REQUEST FOR ADDITIONAL INFORMATION 254-2075 REVISION 0

3/3/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 05.02.04 - Reactor Coolant Pressure Boundary Inservice Inspection and Testing
Application Section: Section 5.2.4

QUESTIONS for Component Integrity, Performance, and Testing Branch 1 (AP1000/EPR Projects) (CIB1)

05.02.04-1

DCD Tier 2, Section 5.2.4.1.1 describes accessibility for inspection and states that the physical arrangement of ASME Code Class 1 components is designed to allow personnel and equipment access "to the extent practical" to perform the required inservice examinations specified by the Code and mandatory appendices. The DCD also states that space is also provided per ASME Code, Section XI, paragraph IWA-1500(e) for necessary operations "to the extent practical" associated with repair/replacement activities. It states that piping arrangement allows for adequate separation of piping welds so that space is available to perform ISI. It further states that welds in piping that pass through wall are located such that there is sufficient clearance and access into the wall penetration to perform weld examination. The DCD also states that design features include sufficient clearances for personnel and equipment, maximized examination surface distances, and favorable materials, weld joint simplicity, elimination of geometric interferences, and proper weld surface preparation.

The staff notes that the phrase "to the extent practical" is inconsistent with a design that enables the performance of PSI/ISI examinations by eliminating interferences due to design, geometry, or materials of construction. The regulations in 10 CFR 50.55a(g)(3)(i) and (3)(ii) require that for a boiling- or pressurized-water nuclear power reactor whose design certification is issued on or after July 1, 1974, components (including supports) classified as Class 1, 2, and 3 must be designed and be provided with access to enable the performance of inservice examination and must meet the preservice examination requirements set forth in the editions and addenda of Section XI of the ASME Code incorporated by reference. In this regard, the term "to the extent practical" is unlikely to apply to a design certification application since design, geometry, and materials of construction can be revised as necessary to meet Code ISI examination requirements. If any specific conditions exist in the US-APWR in which you believe Code ISI examinations are impractical, those conditions should be clearly described and justification should be provided describing why it is impractical to meet Code requirements for reasons of design, geometry, or materials of construction at this time.

05.02.04-2

The SRP acceptance criteria state that the methods, procedures, and requirements regarding qualification of nondestructive examination personnel are in accordance with the ASME Code, Section XI, Article IWA-2300, "Qualification of Nondestructive Examination Personnel." DCD Tier 2, Section 5.2.4.1.2 does not address this acceptance criteria. Please provide additional information with respect to qualification of nondestructive examination personnel in order for the staff to obtain a reasonable assurance finding for this aspect of the operational program.

05.02.04-3

The SRP states that exemptions from Code examinations should be permitted if the criteria in the ASME Code, Section XI, Subsubarticle IWB-1220, "Components Exempt from Examination," are met. DCD Tier 2 Section 5.2.4.1.6 states that Section XI Code exemptions are permitted by Subarticle IWB-1220. Please provide additional information in order for the staff to determine if the criteria in Subsubarticle IWB-1220 are met in the U.S. APWR design. Your discussion should specifically discuss those conditions in the US-APWR plant where inaccessibility of welds due to concrete encasement, buried underground, or encapsulation exist. Also, if no additional exemptions to the criteria are necessary for the U.S. APWR design, please state as such in the DCD.

05.02.04-4

The SRP states that the reviewer will determine if the applicant/licensee has demonstrated that any ASME Code requirement is impractical due to design, geometry, or materials of construction. The U.S. APWR DCD, Section 5.2.4.1.7 states that the COL applicant discusses any requests for relief from ASME Code requirements that are impractical as a result of limitations of component design, geometry, or materials of construction. In such cases, specific information is provided which identifies the applicable Code requirements, justification for the relief request, and the inspection method to be used as an alternative. The staff could not determine if the U.S. APWR design incorporates relief requests from impractical examinations as a result of component design, geometry, or materials of construction. The staff notes that the DCD applicant should discuss this aspect, because there should be no relief requests for PSI and first interval ISI examinations due to the requirements under 10 CFR 50.55a(g)(3). Please revise the DCD to state no Code ISI requirements are impractical for the US-APWR design when using the ISI code of record in order for the staff to obtain a reasonable assurance finding.

05.02.04-5

The U.S. APWR DCD, Section 5.2.4.1.8 states that code cases referenced by the COL applicant that may have been invoked in connection with the ISI program are in compliance with Regulatory Guide 1.147. Please revise the DCD to state what code cases if any, are incorporated into the U.S. APWR design. In addition, First

Revised Order EA-03-009 and ASME Code Case N-729-1, are provided as requirements for the system boundary subject to inspection of the reactor vessel head. Due to control rod drive mechanism (CRDM) J-groove weld cracking, the staff believes it is important that the most recent inspection requirements be applied during operation. The NRC position applicable to inspection requirements for the reactor vessel is presented in the final amended rule to 10 CFR 50.55a(g)(6)(ii)(D) related to reactor vessel head inspections (73 FR 52749) issued on September 10, 2008. Please revise the DCD to ensure it is consistent with augmented requirements for the inservice inspection program for the reactor vessel head by implementing ASME Code Case N-729-1 as amended in the final rule amendment to 10 CFR 50.55a.

05.02.04-6

The SRP (NUREG-0800) states that the ISI program is reviewed to verify that the high-energy system piping between containment isolation valves receives an augmented ISI that meets four criteria. The US-APWR DCD does not address this aspect of augmented ISI. If no high-energy piping (including Class 1 piping) penetrates the containment, and no augmented ISI is required to protect against postulated piping failures of high-energy piping (including Class 1 piping) between containment isolation valves, please revise the DCD to reflect this and discuss how postulated pipe breaks at the containment boundary are considered including a discussion of single-failure of one containment isolation valve to close. Otherwise, please provide a description of the augmented ISI that is used for high-energy system piping between containment isolation valves.

05.02.04-7

The US-APWR DCD, Section 5.2.4, does not discuss any aspect of a boric-acid, leak-detection program to address the concerns of NRC Generic Letter 88-05. NUREG-0800 states that for PWR plants the applicant must establish an inspection program to detect and correct potential reactor-coolant-pressure-boundary corrosion caused by boric acid leaks as described in NRC Generic Letter 88-05. Please revise the DCD to describe how specific design features of the US-APWR plant enable effective boric-acid, leak-detection inspections in sufficient detail for the staff to make a reasonable assurance determination and provide what actions are necessary by COL applicants to address any other aspect of the operational program (e.g., inspection frequency).

05.02.04-8

The staff notes that a significant number of dissimilar-metal welds and austenitic welds in the current U.S. PWR fleet have experienced cracking due to primary-water, stress-corrosion cracking (PWSCC). The staff considers this issue a significant safety issue and has committed a considerable amount of resources and oversight to resolve this issue in the operating fleet. The US-APWR DCD does not describe what design considerations have been taken into account to address this issue. Based on the above, the staff requires additional

information in order to obtain a reasonable assurance finding of the acceptability of the US-APWR design to address the concerns of PWSCC. Please discuss the design details for preservice and inservice inspection of Class 1 austenitic and dissimilar-metal welds with respect to their ability to enable inspection and monitoring for PWSCC degradation. Specifically, address two-sided accessibility. If two-sided access cannot be obtained to perform the same type of nondestructive examination method during inservice examination as performed during preservice examination, discuss how NRC regulations under 10 CFR 50.55a(b)(2)(xv), 10 CFR 50.55a(b)(2)(xvi) and the ASME Code requirements will be met. Note that the staff assumes that any relief from the Code requirements for these susceptible welds on the basis of design, geometry, or materials of construction should not be necessary, since these factors can be rectified during the design stage before the plant is constructed. If radiography is to be used to supplement one-sided examinations, discuss how operational and radiological concerns associated with the method will be taken into consideration such that 100% examination of the required weld volume remains practical by the COL holder (or licensee). Finally, please state in the DCD that any changes to the design of US-APWR components by the COL applicant should include a discussion of the provisions to preserve accessibility to perform ISI for Class 1, 2, and 3 components when meeting IWA-1500 and 10 CFR 50.55a(g)(3).