



Holtec Center, 555 Lincoln Drive West, Marlton, NJ 08053

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July 22, 2004

Mr. Christopher Regan  
U.S. Nuclear Regulatory Commission  
White Flint Building  
11555 Rockville Pike  
Rockville, MD 20852

Subject: USNRC Docket No. 72-1014, TAC L23657  
HI-STORM 100 Certificate of Compliance 1014  
HI-STORM License Amendment Request 1014-2, Revision 2, Supplement 4  
Proposed Certificate of Compliance Requirement for Cask/Pad Interface Friction

References: 1. Holtec Project 5014

Dear Mr. Regan:

Enclosed please find the following revised documents comprising Supplement 4 to License Amendment Request (LAR) 1014-2, Revision 2. This supplement provides modified proposed changes to the HI-STORM CoC to address potential site-specific reductions in the cask to ISFSI pad interface friction. A new paragraph on this issue has been added to Section 3.4 of Appendix B to the CoC.

The following attachments are provided.

- Replacement pages for the marked-up CoC proposed changes
- Replacement pages for the revised CoC proposed changes

Instructions for updating the marked-up and the revised versions of the HI-STORM CoC are as follows:

1. Insert this cover letter in the front of the LAR notebook.
2. Remove pages 3-14 and 3-15 from Appendix B of the marked-up CoC (2 pages) and insert the revised pages 3-14 and 3-15 from Attachment 1 (2 pages) after existing page 3-13.
3. Remove pages 3-14 and 3-15 from Appendix B of the revised CoC (2 pages) and insert the revised pages 3-14 and 3-15 from Attachment 2 (2 pages) after existing page 3-13.

Please contact the undersigned if you require additional information.

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U. S. Nuclear Regulatory Commission  
ATTN: Christopher Regan  
Document ID: 5014533  
Page 2 of 2

Sincerely,

Evan Rosenbaum, P.E.  
Project Manager, LAR 1014-2

Approval:

Stefan Anton, Dr.-Ing.  
Acting Licensing Manager

Attachments: 1. Replacement Pages for Markup CoC (2 pages)  
2. Replacement Pages for Revised CoC (2 pages)

Distribution: Mr. Christopher Regan, USNRC (with 7 copies of attachments)  
Holtec User's Group  
Holtec User's Group Licensing Committee



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**LAR 1014-2, Revision 2, Supplement 4**

**Attachment 1**

**CoC Changes – Marked-Up Version**

**(2 pages, excluding this sheet)**

**DESIGN FEATURES**

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**3.4 Site-Specific Parameters and Analyses (continued)**

b. *For free-standing casks, under environmental conditions that may degrade the pad/cask interface friction (such as due to icing) the response of the casks under the site's Design Basis Earthquake shall be established using the best estimate of the friction coefficient in an appropriate analysis model. The analysis should demonstrate that the earthquake will not result in cask tipover or cause a cask to fall off the pad. In addition, impact between casks should be precluded, or should be considered an accident for which the maximum g-load experienced by the stored fuel shall be limited to 45 g's.*

cb. For those ISFSI sites with design basis seismic acceleration values higher than those allowed for free-standing casks, the HI-STORM 100 System shall be anchored to the ISFSI pad. The site seismic characteristics and the anchorage system shall meet the following requirements:

i. The site acceleration response spectra at the top of the ISFSI pad shall have ZPAs that meet the following inequalities:

$$G_H \leq 2.12$$

AND

$$G_V \leq 1.5$$

Where:

$G_H$  is the vectorial sum of the two horizontal ZPAs at a three-dimensional seismic site (or the horizontal ZPA at a two-dimensional site) and  $G_V$  is the vertical ZPA.

ii. Each HI-STORM 100 dry storage cask shall be anchored with twenty-eight (28), 2-inch diameter studs and compatible nuts of material suitable for the expected ISFSI environment. The studs shall meet the following requirements:

Yield Strength at Ambient Temperature:  $\geq 80$  ksi

Ultimate Strength at Ambient Temperature:  $\geq 125$  ksi

Initial Tensile Pre-Stress:  $\geq 55$  ksi AND  $\leq 65$  ksi

NOTE: The above anchorage specifications are required for the seismic

(continued)

## DESIGN FEATURES

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### 3.4 Site-Specific Parameters and Analyses (continued)

spectra defined in item 3.4.3.b.i. Users may use fewer studs or those of different diameter to account for site-specific seismic spectra less severe than those specified above. The embedment design shall comply with Appendix B of ACI-349-97. A later edition of this Code may be used, provided a written reconciliation is performed.

iii. Embedment Concrete Compressive Strength:  $\geq 4,000$  psi at 28 days

4. The analyzed flood condition of 15 fps water velocity and a height of 125 feet of water (full submergence of the loaded cask) are not exceeded.
5. 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.
6.
  - a. 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  $\leq 45$  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.
  - b. For anchored casks, the ISFSI pad shall be designed to meet the embedment requirements of the anchorage design. A cask tip-over event for an anchored cask is not credible. The ISFSI pad shall be verified by analysis to limit cask deceleration during a design basis drop event to  $\leq 45$  g's at the top of the MPC fuel basket, except as provided for in this paragraph below. 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 design in accordance with ANSI N14.6 and having redundant drop protection features.
7. 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.

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**LAR 1014-2, Revision 2, Supplement 4**

**Attachment 2**

**CoC Changes – Revised Version**

**(2 pages, excluding this sheet)**

**DESIGN FEATURES**

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**3.4 Site-Specific Parameters and Analyses (continued)**

- b. For free-standing casks, under environmental conditions that may degrade the pad/cask interface friction (such as due to icing) the response of the casks under the site's Design Basis Earthquake shall be established using the best estimate of the friction coefficient in an appropriate analysis model. The analysis should demonstrate that the earthquake will not result in cask tipover or cause a cask to fall off the pad. In addition, impact between casks should be precluded, or should be considered an accident for which the maximum g-load experienced by the stored fuel shall be limited to 45 g's.
- c. For those ISFSI sites with design basis seismic acceleration values higher than those allowed for free-standing casks, the HI-STORM 100 System shall be anchored to the ISFSI pad. The site seismic characteristics and the anchorage system shall meet the following requirements:
  - i. The site acceleration response spectra at the top of the ISFSI pad shall have ZPAs that meet the following inequalities:

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Where:

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- ii. Each HI-STORM 100 dry storage cask shall be anchored with twenty-eight (28), 2-inch diameter studs and compatible nuts of material suitable for the expected ISFSI environment. The studs shall meet the following requirements:

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- iii. Embedment Concrete Compressive Strength:  $\geq 4,000$  psi at 28 days
- 4. The analyzed flood condition of 15 fps water velocity and a height of 125 feet of water (full submergence of the loaded cask) are not exceeded.
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- 7. 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.

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