
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

08/01/2013

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO. 1040-7139 REVISION 3
SRP SECTION: 03.08.01 – Concrete Containment
APPLICATION SECTION: 3.8.1
DATE OF RAI ISSUE: 07/01/2013

QUESTION NO. 03.08.01-16:

On April 3, 2013, the applicant submitted a markup of DCD Tier 2 Section 3.8 to provide updated information related to a seismic design change.

In Subsection 3.8.1.3.4, "Liner Plate Loads and Load Combinations," the last sentence of the last paragraph (Page 3.8-9) states, in part, "the liner may be considered to satisfy the requirement of 0.0020 times the gross cross-sectional area for reinforcement in each direction on the inside face of the PCCV [prestressed concrete containment vessel] to resist effects of shrinkage, temperature."

Shrinkage and temperature reinforcement specified in ACI 349-06 is fully bonded to, and embedded in, the concrete with a minimum concrete cover specified in ACI349-06. The steel liner plate does not appear to be fully bonded to the concrete and does not have a minimum concrete cover over it. Therefore, the applicant is requested to describe how the steel liner plate is attached to the concrete to attain the required full bond and justify that the steel liner plate can be used as shrinkage and temperature reinforcement.

ANSWER:

As described in Subsection 3.8.1.1.1, "General Arrangement," the sixth paragraph (Page 3.8-2) states, in part, "In the cylinder portion of the PCCV, the liner is anchored with WT5x11s running vertically at a pitch of 1.6° (approximately 25 in. spacing along the inside face of the PCCV shell), and stiffened with 1/2 in. by 6 in. rib plates running horizontally in the hoop direction. In the dome portion of the PCCV, except the lowest panel portion where the cylinder liner anchorage system is also adopted, the upper portion of dome liner is anchored with 3/8 in. by 6 in. rib plates (spaced at approximately 32-1/4 in. maximum) which are oriented in a radial pattern originating at the dome apex. The rib plates are stiffened with 5 in. by 3 in. by 1/4 in. angles running horizontally in the hoop direction, spaced at 33 in. maximum."

Governing code for the PCCV and liner is ASME, Section III, Division 2, 2001 Edition through 2003 Addenda. Based on "CC-3535 Concrete Crack Control, (b) Nonprestressed reinforcement shall be provided in the containment shell to control surface and membrane

cracking from the effects of shrinkage, temperature, and membrane tension. The area of such reinforcement in each direction at each face of the concrete shall be a minimum of 0.0020 times the gross cross-sectional area of the section. This requirement may be met in whole or in part by reinforcement otherwise required to resist calculated loads. An integral steel liner, if provided, may be included to satisfy the requirement for inside face reinforcement.” According to the ASME Section III, Division 2 code, steel liner plate can be used as shrinkage and temperature reinforcement. The anchorages provided along with associated welds are sufficiently sized to permit treatment of the liner plate as an “integral” part of the temperature and shrinkage reinforcing steel.

Impact on DCD

There is no impact on the DCD.

Impact on R-COLA

There is no impact on the R-COLA.

Impact on PRA

There is no impact on the 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.