RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

03/29/2013

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 931-6467 REVISION 3**
SRP SECTION:	**03.08.03 – Concrete and Steel Internal Structures of Steel or Concrete Containments**
APPLICATION SECTION:	**03.08.03**
DATE OF RAI ISSUE:	**05/15/2012**

QUESTION NO. 03.08.03-86

Section 6.1 of MHI Technical Report (TR) MUAP-11020-P (R0) presents the connection design approach which consists of two separate evaluations. The first is to design the connection to transfer each of the full design strengths (axial tension strength, in-plane shear strength, etc.) of the weaker of the connected members. The second is to evaluate the connection design for the combinations of design force demands (Nu, Vu in, Mu, Vu out) calculated from Linear Elastic Finite Element (LEFE) analysis of the CIS. Section 7.0 of the TR provides an example of a connection design for the SC wall to basemat anchorage where this design approach is used. In Step 3 of the design approach, the connection required strengths are calculated, and in Steps 5 through 8, the force transfer mechanisms are described. However, the design example does not include the calculations to show that the connection design strength for each force transfer mechanism is greater than or equal to the corresponding connection required strength. To ensure the adequacy of the implementation of the design approach, the applicant is requested to:

1. Complete the design calculations for the example to show that the connection design strength for each force transfer mechanism is greater than or equal to the corresponding connection required strength.

2. The calculations should include the design checks for all connectors in the load transfer paths including the shear studs welded to the baseplate, baseplate, welds, anchor rebars, and coupler. The calculations for the shear studs and anchor rebars should include a check for the concrete breakout strength and the pullout strength, as appropriate.

3. Include the effects of prying forces on the anchor and baseplate due to baseplate flexibility or explain why it is not needed.

4. When updating and completing the sample problem, two items should be corrected: (1) the equation for the required strength on page 7-3 should not be identified as fvVn = fv(Vc + Vs) [and later in the fourth equation – fvVn] which is normally used for design strength, not required strength, and (2) the tie bar spacing on page 7-3 indicates that the tie bar spacing was 10 in. versus T/4 which equals 12 in. as shown on page A-3 of the TR.

ANSWER:

This answer revises and replaces the previous MHI answer that was transmitted by letter UAP-HF-12197 (ML12235A511).

1. The basic analysis and design of the containment internal structures (CIS) calculation includes the detailed design calculation for CIS critical connections as identified in Technical Report MUAP-11020, Rev. 1, Section 7.0, Appendices A and B. As requested, the calculations demonstrate sufficient strength for each force transfer mechanism relative to the required strength, taken as the full expected strength of the connected steel concrete (SC) wall. The basic analysis and design of the CIS calculation is available for NRC audit.

2. The aforementioned calculation contains checks of each connector involved in each force transfer mechanism as follows:

Impact on DCD

There is no impact on the DCD.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on S-COLA

There is no impact on the S-COLA.

Impact on PRA

There is no impact on PRA.

Impact on Technical/Topical Report

There is no impact on the Technical/Topical Report.

This completes MHI's response to the NRC's question.