MITSUBISHI HEAVY INDUSTRIES, LTD.

**1-1, WADASAKI-CHO, 1-CHOME, HYOGO-KU,
KOBE, 652-8585 JAPAN**

May 28, 2014

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

Attention: Mr. William Ward

Docket No. 52-021
MHI Ref: UAP-HF-14020

Subject: MHI's Response to US-APWR DCD RAI No. 1073-7383 (SRP 18)

Reference: 1) "Request for Additional Information No. 1073-7383 Revision 0, SRP Section: 18 - Human Factors Engineering, Application Section: 18" dated February 4, 2014.

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. 1073-7383."

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

Please contact Mr. Joseph Tapia, General Manager of Regulatory Services, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of this submittal. His contact information is provided below.

Sincerely,

Atsushi Kumaki

Atsushi Kumaki,
Manager, APWR Project Group
Global Nuclear Project Department
Nuclear Energy Systems Division
Energy & Environment Domain
Mitsubishi Heavy Industries, Ltd.

Enclosure:

1. Response to Request for Additional Information No. 1073-7383

D081
NRO

CC: W. Ward
J. Tapia

Contact Information
Joseph Tapia, General Manager of Regulatory Services
Mitsubishi Nuclear Energy Systems, Inc.
11405 North Community House Road, Suite 300
Charlotte, NC 28277
E-mail: joseph_tapia@mnes-us.com
Telephone: (704) 945-2740

Docket No. 52-021
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Enclosure 1

UAP-HF-14020
Docket Number 52-021

Response to Request for Additional Information No. 1073-7383

May 2014

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

5/28/2014

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.:	**NO. 1073 COLP 7383**
SRP SECTION:	**18. - HUMAN FACTORS ENGINEERING**
APPLICATION SECTION:	
DATE OF RAI ISSUE:	**2/4/2014**

QUESTION NO. : 18-264

The staff has been informed that MUAP-08014 will be withdrawn. Therefore, citations to MUAP-08014 are incorrect. The staff suggests that MHI reconcile/revise MUAP-13005, and any other documents needed, as described below to remove this citation:

- NUREG-0711, Revision 2, Section 3, Operating Experience Review, Criterion 3.4.2, "Issue Analysis, Tracking, and Review," (2), "Documentation," states that the analysis of operating experience should be documented in an evaluation report.
  - In MUAP-13005 (Rev 0), p. 2, Section 2.0, "Scope," the last paragraph cites MUAP-08014 as the data source for evaluations conducted through operator interviews.
  - In MUAP-13005 (Rev 0), p.10, Section 4.1.4, "Issues Identified by Plant Personnel," the beginning of 1st complete paragraph indicates that operator interview results are documented in MUAP-08014.
  - In MUAP-13005 (Rev 0), p.10, Section 4.1.4, "Issues Identified by Plant Personnel," 2nd full paragraph, MUAP-08014 is cited as the document that describes the operator interview process. The staff suggests that MHI revise this statement and paragraph to reflect what MHI's process is or will be and also to remove the citation to MUAP-08014.
  - In MUAP-13005 (Rev 0), p.11, Section 4.1.4, "Issues Identified by Plant Personnel," 1st paragraph, 2nd sentence, states that the operator interview process and results are documented in MUAP-08014, Rev 2 (Reference 8-5).
  - In MUAP-13005 (Rev 0), p.21, Section 8.0, "References," item 8-5 includes MUAP-08014.
- In addition, MUAP-08014, Revision 1, focused on interviewing operators post-V&V scenario, but does not describe the OER interview process. A description of the process description should be included in MUAP-13005. When reconciling the removal of the MUAP-08014 reference, the staff suggests that MHI ensure that the material which was referenced is adequately covered in MUAP-13005, or referenced to another document which still exists.

ANSWER:

MHI intends to withdraw MUAP-08014 and will revise MUAP-13005 to remove MUAP-08014 citations.

MHI will incorporate a summary of the activities discussed in MUAP-08014 in an attachment in MUAP-07007, Revision 6, "Human-System Interface System Description". Information relevant to the OER interview process conducted as part of the US-Basic HSIS design development will be included in MUAP-07007, Revision 6, Appendix C and MUAP-13005 will incorporate it by reference to MUAP-07007, Revision 6, Appendix C.

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

MUAP-13005 will be revised as follows:

- p. 2, Section 2.0, "Scope", the last paragraph:

  The evaluation of nuclear plant OE also includes HFE issues identified by nuclear plant personnel. These issues were identified through interviews conducted with plant operators during the ~~US-APWR Phase 1 "US-Basic Human-System Interface System Verification and Validation (Phase 1)," MUAP-08014 (Reference 8-5)~~**development of the US-Basic HSIS as described in MUAP-07007, Human-System Interface System Description, Appendix C (Reference 8-5)**.

- p. 4, Section 3.0, "Methodology Overview", fourth item:

  (4) If the HFE issue is within the scope of the US-Basic HSIS but is not adequately resolved by the US-Basic HSIS, a human engineering discrepancy (HED) is created~~.~~**;** New HEDs are not created in OER if the issue is already addressed by an HED from the ~~Phase 1 testing~~**development** of the US-Basic HSIS~~, MUAP-08014 (Reference 8-5).~~

- p. 4, Section 3.0, "Methodology Overview", fifth item:

  (5) If the HFE issue is outside the scope of the US-Basic HSIS but within the scope of the US-APWR and is not already in the process of being resolved by the US-APWR design or HFE process, an HED is created~~. New HEDs are not created in OER if the issue is already addressed by an HED applicable to the US-APWR from the Phase 1 testing of the US-Basic HSIS, MUAP-08014 (Reference 8-5).~~

- p.10, Section 4.1.4, "Issues Identified by Plant Personnel," the beginning of 1st complete paragraph:

  Interview results ~~are~~**were** documented ~~in HFE technical report MUAP-08014, Revision 2 (Reference 8-5),~~ as follows:

  ~~MUAP-08014 Part 1 Section 3.9. describes the~~**The** operator interview process ~~conducted during Phase 1a, which~~ included pre-engineered questionnaires which encompassed areas critical to human performance such as situation awareness, crew coordination, workload and error potential and recovery. In addition, the interview process included unstructured debriefs where operators could discuss any performance problems that arose and any issues that operators felt contributed to performance difficulties. A final interview was conducted with each operating crew**,** which systematically went through each of the major topic areas covered in the final questionnaire to elicit more background information on the sources of operator concerns. ~~Part 1 Sections 3.10.3 and 3.10.4 explain how the data obtained from these operator interviews was analyzed, including the use of video tape for all interviews. Part 1 Sections 3.13.2 and 3.13.3 summarize the interview results.~~

  ~~MUAP-08014 Part 2 Section 4.2 describes the~~**An** operator interview process ~~conducted during Phase 1b. Phase 1b~~ was conducted **after a subsequent set of scenarios were performed** to ~~test~~**validate** the resolutions for many of the HEDs that were generated during ~~Phase 1a~~ **previous testing** and to test HSI elements of the US-Basic HSIS that were not available ~~for testing in Phase 1a~~**as part of the Japanese-Basic HSIS**. ~~As in Phase 1a, Phase 1b included s~~**S**ubjective operator feedback collected **also** via questionnaires and verbal debrief sessions. Following each test scenario operators filled out a short questionnaire followed by a 15 to 30 minute verbal debrief where the operators were given the opportunity to mention any problems of particular concern. At the completion of all test scenarios, participants were given a final written feedback questionnaire. Operators took approximately an hour to an hour and a half to fill out this questionnaire. Following the written final feedback questionnaire, a final verbal debrief session was conducted where operators were provided the opportunity to explain and discuss the HEDs they identified. This final verbal debrief took approximately one hour. All sessions were videotaped and the video tapes reviewed ~~as in the Phase 1a tests. The operator feedback results are provided in Part 2 Section 5.1~~.

  The personnel interviews described above were conducted as part of the evaluation of the Japanese-Basic HSIS for the development of the US-Basic HSIS. Operator feedback from these interviews reflected their OE as it applied to their evaluation of the HSI during dynamic simulations of a broad sampling of plant scenarios for both normal and abnormal conditions. Where the Japanese-Basic HSIS design did not address the concerns expressed by U.S. operators, HEDs were identified by the HFE team and incorporated into the HFE issues tracking system. Operators were also encouraged to write their own HEDs. All HEDs are evaluated by the HFE team for their applicability to the US-Basic HSIS, the US-APWR HSI inventory, or the plant design. The resolution process for all HEDs is described in the HFEPMP.

  The US plant personnel (i.e., reactor operators and senior reactor operators) who contributed to the development of the US-Basis HSIS~~, as described above,~~ based their evaluations and the issues they identified on their personal OE. ~~Since the interview process and results are fully documented in MUAP-08014, Revision 2 (Reference 8-5), this portion of the OER IP has been completed. Therefore, there is no additional documentation for issues identified by plant personnel" in the OER results summary report (ReSR).~~

- p.21, Section 8.0, "References," item 8-5:

  8-5 ~~US-Basic Human-System Interface System Verification and Validation (Phase 1), MUAP-08014, Revision 2, MHI, 2013.~~**Human-System Interface System Description, MUAP-07007, Revision 6, MHI, May 2014**

This completes MHI's response to the NRC's question.