NRC FORM 699
(9-2003)

U.S. NUCLEAR REGULATORY COMMISSION

CONVERSATION RECORD

DATE: 04/02/2009

TIME: 2:00pm

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU
Tammy Morin, Chuck Bullard, Stephan Anton, Alan Soler

TELEPHONE NO.
856-797-0900

ORGANIZATION
Holtec International

SUBJECT
Discussion of Holtec's proposed supplement to the HI-STORM 100U second RAI submittal

TYPE OF CONVERSATION
- [ ] VISIT
- [ ] CONFERENCE
- [x] TELEPHONE
  - [ ] INCOMING
  - [x] OUTGOING

SUMMARY (Continue on Page 2)

NRC- John Goshen, Gordon Bjorkman

Holtec provided the draft of FSAR text to be revised to clarify one of their responses. See attached. The NRC provided several comments:
First sentence- "proximate structure" should be changed to important to safety to be consistent with other sections of the FSAR and the analyses. Holtec agreed.
Second comment - Holtec discussed its approach to modeling the loads on the surface pad and vertical walls during transporter use. The NRC identified several portions of the analysis that did not completely bound specific conditions. Holtec provided an approach that would address these issues and re-run the analysis. The results to be provided in a followup telcon on 4/03/09. Holtec is still going to provide the supplement on or by April 6.

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ACTION REQUIRED
Telcon with Holtec on April 3, 2009.

NAME OF PERSON DOCUMENTING CONVERSATION
John Goshen

SIGNATURE
John Goshen

DATE
04/02/2009

ACTION TAKEN
Telcon made on 4/03/09

TITLE OF PERSON TAKING ACTION
John Goshen

SIGNATURE OF PERSON TAKING ACTION
John Goshen

DATE
04/03/09

CONVERSATION RECORD (Continued)

SUMMARY *(Continue on Page 3)*

FSAR TEXT TO BE ADDED TO 3.I

Structural Evaluation of the Top Surface Pad Subject to Live and Seismic Loadings from a Loaded Transporter

The Top Surface Pad (TSP) is categorized as a "proximate structure" in Supplement 2.I.The function of the Top Surface Pad (TSP) is to provide haul paths for the transporter to deliver a HI-TRAC to an empty VVM. The Top Surface Pad is isolated from the VVM Interface Pad by appropriately located expansion joints to isolate the CEC from any unbalanced loads imparted by the transporter. The minimum characteristics of the TSP (pad thickness and strength, and reinforcing bar layout and strength) are provided in Table 2.I.7. The TSP is supported by the Lateral Subgrade, and the loaded transporter imparts a localized loading to the TSP. A structural evaluation is performed to demonstrate that the gross moment and shear capacities set forth in ACI-318-05 are not exceeded under a load of 450,000 lb, which bounds the weight of a typical transporter carrying a loaded HI-TRAC. A 3x3 array of VVMs is modeled using ANSYS, with the loaded transporter positioned over the central VVM cavity. The substrate (with properties characteristic of an 800 ft/sec shear wave velocity) is extended beyond the TSP apron a distance equal to the depth of the subgrade below the TSP. The base of the substrate, grounded on the Support Foundation is assumed fixed, and the displacement normal to the four lateral free surfaces of the substrate is also zeroed. Figure 3.I.15 shows the model before meshing by the ANSYS finite element code. The steel structure of the CECs is not included in the model so as not to impart any additional stiffness to the supporting substrate. Similarly, the VIPs that are enclosed by the TSP are ignored as they are separated from the TSP by expansion joints. The transporter is not modeled; rather, a vertical pressure is applied to the top surface of the TSP to simulate the loaded interface. In Figure 3.I.15, the "strips" of concrete represent the interface areas where the transporter could be located. For conservative results, a transporter with the smallest span that can be moved over a VVM is chosen. The configuration forms a gridwork of concrete beams with wide beams parallel to the transporter path and narrow cross-beams perpendicular to the transporter path. Figure 3.I.16 shows the configuration after the meshing operation.

Two load cases are considered:

The first load case consists of an equal pressure of approximately 47 psi applied to each of two load patches straddling the VVM. This represents the weight of a loaded transporter divided over two tracks. In addition to the applied pressure, the weight of the TSP and the substrate is included using the maximum weight densities ascribed to these components in Supplement 2.I, Tables 2.I.2 and 2.I.4. All loads are considered live loads when computing final safety factors.

The second load case consists of the aforementioned live load pressure plus an additional vertical pressure increment on each load patch to balance the additional vertical force and overturning moment from the vertical and horizontal component of the design basis seismic acceleration (Table 2.I.4). Using the 100%-40% rule (RG 192, Revision 2), the bounding load patch pressures on each side of the VVM cavity are approximately 83 psi and 24 psi.

Typical results are illustrated in Figures 3.I.17 and 3.I.18, which show the distribution of the normal stress directed along the TSP concrete beams. The effect of the horizontal seismic loading is clearly evident. It is also evident that the loaded transporter causes a localized response in terms of increased stress. Figure 3.I.19 illustrates an appropriate reinforcement pattern for the connection at the transporter path beam and the cross-beam joint. Table 3.I.11 summarizes the key results from the analyses and includes minimum safety factors for bending and shear for both the TSP concrete beam parallel to the transporter path as well as the cross beams perpendicular to the transporter path. Safety factors are computed in accordance with the applicable concrete code (ACI-318-05) per the following steps. The appropriate finite element stresses are averaged across the width of each beam. Next the averaged stresses are used to compute cross-section bending moments and shear forces. The final safety factors are computed using the code allowable bending moments and shear forces. The reported safety factors for the cross-beam shear are conservative as they do not include the contribution from the angled reinforcement. Details of the calculations, including the complete set of ANSYS results, are found in the Calculation Package supporting this HI-STORM 100U application.

The results in Table 3.I.11 demonstrate the large margins of safety resulting from these bounding load cases. Because of the localized nature of the high stress areas, it is clear that these results are also representative of any location on a larger ISFSI pad.

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CONVERSATION RECORD (Continued)

TABLE 3.I.11
TOP SURFACE PAD MINIMUM SAFETY FACTORS AND DISPLACEMENT FOR TRANSPORTER LOADING CASE

ITEM	SF(BENDING)*	SF(SHEAR)	MAX. LOCAL DISPLACEMENT (INCH)
TRANSPORTER PATH – LOAD COMB. 1	8.413	7.285	0.052
CROSS-BEAM – LOAD COMB. 1	6.21	2.964	0.046
TRANSPORTER PATH – LOAD COMB. 2	8.241	5.873	0.068
CROSS-BEAM – LOAD COMB. 2	6.425	2.632	0.060

* SF = SAFETY FACTOR