

REQUEST FOR ADDITIONAL INFORMATION 482-3655 REVISION 0

11/9/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 03.05.03 - Barrier Design Procedures

Application Section: SRP 3.5.3

QUESTIONS for Structural Engineering Branch 1 (AP1000/EPR Projects) (SEB1)

03.05.03-7

SRP 3.5.3., "Barrier Design Procedures," provides guidance to meet the relevant requirements of GDC 2 and GDC-4. Several prediction models are available for estimating the missile impact damages for concrete materials. From a safety design point, the most critical prediction should be used as design basis.

SRP 3.5.3, SRP Acceptance Criteria, item 1B suggests Stanford Research Institute (SRI) equations developed from test data in ORNL/NSIC-5, Vol. 1, Chapter 6, by Cottrell and Savolainen for designing steel penetration thickness. Ballistic Research Laboratory (BRL) equations may be used, provided the results are comparable to those obtained by using the SRI equation or validated by penetration tests. US-APWR-DCD Section 3.5.3.1.2 suggests the use of either formula. If the BRL equation is to be used to calculate steel penetration thicknesses, provide the test data to verify its validity or confirm that the larger thickness requirement resulting from the use of either the BRL or SRI equation will be used in the design.

03.05.03-8

SRP 3.5.3., "Barrier Design Procedures," suggests the criteria for meeting the relevant requirements of GDC 2 and GDC-4. Several prediction models are available for estimating the missile impact damages for concrete materials. From the safety design viewpoint, the most critical prediction should be used as the design basis. As for the composite structure, the SRP further specifies that when the first barrier is concrete, procedures are reviewed on a case-by-case basis.

US-APWR DCD Section 3.5.3.1.3 (Composite Section Barrier Analysis) provides the evaluation of composite barriers for use as missile protection. SRP 3.5.3 recommends the use of composite sections as a barrier where the first layer is steel, provided that the guidance in Reference 6 of the SRP 3.5.3 is followed. Accordingly, the staff requests the following information:

- Identify, if any, and where, composite barrier protection will be provided in the barrier design.
- Clarify whether any composite barriers are utilized and where the first material is concrete, and if so, what procedures will be used in the analysis.