

REQUEST FOR ADDITIONAL INFORMATION 728-4534 REVISION 2

4/6/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 18 - Human Factors Engineering

Application Section: 18.1 program plan

QUESTIONS for Operating Licensing and Human Performance Branch (AP1000/EPR Projects) (COLP)

18-106

NUREG-0711 Criterion 2.4.1(2) states: "Assumptions and Constraints - An assumption or constraint is an aspect of the design, such as a specific staffing plan or the use of specific HSI technology that is an *input* to the HFE program rather than the result of HFE analyses and evaluations. The design assumptions and constraints should be clearly identified."

The US-APWR DCD does not clearly communicate that the US-Basic HSI design, as described in Topical Report MUAP-07007, is used as the basis for the US-APWR configuration. For example:

- DCD, Section 18.1.1.1 states that, "The design assumptions and constraints of the Basic HSI System are clearly identified in Section 5.1.1.2 of Reference 18.1-1." This statement seems too limiting as the entire US-Basic HSI design is the assumed starting point for the US-APWR. The staff believes this relationship needs to be stated explicitly in the DCD so the scope of the associated SER is clear.
- DCD, Section 18.1.1.1 states that, "Reference 18.1-1 describes the US-APWR HSIS design and the HFE design process." The staff believes this is incorrect and should say that Reference 18.1-1 describes the US-Basic HSI design. The reference to the HFE design process is irrelevant as a generic reference since section 5 will not be approved in the SER associated with MUAP-07007 (see last bullet below).
- Many sections of the DCD and the supporting technical reports use the terms "Japanese APWR design", "Basic HSI System", "Japanese standard HSI design", and "reference plants." These terms need to be used consistently and where appropriate replaced with a reference to the US-Basic HSI Design so there is no confusion in which configuration supports the US-APWR design configuration. The staff has reviewed the interface between the Japanese APWR and the US-Basic HSI Design as part of the Safety Evaluation of Topical Report MUAP-07007. As discussed during a public meeting on February 20, 2011, staff will be approving section 4 of MUAP-07007 in its SER. Given approval of section 4 of the Topical Report, the DCD should explicitly address the translation of the US-Basic HSI design configuration to the US-APWR configuration.

REQUEST FOR ADDITIONAL INFORMATION 728-4534 REVISION 2

- References are made to the processes described in section 5 of Topical Report, MUAP-07007, which will not be approved in the Safety Evaluation associated with that report, as discussed during a public meeting on February 20, 2011. For example, "Reference 18.10-2, Subsection 5.10.2.2.4, describes the process for the integrated system validation methodology." Typically such references are not going to be sufficient as the Topical Report provides a program level description verses an implementation plan level description. These references should be to the detailed Implementation Plan that translates the US-Basic HSI Design to the US-APWR Design.

The following actions are requested:

1. Revise the DCD so it explains that the US-Basic HSI design is the starting point for the US-APWR HSI design.
2. Revise terminology in the DCD and supporting documents so that terms are used consistently.
3. Reference the Topical Report and/or supporting documents consistently.

18-107

NUREG-0711 criterion 2.4.1(3) states: "Applicable Facilities—The HFE program should address the main control room, remote shutdown facility, technical support center (TSC), emergency operations facility (EOF), and local control stations (LCSs)."

DCD section 18.1.1.2 states: "Local control stations (LCSs) - consideration of HFE activities for LCSs are limited to those control stations that support:

- On-line testing, radiological protection activities, and required chemical monitoring supporting technical specifications
- Maintenance required by technical specifications
- Emergency and abnormal conditions response"

How are risk important human actions addressed with respect to LCSs?

18-108

NUREG-0711 Criterion 2.4.1(3) states: "Applicable Facilities - The HFE Program should address the main control room, remote shutdown facility, technical support center (TSC), emergency operations facility (EOF), and local control stations (LCSs)."

MHI has responded to RAI 295-2341, questions 18-7 and 18-8. Both questions deal with the HFE design of the EOF/TSC. The responses have not resolved the staff's questions. Further confusion exists because NUREG-0711 is not clear as to which elements are to be applied to the EOF/TSC. The staff requests responses for the following questions and has provided best practices observed from other design centers that represent what the staff feels is a reasonable compromise from 100% application of all NUREG-0711 elements.

REQUEST FOR ADDITIONAL INFORMATION 728-4534 REVISION 2

EOF/TSC HFE design responsibilities are unclear.

- DCD Section 18.1.1.2 states the DCD scope is limited to identification of information requirements and includes SPDS, Meteorological displays, off-site radiation monitoring, and post accident monitoring.
- DCD Section 18.1.1.2 States, “The site specific HFE team is to design the EOF, in accordance with the HFE program. The site specific HFE team is to specify the communication system requirements; ...”
- MUAP-09019, US-APWR HSI Design, section 2.3 states, “The license holder shall also create implementation procedures for the EOF...”

Concerns:

- MUAP-09019 increases the scope of the COL applicant’s responsibility. The MUAP is not referenced in the DCD.
- The COL applicant’s responsibility for design responsibilities is not communicated to the applicant via a COL information item. The MHI response to question 18-7 indicated that the additional COL information item was deleted because the DCD section now described the division of responsibility between the HFE team and COL applicant. This is not consistent with NUREG-0800 guidance which states that interface requirements are identified as COL information items. Also the additional ITAAC added did not contain specific, measurable acceptance criteria. The acceptance criteria were the same as the design commitment.
- The DCD does not provide a complete list of what the COL applicant is responsible for. For example, anthropometric design and room layout are not addressed.
- The MHI response to question 18-8 stated that the same approach as the NUREG-0711 program is applied to the process for the EOF/TSC but then took immediate exception to that by stating that processes other than the task analysis were very clear and therefore needless to analyze for the EOF/TSC. No basis was provided to support this position.

The staff believes the following actions should be taken:

- Reestablish the COL information item to communicate the interface requirement associated with EOF/TSC design. Specify in the COL information item that the COL applicant should complete the EOF/TSC design in accordance with NUREG-0696. This provides approved acceptance criteria for the design of these centers and avoids questions about what the phrase, “in accordance with the HFE program” means.
- Complete the OER, Functional analysis/functional allocation, and task analysis elements for the EOF/TSC HFE design. V&V is accomplished via the site specific

REQUEST FOR ADDITIONAL INFORMATION 728-4534 REVISION 2

ITAAC that require a full participation exercise followed by the periodic drills required by the COL applicants emergency plan.

Reference: MHI's Responses to US-APWR DCD RAI No. 295-2341; MHI Ref: UAP-HF-09225; dated April 28, 2009; ML091210213.

18-109

NUREG-0711 Criterion 2.4.2(2) states, "... The team should have the authority and organizational placement to provide reasonable assurance that all areas of responsibility are accomplished and to identify problems in the implementation of the overall plant design. The team should have the authority to control further processing, delivery, installation, or use of HFE products until the disposition of a nonconformance, deficiency, or unsatisfactory condition has been achieved."

The diagram in DCD Figure 18.1-1 does not show how the HFE design team fits into the larger design team and the US-APWR project.

MUAP-09019, Section 3.2, Figure 1 provides an organization chart which includes both organizational and functional relationships but only shows the organization up through project manager positions. It is unclear how they fit in the larger engineering organization. RAI 295-2341, Question 18-9 requested this information. The response (UAP-HF-09225) stated the organization placement and authority of these teams is controlled by the "Quality Assurance Program . . . (PQD-HD-19005)." This document shows the high level organization but does not connect that organization with the organization described in MUAP-09019.

- Describe the management levels between the project manager described in MUAP-09019, Figure 1 and the management position described in the QA program.
- Include or reference within the DCD the information in MUAP-09019 and this RAI response so more detailed organizational information is available to illustrate how this criterion is met.

18-110

NUREG-0711, Criterion 2.4.1(4) states: "Applicable HSIs, Procedures and Training - The applicable HSIs, procedures, and training included in the HFE program should include all operations, accident management, maintenance, test, inspection and surveillance interfaces (including procedures)."

Topical Report MUAP-07007, section 5.1.1.4 uses the same words as the NUREG. The DCD section 18.1.1.3 replaces the term "accident management" with "emergency response."

REQUEST FOR ADDITIONAL INFORMATION 728-4534 REVISION 2

Please clarify the difference in wording. (note: emergency response could mean emergency operating procedures and/or the procedures used to implement the emergency plan).

18-111

NUREG-0711 Criterion 2.4.3(1) states: "General Process Procedures - The process through which the team will execute their responsibilities should be identified. The process should include procedures for:

- assigning HFE activities to individual team members
- governing the internal management of the team
- making management decisions regarding HFE
- making HFE design decisions
- governing equipment design changes
- design team review of HFE products"

From the MHI response to RAI 295-2341, Questions 18-12 and 18-16, and DCD section 18.1.3.1, the staff understands that the QA Program describes generic quality standards applicable to the above activities.

Please provide the title of the working level documents that control these activities and a summary of what each document requires relative to the areas listed in the NUREG-0711 criterion above.

18-112

NUREG-0711 Criterion 2.4.3(2) states: "Process Management Tools - Tools and techniques (e.g., review forms) to be utilized by the team to verify they fulfill their responsibilities should be identified."

The MHI response to RAI 295-2341, Question 18-13, describes the HED process. The staff acknowledges this as one process management tool but this tool does not address the responsibilities listed in criterion 2.4.3(1).

MHI is requested to:

- Provide the title of working level procedures that control work flow, work priority, work review, describe interfaces with project management, and describe interfaces with supporting technical groups.
- List the key data bases, forms, and other tools contained in these procedures that are used to facilitate proper implementation of the procedure.
- Provide a flow chart of the engineering process that includes process feedback, issue disposition, independent reviews, and supporting technical reviews.

Include this material in the DCD or in documents referenced by the DCD (The staff is looking for more detail than QA Program control contained in the previous response).

REQUEST FOR ADDITIONAL INFORMATION 728-4534 REVISION 2

18-113

NUREG-0711 Criterion 2.4.3(4) states: "HFE Program Milestones - HFE milestones should be identified so that evaluations of the effectiveness of the HFE effort can be made at critical check points and the relationship to the integrated plant sequence of events is shown. A relative program schedule of HFE tasks showing relationships between HFE elements and activities, products, and reviews should be available for review."

The DCD, section 18.1.3.4, repeats the NUREG criteria then references figure 4.0-2 in the Topical Report (in accordance with RAI response 295-2341, Question 18-15).

Explain how the limited milestone schedule provided in the Topical Report ensures an appropriate level of effectiveness evaluation.

18-114

DCD, Chapter 18, Section 18.1, "HFE Program Management," does not reference MUAP-09019, "US-APWR HSI Design," yet part 1 of that document contains additional detail on the program management plan.

The documents are not always consistent. For example:

MUAP-09019, Section 3.1 provides a minimum experience level of 10 years. Minimum experience is not addressed in the DCD.

MUAP-09019, Section 6.1 says an "expert panel" shall formulate discrepancy resolution. The DCD, Section 8.1.4 says the HSI design team will do this. From the explanation in MUAP-09019 the "expert Panel" appears to contain membership outside the HFE design and V&V teams.

MUAP-09019, Section 6.2 provides information on the threshold being used for HEDs. This is not addressed in the DCD.

Within the Program Management section, the staff has used MUAP-09019 to clarify material in the DCD and/or demonstrate that review criteria have been met. For example:

- DCD, Section 18.1.1.2 – to clarify HFE application to local control stations
- DCD, Section 18.1.1.2 – to clarify EOF responsibilities
- DCD, Section 18.1.2.2 – to clarify project organization
- DCD, Section 18.1.3.3 – to clarify work process
- DCD, Section 18.1.4 – to clarify HED processing (MUAP-09019, sections 6&7)
- DCD, Section 18.1.5 – to clarify phased approach (MUAP-09019, section 8)

Consolidate or reference information within the DCD as appropriate. Resolve differences between the documents.