 CFR 72.212 Report **Revision Number:** 4

Title: PSEG 10 CFR 72.212 Report

Change No.	212 Report Section	Description of Change
15	5.3.1.2, new 9th para.	Editorial change to address enforcement action taken against the CoC holder that affected previously loaded Hope Creek MPCs.
16	Table 5.3.1-2	Editorial correction in the "Location" column to change ""West" to "East" shore of the Delaware River.
17	5.3.2	Editorial change in the 2nd sentence to correct tense.
18	5.4.1.1, 8th para.	Editorial change to revise reference number.
19	5.4.1.4, 1st para.	Editorial change in the 2nd sentence to delete "Section."
20	5.4.1.6, 2nd para.	Editorial change in the 2nd sentence to replace "are" with "is."
21	5.4.1.7, 3rd para.	Editorial change in the 1st sentence to delete the first occurrence of "or."
22	5.4.1.8.2, 2nd para.	Changed the allowable annual average ambient temperature for HI-TRAC in the 1st sentence from 100°F to 80°F to reflect the revised value in the FSAR table.
23	5.4.1.8.3, 1st para.	Editorial change in the 2nd sentence to revise the HI-STORM FSAR section number reference. The previously referenced section of the FSAR has been deleted.
24	5.4.1.9, 1st para.	a) Editorial change in the last sentence to add "top plate" after "overpack lid" and change the referenced HI-STORM FSAR table from Table 4.4.36 to 4.4.7. b) In the last sentence, the top plate temperature is changed from 200°F to 190°F to reflect a change in this HI-STORM FSAR value.
25	5.4.1.12, 1st para. and new 2nd para.	Editorial changes throughout the paragraph to change "deviations" to "changes," to discuss the fact that previous ECO changes have been incorporated into a subsequent FSAR revision, and to refer to Table 5.4.1.12-1 for changes made by the CoC holder against the FSAR revision of record for the latest loading campaign (Revision 7)
26	Table 5.4.1.12-1	a) Editorial change to re-format the table to remove the column listing the CoC holder's 72.48 identification number and the "**" note at the bottom of the table. The CoC holder's 72.48 number can be found on the referenced ECO. b) Editorial changes to describe changes the CoC holder made to the cask FSAR text and table either for an approved amendment request or under their 72.48 program. They are editorial with respect to this 212 Report revision because the CoC holder already approved the changes to the cask FSAR and there is no change to the evaluations in the 212 Report as a result of the cask FSAR changes. Changes described in the table are implemented by procedures, as required. Revisions to the PSEG implementing procedures each receive their own 72.48 reviews.
27	Table 5.4.1.12-2	Change to add FSAR Revision 7 to the affected FSAR revision column. This indicates that the change continues to apply to FSAR Revision 7 as reviewed in this 72.48 screen.
28	5.4.1.14 (new)	Text added to address a new FSAR requirement that for ISFSIs located at high elevations, a unique thermal analysis is required.
29	5.7.1.1	Editorial changes to delete the details of the basis for the Hope Creek ISFSI EAL. This basis information is located in the Hope Creek Event Classification Guideline document and need not be repeated in the 212 Report.
30	5.7.1.2, 1st para.	Editorial change in 2nd sentence to change "Hope Creek Quality Assurance Topical Report" to "Salem and Hope Creek Generating Stations Quality Assurance Topical Report."
31	5.7.1.2, 2nd para.	Editorial change to replace "Hope Creek" with PSEG" to reflect that the site-wide QATR is applicable to both Salem and Hope Creek.
32	5.7.1.2, 3rd and 4th para.	Editorial changes to modify the reference number in two places and refer to a new procedure governing this process.
33	5.7.1.5	Editorial change in the 2nd sentence to revise the reference number.

72.48 REVIEW COVERSHEET FORM

Station/Unit(s): Hope Creek

Activity/Document Number: PSEG 10 CFR 72.212 Report **Revision Number:** 4

Title: PSEG 10 CFR 72.212 Report

Change No.	212 Report Section	Description of Change
34	6.0	Editorial changes to: a) Update the versions of the CoC and FSAR to include Amendment 5 and Revision 7, respectively. b) Update the SER reference to reflect CoC Amendment 5. c) Update revision levels of various procedures d) Delete Reference 6.31.12 and move "Precautions Against Fire to Reference 6.54.1 under its new procedure number, FP-AA-001. e) Revise the title of Reference 6.31.13, Procedure HC.OP-AB.MISC-0004 to reflect the procedure's title being revised. f) Delete Reference 6.31.19 and move to the Plan Documents section as new Reference 6.33.1. Previous Reference 6.33.1 (NC.NA-AP.ZZ-0024) is no longer an active procedure. g) Re-name Reference 6.33.2 to change "Hope Creek Quality Assurance Topical Report" to "Salem and Hope Creek Generating Stations Quality Assurance Topical Report" and indicate the document's new ID number, NO-AA-10. h) Add "(ECG)" and deleted the revision number for Reference 6.33.3. i) Added new Reference 6.39. j) Added new References 6.54.1 and 6.54.2 for Nuclear Common procedures.
35	Appendix 1, Introduction	Editorial change to add a paragraph discussing the applicability of different CoC amendments to the casks at the ISFSI.
36	Appendix 1, Table 1	Editorial changes are made to the description of the cask system in Section 1.b of the CoC. These editorial changes continue to accurately reflect the cask hardware used at the Hope Creek ISFSI.
37	Appendix 1, Table 1, Condition 9	Condition 9 of the CoC was revised in Amendment 5 to provide different thermal test requirements for the first cask systems used. The 212 Report is revised to recognize the differing requirements of this condition from CoC Amendments 2 and 3 (for casks 1-12) and CoC Amendment 5 (for casks 13 and higher). The Hope Creek compliance statement for this CoC condition remains the same for all three amendments. That is, the fuel selection procedures at Hope Creek do not permit loading high burnup fuel or result in casks exceeding the heat load threshold requiring use of the Supplemental Cooling System or performance of the thermal test.
38	Appendix 1, Table 1, Condition 10	Editorial: Condition 10.g of the CoC was revised in Amendment 5 to add "if applicable" to the condition. The 212 Report was revised to accurately describe the evolution of the requirements of Condition 10 over CoC Amendments 2, 3, and 5, and to explain that Condition 10.g is not applicable because the Supplemental Cooling System is not used at Hope Creek.
39	Appendix 1, Table 1, Condition 12	Editorial: The compliance statement for CoC Condition 12 has been revised to state that CoC Amendment 5 is being used to load casks in 2010 and later.
40	Appendix 1, Table 2, LCO 3.1.1	a) Editorial: The statement "(Amendment 3 changes shown in italicized text)" was deleted. b) Several changes to LCO 3.1.1 were made in Amendment 5 and are reflected in the 212 Report. Hope Creek DCS procedures have been changed appropriately to comply with the revised CoC requirements, as applicable.
41	Appendix 1, Table 2, LCO 3.1.2	a) Several changes to LCO 3.1.2 were made in Amendment 5 and are reflected in the 212 Report. Hope Creek DCS procedures have been changed appropriately to comply with the revised CoC requirements, as applicable. b) A change is made to the description of compliance to indicate that the casks are *equipped* with temperature monitoring instrumentation, rather than stating that PSEG is choosing to use the temperature monitoring option.
42	Appendix 1, Table 2, LCO 3.1.3	Editorial: The statements of compliance for the two different versions of LCO 3.1.3 (between CoC Amendments 2 and 3/5) are modified to correct a reference to the DCS procedure governing MPC unloading operations.

72.48 REVIEW COVERSHEET FORM

Station/Unit(s): Hope Creek

Activity/Document Number: PSEG 10 CFR 72.212 Report **Revision Number:** 4

Title: PSEG 10 CFR 72.212 Report

Change No.	212 Report Section	Description of Change
43	Appendix 1, Table 2, LCO 3.1.4	LCO 3.1.4 was modified in CoC Amendment 5 to require use of the Supplemental Cooling System if the cask exceeds a certain heat load in addition to the previous requirement for SCS use if high burnup fuel is in the cask. The statements of compliance are split to recognize the applicability of the two different version of this LCO to the first 12 casks and the 13th and higher casks. In both cases, the LCO is not applicable because the current fuel selection procedures prohibit high burnup fuel from being loaded and cask heat loads are prohibited from exceeding the threshold requiring SCS use.
44	Appendix 1, Table 2, LCO 3.2.2	Editorial: Reference numbers are changed to reflect rearrangement of the reference section.
45	Appendix 1, Table 2, CoC Table 3-1	Editorial: A new row is added to the table in the 212 Report to specifically address the requirements in CoC Table 3-1, which augment the requirements in LCO 3.1.1 for MPC drying. The 212 Report re-states the CoC requirements and refers to the Hope Creek DCS implementing procedures.
46	Appendix 1, Table 2, CoC Table 3-2	Editorial: A new row is added to the table in the 212 Report to specifically address the requirements in CoC Table 3-2, which augment the requirements in LCO 3.1.1 for MPC helium backfill. The 212 Report re-states the CoC requirements and refers to the Hope Creek DCS implementing procedures.
47	Appendix 1, Table 2, TS 5.5	Editorial: The reference numbers are clarified in the last sentence of the next-to-last paragraph
48	Appendix 1, Table 2, TS 5.7	Editorial: Reference numbers are changed to reflect re-arrangement of the reference section.
49	Appendix 1, Table 3, TS 2.1	a) Editorial: The 212 Report has been revised to reflect the deletion of TS 2.1.1.c and the re-numbering of the subsequent TS in this section. Former TS 2.1.1.c addressed the loading of damaged fuel in a uniform fuel loading scheme. This is a one-time requirement implemented at the time of fuel selection that applied to previously loaded casks and can now be deleted from the 212 Report for casks loaded under CoC Amendment 5. b) Editorial: The re-numbered remaining TS in Section 2.1.1 remain not applicable to Hope Creek
50	Appendix 1, Table 3, TS 2.3	Editorial: A row is added to the table in the 212 Report to address this CoC section, which is not used.
51	Appendix 1, Table 3, TS 2.4	Editorial: A new row is added to the table in the 212 Report to address TS 2.4 and refer to the fuel selection procedures.
52	Appendix 1, Table 3, TS 3.4.1	Editorial: An improper capitalization is corrected.
53	Appendix 1, Table 3, TS 3.4.6	Editorial: The term "cask crawler" is replaced with "VCT" in the 2nd paragraph and the word "now" is deleted in the last paragraph.
54	Appendix 1, Table 3, TS 3.4.9	Editorial: In the 2nd paragraph, the word "ISFSI" is added to the 1st sentence and a summary statement is added at the end.
55	Appendix 1, Table 3, TS 3.4.10	Editorial: "Hope Creek operating procedure" is changed to "cask loading procedures," the MPC loading procedure is added as a reference, and "helium" is changed to "inert gas" to match the CoC requirement.

72.48 REVIEW COVERSHEET FORM

Station/Unit(s): Hope Creek

Activity/Document Number: PSEG 10 CFR 72.212 Report **Revision Number:** 4

Title: PSEG 10 CFR 72.212 Report

Change No.	212 Report Section	Description of Change
56	Appendix 1, Table 3, TS 3.7	Editorial: The referenced LCO number is corrected and the heat load threshold requiring use of the Supplemental Cooling System is added.
57	Appendix 2	Editorial: a) The serial numbers, CoC and FSAR versions, and applicable ECOs for the MPCs to be used in the 2010 loading campaign are added. b) Note *** is revised to add CoC Amendment 5 and FSAR Revision 7.

Reason for Activity:
(Discuss why the proposed activity is being performed.)

PSEG is choosing to adopt later HI-STORM 100 System CoC and FSAR versions for Hope Creek casks loaded after the first 12 casks already at the ISFSI. The licensing bases for the first 12 casks remains what they were at the time of loading as discussed in the 212 Report, Appendix 2. Adoption of a new cask licensing basis requires the site 212 Report to be revised to address compliance with the new and revised requirements in the later licensing basis documents. This revision also updates the references to reflect the latest version of these documents.

Effect of Activity:
(Discuss how the activity impacts ISFSI operations, design bases, or safety analyses described in the cask FSAR or 212 Report.)

The changes to the CoC and associated FSAR changes have been reviewed and approved by the NRC and cannot be changed unless the CoC holder requests and receives NRC approval. The effect of each applicable change is evaluated and addressed in the 212 Report. Other changes to the FSAR made by the CoC holder after the last adopted FSAR revision under the provisions of 10 CFR 72.48 are also reflected, as applicable, in this 212 Report revision. The overall processes for loading and unloading a spent fuel cask and placing it at the ISFSI are largely unchanged. There are some changes to the details that require commensurate changes in the 212 Report and in the DCS implementing procedures to ensure continued compliance. Each procedure revision will have its own 72.48 review.

Summary of Conclusion for the Activity's 72.48 Review:
(Provide justification for the conclusion, including sufficient detail to recognize and understand the essential arguments leading to the conclusion. Provide more than a simple statement that a 72.48 Screening, 72.48 Evaluation, or a CoC Amendment Request, as applicable, is not required.)

The changes to the 212 Report made by PSEG reflect changes made by the CoC holder in the amended CoC and revised cask FSAR. Changes to the 212 Report in this revision are made strictly to address the changes in the cask CoC and FSAR since the last version of these documents adopted by PSEG and do not create any changes to those documents. Thus, the 72.48 Screening for this 212 Report revision indicates that a change to the CoC is not required and no changes to the cask FSAR are required. A full 72.48 evaluation is not required because there are no adverse changes among the 212 Report changes. NRC prior approval of the changes to the 212 Report is also not required because the changes to the CoC, as reflected in the 212 Report, have already approved by the NRC. Changes to the cask FSAR made by the CoC holder either to reflect the amended CoC or under 10 CFR 72.48 since the last cask FSAR revision adopted by PSEG, were reviewed for applicability as addressed in this 212 Report revision.

Attachments:
Attach all 72.48 Review forms completed, as appropriate.
(NOTE: if both a Screening and Evaluation are completed, no Screening No. is required.)

72.48 REVIEW COVERSHEET FORM

Station/Unit(s): Hope Creek

Activity/Document Number: PSEG 10 CFR 72.212 Report **Revision Number:** 4

Title: PSEG 10 CFR 72.212 Report

Forms Attached: (Check all that apply.)

x	**Applicability Review**				
x	**72.48 Screening**	**72.48 Screening No.**	H10-01	**Rev.**	0
	72.48 Evaluation	**72.48 Evaluation No.**		**Rev.**	

72.48 APPLICABILITY REVIEW FORM

Activity/Document Number: PSEG 10 CFR 72.212 Report **Revision Number:** 4

Address the questions below for all aspects of the activity. If the answer is "yes" for any portion of the activity, apply the identified process(es) to that portion of the activity. Note that it is not unusual to have more than one process apply to a given activity. See Section 4 of the 72.48 Resource Manual (RM) (LS-AA-105-1000) for additional guidance.

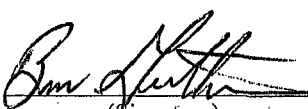
I.	Does the proposed activity involve a change to the:		
	1. CoC, including appendices (10CFR72.244)?	x NO __ YES	See Section 4.2 of the RM
	2. Conditions of License, i.e., Quality Assurance program (10CFR50.54(a))? Security Plan (10CFR50.54(p))? Emergency Plan (10CFR50.54(q))?	 x NO __ YES x NO __ YES x NO __ YES	See Section 4.3.4 of the RM
	3. Specific Exemptions (10CFR72.7)?	x NO __ YES	See Section 4.2 of the RM
	4. Radiation Protection Program (10CFR20)?	x NO __ YES	
	5. Fire Protection Program (applicable Part 50 UFSAR or operating license condition)?	x NO __ YES	See Section 4.3.7 of the RM
	6. Programs controlled by the plant Operating License or the Technical Specifications (such as the ODCM)?	x NO __ YES	
	7. Environmental Protection Program?	x NO __ YES	
	8. Other programs controlled by other regulations?	x NO __ YES	See Section 4.3.4 of the RM
II.	Does the proposed activity involve a change to the:		
	1. Cask FSAR (including documents incorporated by reference) that is excluded from the requirement to perform a 72.48 Review by NEI 96-07, Appendix B?	x NO __ YES	See Section 4.3.5 of the RM
	2. Managerial or administrative procedures governing the conduct of facility operations (subject to the control of 10CFR50, Appendix B)?	x NO __ YES	See Section 4.3.6 of the RM
	3. Regulatory commitment not covered by another regulation based change process (see NEI 99-04)?	x NO __ YES	See Section 4.2.3/4.2.4 of the 50.59 RM (LS-AA-104-1000)
III.	Does the proposed Activity involve a change to the Part 50 operating facility (subject to control by 10 CFR 50.59)?	x NO __ YES	See LS-AA-104

Check one of the following:

☐ **If** all aspects of the activity are controlled by one or more of the above processes, **then** a 72.48 Screening is not required and the activity may be implemented in accordance with its governing procedure.

☒ **If** any portion of the Activity is **not** controlled by one or more of the above processes, then process a 72.48 Screening for the portion not covered by any of the above processes. The remaining portion of the activity should be implemented in accordance with its governing procedure.

Signoff:

72.48 Screener/(72.48 Evaluator) (Circle One) Brian Gutherman/March 3, 2012 (Print name)/(Qual. expiration date) Sign:  (Signature) Date: 5/21/10

72.48 SCREENING FORM

72.48 Screening No. H10-01 **Rev. No.** 0

Activity/Document Number: PSEG 10 CFR 72.212 Report **Revision Number:** 4

I. 72.48 Screening Questions (Check correct response and provide separate written response providing the basis for the answer to each question)(See Section 4 of the Resource Manual (RM) (LS-AA-105-1000) for additional guidance):

See 72.48 cover sheet for a full listing of changes. The responses to the screening questions below apply to the non-editorial changes listed in the cover sheet: Change Nos 13, 22, 24b, 27, 28, 37, 40b, 41a, 41b, and 43.

1. Does the proposed Activity involve a change to an SSC that adversely affects a cask FSAR described design function? (See Section 4.3.10 of the RM) ___ YES _x_ NO

   The changes made to the 212 Report were largely editorial. The responses to this question for the non-editorial changes are addressed individually below:

   Change 13

   This change to the 212 Report removes the discussion of the site security checkpoint to reflect its removal from service. This checkpoint was located on the site access road about a mile from the Salem/Hope Creek site Protected Area (PA). In the past, it served as a first check to ensure vehicles and personnel seeking access the site, including visitors and badged personnel, are authorized to do so. This included access to the site parking areas, in-processing center, headquarters building and other facilities outside the plant PA. The ISFSI itself is located inside the plant PA. There is no credit taken for this checkpoint in the design and analysis of the ISFSI and the casks to withstand a malevolent act, such as a vehicle bomb. The ISFSI is appropriately designed and analyzed to ensure the casks can withstand a design basis threat of this type approaching the ISFSI from outside the protected area to the nearest point of the vehicle barrier system, unabated. Therefore, this change does not involve a change to an SSC that adversely affects a cask FSAR-described design function.

   Change 22

   This change to the 212 Report changes the maximum permitted annual average ambient temperature for use of the HI-TRAC transfer cask from 100°F to 80°F. This 212 Report change is a verbatim reflection of a change made by the CoC holder in Table 2.2.2 of the cask FSAR. The reduction of this temperature value was authorized by Holtec under their change control program. The annual average temperature at the ISFSI site is 53.1°F as shown in Hope Creek UFSAR Table 2.3-9. The site condition is bounded by the generic design assumption with significant margin. Therefore, this change does not involve a change to an SSC that adversely affects a cask FSAR-described design function.

   Change 24b

   This change reduces the computed overpack top lid temperature from 200°F to 190°F to be consistent with the same change made in HI-STORM FSAR Table 4.4.7. This 10°F reduction in the estimated overpack top lid temperature is inconsequential because the temperature is cited in the 212 Report to demonstrate that the lid is warm enough to inhibit the accumulation of snow and ice on the top of the cask. This statement remains true at 190°F. Therefore, this change does not involve a change to an SSC that adversely affects a cask FSAR-described design function.

   Change 27

   This change adds a reference to HI-STORM FSAR Revision 7 to the list of three site-specific deviations from the cask FSAR in Table 5.4.1.12-2 of the 212 Report. Each of these deviations remains applicable to FSAR Revision 7 because the information in the cask FSAR to which these deviations apply has not changed in FSAR Revision 7. Therefore, this change does not involve a change to an SSC that adversely affects a cask FSAR-described design function.

Change 29

This change addresses a new HI-STORM FSAR requirement that ISFSIs located at elevations greater than 1500 feet require a site-specific thermal analysis for the cask system. The elevation of the Salem/Hope Creek ISFSI site is well below 1500 feet and no unique thermal analysis is required. Therefore, this change does not involve a change to an SSC that adversely affects a cask FSAR-described design function.

Change 38

This change addresses the fact that Condition 9 of the CoC, in its two different forms, applies to different casks at the ISFSI. In CoC Amendment 5, Condition 9 was modified to require a different type of thermal test for the first casks placed in service with a heat load greater than or equal to 20 kW. This is addition to the requirement to perform tests on the Supplemental Cooling System and report the results to the NRC. The Hope Creek fuel selection procedures include appropriate controls to preclude loading high burnup fuel and require thermal validation testing if the cask heat load is greater than or equal to 20 kW. The fuel handling procedures precludes the loading of high burnup fuel by the inclusion of statements that use of the FHD System and Supplemental Cooling System (required for high burnup fuel) are not discussed in the 212 report (and are, therefore, not permitted to be used). Thus, this Condition remains not applicable to Hope Creek casks at this time and a 212 report revision will be required before FHD or SCS may be used. Therefore, this change does not involve a change to an SSC that adversely affects a cask FSAR-described design function.

Change 41b

This change addresses changes to LCO 3.1.1 in Appendix A to the CoC. Among the changes is a time limit for vacuum drying casks above a certain heat load and several changes to the Required Actions of the LCO. The changes to the 212 Report simply reflects the changes to the wording of the LCO. The DCS implementation procedures have been revised to incorporate the changes to the LCO. Therefore, this change does not involve a change to an SSC that adversely affects a cask FSAR-described design function.

Change 42a

This change addresses changes to LCO 3.1.2 in Appendix A to the CoC. Among the changes is that the heat removal system is not considered inoperable if the air ducts are 50% blocked or less and new, separate temperature monitoring acceptance criteria are provide in the Surveillance Requirements for PWR and BWR fuel. The change to the 212 Report simply reflects the changes to the wording of the LCO. The DCS implementation procedures have been revised to incorporate the changes to the LCO. Therefore, this change does not involve a change to an SSC that adversely affects a cask FSAR-described design function.

Change 42b

The statement of compliance for LCO 3.1.2 at Hope Creek is modified to clarify that the casks are *equipped* with temperature monitoring instrumentation if PSEG chooses to use this method of complying with the LCO. The previous language implied that PSEG would use this method at all times. This change makes the statement of compliance consistent with the option that the CoC permits. Therefore, this change does not involve a change to an SSC that adversely affects a cask FSAR-described design function.

72.48 Screening No. H10-01 **Rev. No.** 0

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Change 44

This change addresses changes to LCO 3.1.4 in Appendix A to the CoC. This LCO has been modified from Amendments 2/3 to require use of the Supplemental Cooling System for both high burnup fuel and higher heat load casks (> 28.74 kW). The statement of compliance is re-formatted to address the fact that the previous version of the LCO applies to the first 12 casks loaded and the Amendment 5 version applies to casks 13 and higher. The fuel selection procedures currently prohibit casks exceeding this heat threshold from being loaded by including a statement that the SCS is not allowed to be used because it is not discussed in the 212 Report. Thus this LCO remains not applicable to Hope Creek casks at this time and a 212 report revision will be required before SCS may be used. Thus, this LCO does not apply and this change does not involve a change to an SSC that adversely affects a cask FSAR-described design function.

In summary, the above non-editorial changes to the 212 Report were made to reflect changes made by the CoC holder in the cask CoC and supporting FSAR. No changes to or deviations from the cask FSAR are proposed by these changes to the 212 Report. The changes to the 212 Report are being made solely to demonstrate that PSEG continues to comply with the later versions of the cask CoC and FSAR, which will be used to place Hope Creek spent fuel into dry storage in 2010 and later, and to reflect the continued applicability of requirements from earlier CoC amendments to previously loaded casks.

2. Does the proposed Activity involve a change to a procedure that adversely affects how cask FSAR described SSC design functions are performed or controlled? (See Section 4.3.11 of the RM) ___ YES _x_ NO

Please see the 72.48 Cover Sheet for a complete description of all changes to the 212 Report in Revision 4 and refer to the response to Question 1 for a description of the non-editorial changes.

In summary, the above non-editorial changes to the 212 Report were made to reflect changes made by the CoC holder in the cask CoC and supporting FSAR. No changes to or deviations from the cask FSAR are proposed by these changes to the 212 Report. The changes to the 212 Report are being made solely to demonstrate that PSEG continues to comply with the later versions of the cask CoC and FSAR, which will be used to place Hope Creek spent fuel into dry storage in 2010 and later, and to reflect the continued applicability of requirements from earlier CoC amendments to previously loaded casks.

No changes to cask loading procedures or other implementing documents that perform or control cask FSAR-described design function are governed by this 72.48 screening, which applies only to changes to the 212 Report. Changes to the Hope Creek dry cask storage procedures used to comply with CoC Amendment 5 and FSAR Revision 7 are being made under a separate effort and each revised procedure will receive its own 72.48 review.

3. Does the proposed Activity involve an adverse change to an element of a cask FSAR described evaluation methodology, or use of an alternative evaluation methodology, that is used in establishing the design bases or used in the safety analyses? (See Section 4.3.12 of the RM) ___ YES _x_ NO

Please see the 72.48 Cover Sheet for a complete description of all changes to the 212 Report in Revision 4 and refer to the response to Question 1 for a description of the non-editorial changes.

In summary, the above non-editorial changes to the 212 Report were made to reflect changes made by the CoC holder in the cask CoC and supporting FSAR. No changes to or deviations from the cask FSAR are proposed by these changes to the 212 Report. The changes to the 212 Report are being made solely to demonstrate that PSEG continues to comply with the later versions of the cask CoC and FSAR, which will be used to place Hope Creek spent fuel into dry

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storage in 2010 and later, and to reflect the continued applicability of requirements from earlier CoC amendments to previously loaded casks.

The cask system's design and analysis, including the methods used therein are controlled by the CoC holder, which is the design authority for the cask system. The changes made to the 212 Report were largely editorial and the changes that were not editorial were made to reflect changes made by the CoC holder in the cask CoC and supporting FSAR. No changes to cask safety analyses or methods used in those analyses are being made in this 212 Report revision.

4. Does the proposed Activity involve a test or experiment not described in the cask FSAR, where an SSC is utilized or controlled in a manner that is outside the reference bounds of the design for that SSC or is inconsistent with analyses or descriptions in the cask FSAR? (See Section 4.3.13 of the RM) ___ YES _x_ NO

Please see the 72.48 Cover Sheet for a complete description of all changes to the 212 Report in Revision 4 and refer to the response to Question 1 for a description of the non-editorial changes.

In summary, the above non-editorial changes to the 212 Report were made to reflect changes made by the CoC holder in the cask CoC and supporting FSAR. No changes to or deviations from the cask FSAR are proposed by these changes to the 212 Report. The changes to the 212 Report are being made solely to demonstrate that PSEG continues to comply with the later versions of the cask CoC and FSAR, which will be used to place Hope Creek spent fuel into dry storage in 2010 and later, and to reflect the continued applicability of requirements from earlier CoC amendments to previously loaded casks.

The changes made to the 212 Report were largely editorial and the changes that were not editorial were made to reflect changes made by the CoC holder in the cask CoC and supporting FSAR. No changes to cask loading procedures or other implementing documents that perform or control cask operations are governed by this 72.48 screening, which applies only to changes to the 212 Report. Because no cask operating activities are governed directly by the 212 Report, these change do not represent a test or experiment.

5. Does the proposed Activity require a change in the CoC, including appendices? (See Sections 4.2 and 4.3 of the RM) ___ YES _x_ NO

Please see the 72.48 Cover Sheet for a complete description of all changes to the 212 Report in Revision 4 and refer to the response to Question 1 for a description of the non-editorial changes.

The changes made to the 212 Report were largely editorial and the changes that were not editorial were made to reflect changes made by the CoC holder in the cask CoC and supporting FSAR. The changes to the 212 Report were made solely to ensure PSEG continues to comply with the later versions of the cask CoC and FSAR, which will be used to place Hope Creek spent fuel into dry storage in 2010 and later and to reflect the continued applicability of requirements from earlier CoC amendments to previously loaded casks. All changes to the 212 Report are consistent with Amendment 5 of the HI-STORM 100 System CoC.

6. Does the proposed Activity require a change to the PSEG 72.212 Report? (See Section 4.3.9 of the RM) ___ YES _x_ NO

Please see the 72.48 Cover Sheet for a complete description of all changes to the 212 Report in Revision 4 and refer to the response to Question 1 for a description of the non-editorial changes.

This 72.48 screening governs changes to the PSEG 72.212 Report. No additional changes are necessary. These changes are being prepared pursuant to LS-SH-107-1004.

72.48 SCREENING FORM

72.48 Screening No. H10-01 **Rev. No.** 0

Activity/Document Number: PSEG 10 CFR 72.212 Report **Revision Number:** 4

7 Does the Activity involve a change to the 10CFR71 transport CoC/SAR? ___ YES _x_ NO

Please see the 72.48 Cover Sheet for a complete description of all changes to the 212 Report in Revision 4 and refer to the response to Question 1 for a description of the non-editorial changes.

The 10CFR71 CoC and SAR address the dual-purpose design of the Multi-Purpose Canister (MPC) and its transportability in a HI-STAR 100 overpack pursuant to 10CFR71 CoC 9261. The HI-TRAC transfer cask and HI-STORM overpack used for preparation, handling and storage operations under 10 CFR 72, are not transportable components. The changes made to the 212 Report were largely editorial and the changes that were not editorial were made to reflect changes made by the CoC holder in the cask CoC and supporting FSAR. No changes to the MPC design are involved or driven by these changes to the 212 Report. The changes to the 212 Report were made solely to ensure PSEG continues to comply with the later versions of the cask CoC and FSAR, which will be used to place Hope Creek spent fuel into dry storage in 2010 and later and to reflect the continued applicability of requirements from earlier CoC amendments to previously loaded casks. Therefore, there are no changes to the Part 71 CoC/SAR required as a result of these changes to the 212 Report

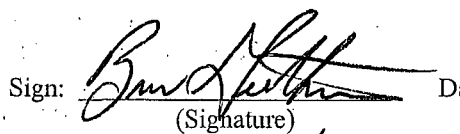
II. List the documents (e.g., cask FSAR, CoC including appendices, 212 Report, other licensing basis, technical, commitments, etc.) reviewed, including sections numbers where relevant information was found (if not identified in the response to each question).

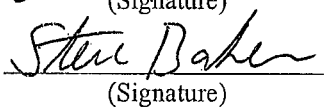
HI-STORM CoC, Amendment 5 (all)
HI-STORM FSAR, Revision 7 (all)

III. Select the appropriate conditions:

x	**If** all questions are answered NO, **then** complete the 72.48 Screening and implement the Activity per the applicable governing procedure.
	If question 1, 2, 3, or 4 is answered YES and question 5 is answered NO, **then** a 72.48 Evaluation shall be performed.
	If questions 1, 2, 3, and 4 are answered NO and question 5 is answered YES, **then** a CoC Amendment is required prior to implementation of the Activity.
	If question 5 is answered YES for any portion of an Activity, **then** a CoC Amendment is required prior to implementation of that portion of the Activity. In addition, **if** question 1, 2, 3, or 4 is answered YES for the remaining portions of the Activity, **then** a 72.48 Evaluation shall be performed for the remaining portions of the Activity.
	If question 6 is answered YES for any portion of an Activity, **then** process a change to the 212 Report in accordance with LS-SH-107-1004.
	If question 7 is answered YES for any portion of the Activity, **then** inform the CoC holder of the change impact on 10CFR71.

IV. Screening Signoffs:

72.48 Screener: Brian Gutherman/March 3, 2012 (Print name)/(Qual. expiration date) Sign:  (Signature) Date: 5/24/10

72.48 Reviewer: Steve Baker/March 11, 2011 (Print name)/(Qual. expiration date) Sign:  (Signature) Date: 5/24/10