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August 25, 2011

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Attention: Mr. Jeffrey A. Ciocco

Docket No. 52-021
MHI Ref: UAP-HF-11278

Subject: MHI's Response to US-APWR DCD RAI No.792-5928 Revision 3 (SRP 18)

References: 1) "Request for Additional Information No. 792-5928 Revision 3, SRP Section: 18 – Human Factor Engineering Application Section: 18.5" dated July 26, 2011.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Response to Request for Additional Information No. 792-5928 Revision 3".

Enclosed is the response to 1 RAI contained within Reference 1.

Please contact Dr. C. Keith Paulson, Senior Technical Manager, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of the submittals. His contact information is below.

Sincerely,

Y. Ogata

Yoshiki Ogata,
General Manager- APWR Promoting Department
Mitsubishi Heavy Industries, LTD.

Enclosure:

1. Response to Request for Additional Information No. 792-5928, Revision 3

CC: J. A. Ciocco
C. K. Paulson

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NRO

Docket No. 52-021
MHI Ref: UAP-HF-11278

Enclosure 1

UAP-HF-11278
Docket Number 52-021

Response to Request for Additional Information
No. 792-5928, Revision 3

August, 2011

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

8/25/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No 52-021

RAI NO.:	**NO. 792 COLP 5928 REVISION 3**
SRP SECTION:	**18 - HUMAN FACTORS ENGINEERING**
APPLICATION SECTION:	**18.5- STAFFING AND QUALIFICATIONS**
DATE OF RAI ISSUE:	**7/26/2011**

QUESTION NO.: 18-140

The responses with regard to the single unit staffing and the role of the second RO, the staff finds acceptable and confirmatory.

The response with regard to the role(s) of the SRO/STA, the staff finds the response does not provide sufficient information to address the staff concerns. The Shift Supervisor and STA responsibilities are not sufficiently defined for abnormal control room operations so that the staff can be assured the SRO/ STA working in the dual role will be able to successfully perform both duties. The staff requests additional justification describing how the Shift Supervisor will be able to perform the functions of the STA (as described in Generic Letter 79-61); and show that he is capable of all other concurrent duties during accident conditions such as interim site emergency director, communicating with the off-site organizations, company organizations, etc., while maintaining vigilance on the emergency plan which is in constant need of evaluation during an accident. Additionally, the shift supervisor, will likely be filling the interim site emergency director role for greater than one hour during the initial implementation of the emergency plan; until the emergency response organization is manned and he is relieved as emergency director. Explain how he can provide insight to the operating crew as STA during this time.

Reference: MHI's Responses to US-APWR RAI No. 725-5408; MHI Ref: UAP-HF-11124; dated April 27, 2011; ML11119A208.

ANSWER:

In consideration of staff comments, and for consistency with IN 93-81 and GL 79-61, and consistency with US practices in current operating plants, the minimum operator staffing levels for the US-APWR will be changed as follows:

- 1 SRO located at the plant fulfilling the role of Shift Manager
  - The combined role with STA will be deleted, to avoid concurrent duties during emergency conditions. The position name of Shift Supervisor will be changed to Shift Manager for consistency with operating plants and to avoid confusion with MCR Supervisor. The MCR Supervisor reports to the Shift Manager.

- 1 SRO located within the MCR fulfilling the role of MCR Supervisor and STA
  - The STA responsibilities will be assigned to the MCR Supervisor for normal operations (abnormal conditions are discussed below). To fulfill this role the MCR Supervisor will have both SRO and STA qualifications. This combined role is consistent with IN 93-81 which emphasizes "the need for engineering expertise in the control room" and "the STA will have an active role in shift activities". This is also consistent with many operating plants in the US. It is noted that in some US-APWR documents the MCR Supervisor is also referred to as the Shift Supervisor or Control Room Supervisor. Erroneous references to Shift Supervisor will be changed to Shift Manager.

- 1 additional SRO or STA at the plant
  - This is a new position, not previously described. This person, with either of these qualifications, will relieve the MCR Supervisor of his combined SRO/STA duties, allowing a single focus during emergency conditions. This will place a separate MCR Supervisor and STA in the MCR during emergency conditions. Since this new person is required to be at the plant, but not continuously in the MCR, this person can be shared by multiple units.

- 1 RO located at the controls of the plant in the MCR
  - No change

- 1 RO located at the plant
  - No change

These changes for the minimum operator staffing do not impact the maximum operator staffing which accommodates a dedicated STA position during all plant conditions, as shown in DCD Figure 18.1-3 and MUAP-07007 Figure 5.5-2.

In addition to the DCD changes identified below, the following US-APWR licensing documentation changes will be made:

HSI System Description and HFE Process, MUAP-07007:

Abstract

...The HSI System includes ~~of~~ an operator console, a supervisor console (also referred to as a shift supervisor console) and a Large Display Panel (LDP)...

4.1.f

...The normal MCR staff is supplemented by a shift technical advisor (STA), one additional SRO and one additional RO that will be at the plant to accommodate ~~unexpected design~~emergency conditions~~, such as conditions where the HSI System is degraded~~. For the minimum staffing, the STA is a shared role, as described in Section

5.5.2. This overall plant staffing meets the regulatory requirements of 10 CFR 50.54(m)(2)(i). While the HSI System is designed to support the minimum MCR and plant staffing described above, the space and layout of the Main Control Room are designed to accommodate the foreseen maximum number of operating and temporary staff, including a dedicated STA. ...

4.1.g

Plant personnel addressed by the HFE program include licensed control room operators as defined in 10 CFR Part 55 and the following categories of personnel defined by 10 CFR 50.120:

- non-licensed operators,
- shift ~~supervisor~~manager,
- shift technical advisor...

5.5.2

Based on these requirements, the minimum operator staffing roles and responsibilities that are the basis for the US-APWR design are defined as follows.

- One RO at the controls ...
- At least one more RO present at the facility...
- One SRO within the MCR at all times. This position is ~~typically~~ the control room supervisor (also referred to as the shift supervisor or MCR supervisor). The SRO is ~~typically~~ located at the Supervisor Console. For minimum staffing, this SRO also fulfils the STA requirement during normal operation.
- At least one more SRO present at the facility during its operation in order to shift above SRO's temporary absence because of the meal time or sudden injury, etc. for redundancy. This SRO position is typically fulfilled by the Shift ~~Supervisor~~Manager of the plant. This SRO is typically located in an office which is in close proximity to the MCR. ~~For minimum staffing, this SRO also fulfils the STA requirement. However, a separate STA may also be designated. The HSI design accommodates the STA at a separate STA Console within the MCR.~~
- At least one more person present at the facility during its operation with SRO or STA qualifications. During emergency conditions, this person will relieve the control room supervisor of either the supervisor or STA responsibilities, allowing a single focus during emergency conditions. This will place a separate MCR Supervisor and STA in the MCR during emergency conditions. Since this person is required to be at the facility, but not continuously in the MCR, this person can be shared by multiple units. ...

Figure 5.5-1

- STA will be moved from Shift Supervisor to MCR Supervisor
- Shift Supervisor will be changed to Shift Manager
- An additional dotted line box will be added to show the additional person with SRO or STA qualifications reporting to the Shift Manager. The dotted line indicates "Not located in MCR".

Figure 5.5-2:

- Shift Supervisor will be changed to Shift Manager

US-APWR Staffing and Qualifications Implementation Plan, MUAP-10008:

4.2.1

Operating staff positions and associated qualifications:

- Shift ~~Supervisor~~Manager

The Shift ~~Supervisors~~Managers are responsible for supervising the evolutions conducted during their shift and ensuring that they are conducted in accordance with the operating license, station procedures, and applicable directives and policies. The Shift ~~Supervisors~~Managers are responsible for supervising shift operations personnel and for conducting on-shift training. During periods when senior management personnel are not on site, the Shift ~~Supervisor~~Manager assumes responsibility for all station activities. Each Shift ~~Supervisor~~Manager is required to maintain a Senior Reactor Operator (SRO) License pursuant to 10 CFR Part 55.54 "Senior Operator".

- MCR Supervisor
  The MCR Supervisors (also referred to as Shift Supervisors or Control Room Supervisors) report directly to the Shift ~~Supervisor~~Manager, and are members of management who assist the Shift ~~Supervisors~~Managers in discharging their responsibilities for supervision of the plant operation. The MCR Supervisors may assume the duties of the Shift ~~Supervisors~~Managers in their absence. The MCR Supervisor is required to maintain a SRO License.
- Shift Technical Advisor
  Shift Technical Advisors (STAs) report to the Shift ~~Supervisor~~Manager. For minimum staffing, the STA responsibilities may be assigned to the MCR Supervisor during normal operations. To fulfill this role the MCR Supervisor will have both SRO and STA qualifications. During emergency operations, a person present at the facility during its operation with SRO or STA qualifications will relieve the MCR Supervisor of his combined SRO/STA duties, allowing a single focus during emergency conditions. Alternately, STA duties may be assigned to a dedicated STA; this dedicated position is assumed in the maximum staffing configuration. ~~, and will be on each shift unless the Shift Supervisor or another individual with a SRO license meets~~ The person fulfilling the role of STA shall have the qualifications described in Option 1 of the Commission Policy Statement on Engineering Expertise (50 Federal Registry 43621, October 28, 1985). ~~The Shift Technical Advisor is required to maintain a SRO License, and The~~the Shift~~MCR Supervisor can fulfill the role of the STA~~.
- Reactor Operators
  The Reactor Operators report directly to the ~~Shift Supervisor or~~ MCR Supervisor, and are responsible for routine evolutions on their assigned unit and for monitoring the status of that unit. Each Reactor Operator is licensed pursuant to 10 CFR Part 55.54 "Operators". ...

4.2.1.1

The minimum operator staffing roles and responsibilities that are the basis for the US-APWR design are assumed as follows:

- 1 SRO located at the plant fulfilling the role of Shift ~~Supervisor~~Manager ~~and STA~~
- 1 SRO located within the MCR fulfilling the role of MCR Supervisor and STA, during normal operation
- 1 RO located at the controls of the plant in the MCR
- 1 RO located at the plant
- At least one more person present at the facility during its operation with SRO or STA qualifications. During emergency conditions, this person will relieve the MCR Supervisor of either the supervisor or STA responsibilities. This person can be shared by multiple units.

US-APWR HSI Design Implementation Plan, MUAP-10009

4.2 Concept of Operation

Plant personnel addressed by the HFE program include licensed control room operators as defined in 10 CFR Part 55 and the following categories of personnel defined by 10

CFR 50.120:

- Non-licensed operators,
- Shift ~~supervisor~~manager,
- Shift technical advisor, ...

Impact on DCD

Please see Attachment-1.

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 the PRA.

DCD_18-140

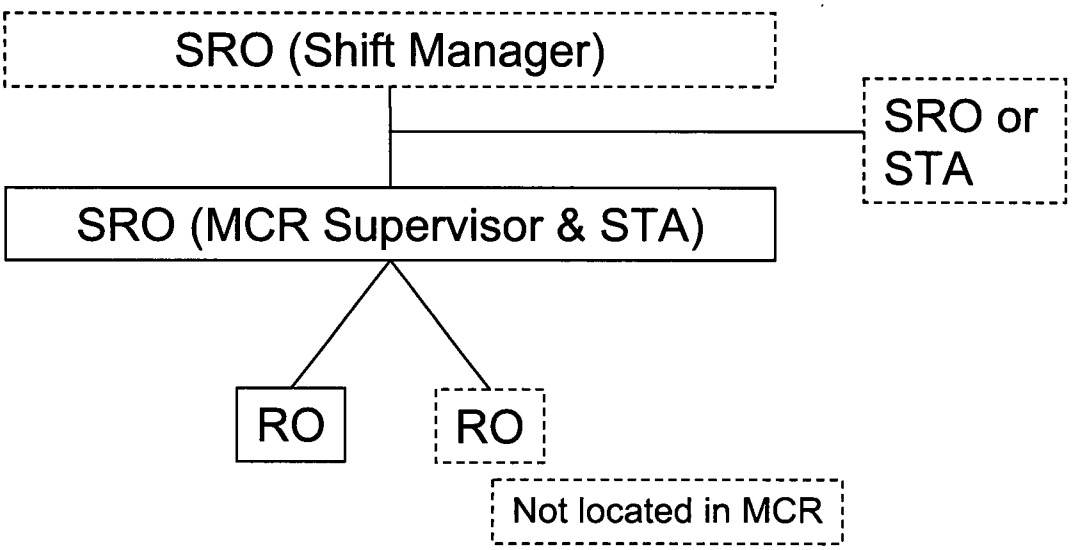

Figure 18.1-2 Operations Personnel Staffing and Organization (Minimum)

DCD_18-140

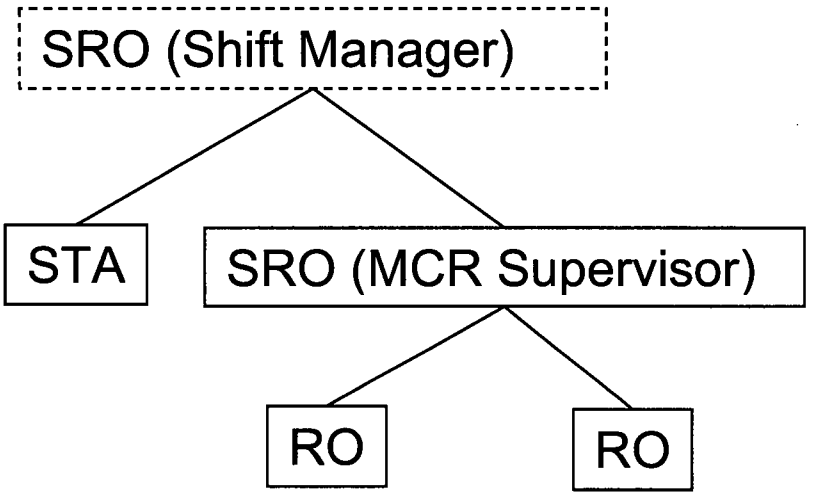

Figure 18.1-3 Operations Personnel Staffing and Organization (Typical)

18.5 Staffing and Qualifications

18.5.1 Objectives and Scope

The objective of the staffing and qualifications analysis is to determine the numbers and qualifications of personnel required for safe and efficient plant operation in a systematic manner that includes a thorough understanding of task requirements and applicable regulatory requirements. During the HFE design phase, staffing qualification analysis is focused primarily on personnel positions that are required for participation in the HFE design and V&V process as described in Section 18.1. The detailed staffing and qualification analysis process is described in the US-APWR Staffing & Qualifications Implementation Plan (MUAP-10008). DCD-18-103

18.5.2 Methodology

The MHI staffing analysis for the US-APWR addresses applicable requirements of 10 CFR 50.54 (Reference 18.5-1) and NUREG-0800, Subsections 13.1.2 and 13.1.3 (Reference 18.5-2) that are necessary to ensure that personnel supporting the procedure, training, HSI development, and the V&V process are sufficient in number and qualifications to permit an adequate response to reference plant conditions. The detailed methodology for conducting the staffing and qualifications analysis and integrating it into the HFE analyses is documented in this section.

The staffing analysis determines the number and background of personnel for the full range of plant conditions and tasks including operational tasks (normal, abnormal, and emergency), plant maintenance, and plant surveillance and testing. The scope of personnel that are considered is identified in the HFE Program Management element (see NUREG-0711 (Reference 18.5-3), Subsection 2.4.1, Criterion 5), and is properly documented.

The plant personnel who are addressed by the HFE program include licensed control room operators (ROs and SRO) as defined in 10 CFR 55 (Reference 18.5-4), and the following categories of personnel defined in 10 CFR 50.120 (Reference 18.5-5):

- Non-licensed operators (Note 1)
- Shift ~~supervisors~~managers DCD_18-140
- Shift technical advisor
- I&C technicians (Note 1)
- Electrical maintenance personnel (Note 1)
- Mechanical maintenance personnel (Note 1)
- Radiological protection technicians (Note 1)
- Chemistry technicians (Note 1)

18.9.2.1 General Training Approach

A systems approach to the training of plant personnel that addresses applicable guidance in Reference 18.9-1, Section 13.2 ("Training", 13.2.1), as defined in 10 CFR 55.4 (Reference 18.9-3), and as required by 10 CFR 52.78 (Reference 18.9-4) and 10 CFR 50.120 (Reference 18.9-5) is employed. NEI 06-13A (Reference 18.9-8), which requires the Systems Approach to Training (SAT) process to be taken, is utilized as a template for program basic structure and content. However, as described in Section 13.2, training program development is the responsibility of the COL Applicant. The development of operational programs and their implementation is the responsibility of the COL Applicant in accordance with SECY-05-0197 (Reference 18.9-13), as described in Section 13.4. DCD_18-120
The overall scope of training is defined to include the following:

- Categories of personnel to be trained, as shown below (Reference 18.9-6, Subsection 4.1.4)
- Specific plant conditions (normal, upset, and emergency, as identified in Section 18.4)
- Specific operational activities (operations, maintenance, testing, and surveillance, as identified in Section 18.4)
- HSIs in the MCR, RSC, TSC, and LCSs

The training development program provides reasonable assurance that personnel have the qualifications commensurate with the performance requirements of their jobs.

Training addresses the following:

- The full range of degraded HSI conditions including: DCD_07.08-9
  - Stable continued operation, accident mitigation and safe shutdown with only safety visual display units
  - Accident mitigation and safe shutdown with a concurrent common cause failure (i.e. operation from the Diverse HSI Panel)
  - Safe shutdown from the Remote Shutdown Room
- The full range of positions of operations and maintenance personnel whose actions may affect plant safety:
  - Licensed operators
  - Non-licensed operators
  - Shift ~~supervisors~~managers DCD_18-140
  - Shift technical advisor