NRC FORM 699 (9-2003) U.S. NUCLEAR REGULATORY COMMISSION

CONVERSATION RECORD

DATE: 11/24/2009

TIME: 2:00 PM

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU: See Below

TELEPHONE NO.: 856-797-0900

ORGANIZATION: Holtec International

SUBJECT: Holtec's proposed approach for submitting HI-STORM 100 LAR #9.

TYPE OF CONVERSATION
- ☐ VISIT
- ☐ CONFERENCE
- ☒ TELEPHONE
  - ☐ INCOMING
  - ☒ OUTGOING

SUMMARY *(Continue on Page 2)*

Participants
NRC
John Goshen, Gordon Bjorkman, Jason Piotter

Holtec
Tammy Morin, Chuck Bullard, Alan Soler, John Zhai, Doug Paul

Southern Company Nuclear
Randy Bunt, Jimmy Cash, John Ponder

Bechtel
Jim Ray, Jesse Love, Larry Rowe, Bhaskar Basu, Guy Goddard, Mike Bennett

Holtec requested telcon with NRC staff to discuss their approach to preparing and submitting HI-STORM 100 license amendment request # 9. The details are below.

Issue # 1

An analysis and evaluation of the Support Foundation Pad for all applicable loads for the selected bounding soil parameters must be performed by Holtec and incorporated in the FSAR. The applicable loads are:

- dead load,
- live load,
- seismic load,
- and long-term settlement.

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ACTION REQUIRED
NA

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
John Goshen	John Goshen	11/24/2009

ACTION TAKEN
NA

TITLE OF PERSON TAKING ACTION	SIGNATURE OF PERSON TAKING ACTION	DATE

CONVERSATION RECORD (Continued)

SUMMARY *(Continue on Page 3)*

Holtec Action

Supplement 3.I will be revised to include an analysis of the Support Foundation Pad for the applicable loads and load combinations (per ACI-318-05) for the limiting soil parameters. The analysis will be performed using the finite element code ANSYS. The finite element model will consist of a 4 x 10 Support Foundation Pad resting on an elastic soil foundation. The dead load from the Top Surface Pad (TSP), the VVM Interface Pad (VIP), the loaded CEC, and the surrounding soil will be applied to the top surface of the Support Foundation Pad as equivalent pressure loads. Similarly the live load from an empty transporter located at the approximate center of the 4 x 10 array will be applied as an equivalent pressure load on the top surface of the Support Foundation Pad and solved as a separate load case. The seismic load transmitted by a loaded CEC to the Support Foundation Pad will be determined from the Design Basis Seismic Model (which is defined in Subsections 3.I.4.7.1 and 3.I.4.7.2). The peak vertical load from the Design Basis Seismic Analysis (minus the dead load) will be applied to the ANSYS model of the Support Foundation Pad as a uniform pressure over the CEC baseplate area at all fifty VVM locations. To address long-term settlement, a maximum allowable differential settlement (between two adjacent VVMs) will be specified in Supplement 3.I. The forces and moments in the Support Foundation Pad due to differential settlement will then be determined using ANSYS by adjusting the elastic modulus of the soil such that, under the applied dead load, the maximum center deflection of the 4 x 10 Support Foundation Pad (relative to its free edges) equals the maximum allowable differential settlement for a 4 x 10 pad. Finally, the results for the various load cases will be combined in ANSYS according to the factored load combinations per ACI-318-05, as applicable, and compared with the shear and moment capacities for the Support Foundation Pad.

To establish that the site-specific parameters at a particular site are enveloped by the design parameters in Supplement 3.I, the general licensee would have to:

i) perform a site-specific SSI analysis using the Design Basis Seismic Model and show that the peak vertical load transmitted by the loaded CEC to the Support Foundation Pad under seismic conditions is less than the peak value calculated in Supplement 3.I;

ii) perform a site-specific differential settlement calculation and show that the result is less than the maximum allowable value given in Supplement 3.I.

Issue # 2

For the second load case (seismic) in the TSP evaluation, no amplification due to TSP flexibility has been assumed in applying the net horizontal acceleration at the top of the TSP to the center of gravity of the loaded transporter.

Holtec Action

The TSP evaluation in Section 3.I.4.4 will be revised such that the net horizontal acceleration applied to the center of gravity of the loaded transporter is equal to 1.5 times the net horizontal acceleration at the top of the TSP. General licensees must perform a site-specific SSI analysis to show that the acceleration at the center of gravity of the loaded transporter is less than the design basis value.

Issue # 3

The addition of the RPS retaining wall constitutes a modification to the design that can significantly alter the structural response of the system due to the application of the design loads. Holtec must analyze and evaluate the effects of the RPS retaining wall on the VVM array.

Holtec Action

Supplement 3.I will be revised to include an SSI analysis of a 5 x 5 VVM array that has the RPS retaining wall on all 4 perimeter sides. The SSI model used to evaluate the RPS retaining wall will be identical to the Design Basis Seismic Model (which is defined in Subsections 3.I.4.7.1 and 3.I.4.7.2), except for the following:

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CONVERSATION RECORD (Continued)

SUMMARY *(Continue on Page 4)*

i) the RPS retaining wall will be added to the model on all 4 sides of the VVM array;

ii) no soil will be modeled outside of the RPS retaining wall above the bottom surface of the Support Foundation Pad (i.e., soil excavated on all 4 sides down to the Support Foundation Pad);

iii) the model will include a single loaded VVM located at the edge of the foundation on the symmetry axis (similar to Cases 3 and 4 in Subsection 3.I.4.7.2).

Since no credit will be taken for any soil surrounding the VVM array, the SSI analysis described above will bound VVM arrays with fewer than four RPS retaining walls (i.e., soil excavated on 1, 2, or 3 sides of the VVM array). The strength evaluation of the Support Foundation Pad, as well as the MPC Confinement Boundary, will be based on the overall maximum results from the Design Basis Seismic Analysis (as described in Subsections 3.I.4.7.1 and 3.I.4.7.2) and the SSI analysis including the RPS retaining wall.

To demonstrate that the RPS retaining wall meets with the strength requirements of ACI-318-05, a static finite element analysis will be performed using ANSYS. For this analysis, the finite element model will consist of an isolated 4 x 10 VVM array with the RPS retaining wall on all 4 perimeter sides and no surrounding soil. The model will be fixed at the base of the Support Foundation Pad. The seismic load will be applied to the model as a global acceleration vector, whose magnitude will equal the maximum acceleration at the top surface of the TSP from the SSI analysis.

Issue # 4

No accident evaluation was performed for construction and excavation activities taking place next to an array of loaded VVMs. Supplement 3.I currently states:

"An appropriate soil-structure interaction analysis shall be performed to support the §72.212 evaluation."

Per the staff, such an analysis must be performed by the CoC holder, not the general licensee.

Holtec Action

See Holtec Action for Issue # 3.

The NRC Staff stated that they were interested in reviewing Holtec's approach but that they could provide no specific technical guidance. The staff did suggest that Holtec review the details of the March 2009 meeting with the staff on license amendment 7 (100U application), and the subsequent SER for the amendment to ensure the requirements for a site specific approach were adequately analyzed. Holtec stated that the amendment request would be submitted in March 2010.