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June 19th, 2009

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-09331

Subject: MHI's Responses to US-APWR DCD RAI No. COLP 370-2475 Revision 1

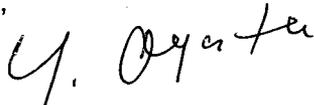
Reference: 1) "Request for Additional Information No. COLP 370-2475 Revision 1,
SRP Section: 18 - Human Factors Engineering, Application Section:
18.9 Training Program Development," dated May 20th, 2009.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") a document entitled "Responses to Request for Additional Information No. COLP 370-2475 Revision 1."

Enclosed is the responses to 1 RAI (7 sub-parts) 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,



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

Enclosure:

1. Responses to Request for Additional Information No. COLP 370-2475 Revision 1

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

D081
NRD

Contact Information

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Docket No. 52-021
MHI Ref: UAP-HF-09331

Enclosure 1

UAP-HF-09331
Docket No. 52-021

Responses to Request for Additional Information No. COLP 370-2475
Revision 1

June 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/17/2009

**US-APWR Design Certification
Mitsubishi Heavy Industries
Docket No. 52-021**

RAI NO.: NO. COLP 370-2475 REVISION 1
SRP SECTION: 18 - HUMAN FACTORS ENGINEERING
APPLICATION SECTION: 18.9 TRAINING PROGRAM DEVELOPMENT
DATE OF RAI ISSUE: 5/20/2009

QUESTION NO. 18-47_1

NUREG-0711, Section 10.4.1, Criteria 1 & 2 state:

1. A systems approach to the training of plant personnel should be developed that addresses applicable guidance in NUREG-0800 Section 13.2 ("Training"), as defined in 10 CFR 55.4, and as required by 10 CFR 52.78 and 50.120.
2. The overall scope of training should be defined including the following:
 - categories of personnel (e.g., senior reactor operator) to be trained
 - specific plant conditions (normal, upset, and emergency)
 - specific operational activities (e.g., operations, maintenance, testing and surveillance)
 - HSIs (e.g., in the main control room, emergency operations facility, remote shutdown panel, local control stations)

Section 18.9.2.1 of the US-APWR DCD states:

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. The overall scope of training is defined to include the following:

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

The US-APWR DCD restates the NUREG-0711 criteria and does not demonstrate, with sufficient detail, **how** criteria 1 & 2 of NUREG-0711 section 10.4.1 will be met. The information to meet this criterion should:

- Provide complete process descriptions
- Provide a flow diagram, or similar graphic example, that illustrates the relationship of

the different process steps to each other

- Contain a description of the applicable technical requirements with sufficient quality, to enable the staff to verify that the product conforms to the intent of the methodology

Please provide detailed information to satisfy criteria 1 & 2 of NUREG-0711, section 10.4.1.

ANSWER:

Each subsection of US-APWR DCD Chapter 18 provides the Implementation Plan for that specific HFE program element. This method of documenting each HFE program element Implementation Plan is consistent with the HFE programs for other certified designs. Since NUREG-0711 provides a method acceptable to the NRC and industry for implementing each program element, the key words from NUREG-0711 have been used in the DCD to document MHI's implementation commitments. The HFE Implementation Plans supplement these words to address unique aspects of the US-APWR, where necessary. However, for the training program element there are no unique aspects of the US-APWR that affect the program at the implementation planning level. Specific to Criteria 1, a systems approach to training is demonstrated by the subsections of Chapter 18.9 which define the objectives, scope, methods, organizational responsibilities, learning objectives, contents of the training program, methods to evaluate the training effectiveness, and commitment to References 18.9-7, 18.9-8, and 18.9-9 of the DCD. To clarify compliance with Criteria 2, the DCD will be revised as shown below.

Impact on DCD

Section 18.9.2.1 will be revised as follows:

- 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 Attachment 1 page 18.9-2 shows the above change.

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/17/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

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APPLICATION SECTION: 18.9 TRAINING PROGRAM DEVELOPMENT
DATE OF RAI ISSUE: 5/20/2009

QUESTION NO. 18-47_2

NUREG-0711, Section 10.4.1, Criterion 3 states:

The training program should provide reasonable assurance that personnel have the qualifications commensurate with the performance requirements of their jobs. Training should address:

- *the full range of positions of operational personnel including licensed and nonlicensed personnel whose actions may affect plant safety*
- *the full range of plant functions and systems including those that may be different from those in predecessor plants (e.g., passive systems and functions)*
- *the full range of relevant HSIs (e.g., main control room, remote shutdown panel, local control stations) including characteristics that may be different from those in predecessor plants (e.g., display space navigation, operation of "soft" controls)*
- *the full range of plant conditions*

Section 18.9.2.1 of the US-APWR DCD states:

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 positions of operations and maintenance personnel whose actions may affect plant safety:*
 - *Licensed operators*
 - *Non-licensed operators*
 - *Shift supervisors*
 - *Shift technical advisor*
 - *I&C technicians*
 - *Electrical maintenance personnel*
 - *Mechanical maintenance personnel*
 - *Radiological protection technicians*
 - *Chemistry technicians*

- *Engineering support personnel*

· *The full range of plant functions and systems that may affect plant safety, including those that may be different from those in predecessor plants (e.g., passive systems and functions). This training encompasses maintenance activities related to technical specifications surveillances. For other maintenance activities, such as corrective maintenance, this is limited to removing equipment from service and restoring equipment to service*

· *The full range of relevant HSIs (e.g., MCR, RSC, and LCSs) including characteristics that may be different from those in predecessor plants (e.g., display navigation or operation of "soft" controls)*

· *The full range of plant conditions*

The US-APWR DCD restates the NUREG-0711 criteria and does not demonstrate, with sufficient detail, **how** criterion 3 of NUREG-0711 section 10.4.1 will be met. The information to meet this criterion should:

- Provide complete process descriptions
- Provide a flow diagram, or similar graphic example, that illustrates the relationship of the different process steps to each other
- Contain a description of the applicable technical requirements with sufficient quality, to enable the staff to verify that the product conforms to the intent of the methodology

Please provide detailed information to satisfy criterion 3 of NUREG-0711, section 10.4.1.

ANSWER:

Phase 2 of the US-APWR HFE program will implement the Training Implementation Plan documented in Section 18.9 through a more detailed Training Program Implementation Procedure. The Implementation Plan documented in Section 18.9 provides sufficient detail to demonstrate compliance to criterion 3 of NUREG-0711, section 10.4.1. The Training Program Implementation Plan ensures that the training program gives personnel skills commensurate with the performance requirements of their jobs described in Section 18.9.2.1 of the US-APWR DCD.

Impact on DCD

There is no impact on the DCD

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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DATE OF RAI ISSUE: 5/20/2009

QUESTION NO. 18-47_3

NUREG-0711, Section 10.4.2, Criteria 1 - 3 state:

- 1. The roles of all organizations, especially the applicant and vendors, should be specifically defined for the development of training requirements, development of training information sources, development of training materials, and implementation of the training program. For example, the role of the vendor may range from merely providing input materials (e.g., EPG) to conducting portions of specific training programs.*
- 2. The qualifications of organizations and personnel involved in the development and conduct of training should be defined.*
- 3. Facilities and resources such as plant-referenced simulator and part-task training simulators needed to satisfy training design requirements and the guidance contained in ANSI 3.5 and Regulatory Guide 1.149 should be defined.*

Section 18.9.2.2 of the US-APWR DCD states:

The roles of all organizations (e.g., MHI, plant owners, and vendors) are specifically defined for the development of training requirements, the development of training information sources, the development of training materials, and the implementation of the training program. For example, the role of the vendor may range from merely providing input materials (e.g., emergency procedure guidelines) to conducting portions of specific training programs. The qualifications of organizations and personnel involved in the development and conduct of training are defined. Facilities and resources, such as plant-referenced simulator and part-task training simulators, needed to satisfy training design requirements, and the guidance contained in ANSI/ANS 3.5 (Reference 18.9-10) and RG 1.149 (Reference 18.9-11), are defined.

The US-APWR DCD restates the NUREG-0711 criteria and does not demonstrate, with sufficient detail, **how** criteria 1 – 3 of NUREG-0711 section 10.4.2 will be met. The information to meet this criterion should:

- Provide complete process descriptions
- Provide a flow diagram, or similar graphic example, that illustrates the relationship of the different process steps to each other

- Contain a description of the applicable technical requirements with sufficient quality, to enable the staff to verify that the product conforms to the intent of the methodology Please provide detailed information to satisfy criteria 1 – 3 of NUREG-0711, section 10.4.2.
-

ANSWER:

The HSI System Description and HFE Process (MUAP-07007, Rev.2) section 5.9, which is referenced by DCD Section 18.9, describes the role of the HFE team, qualification of instructors, and simulator facility requirements to demonstrate compliance to criteria 1 – 3 of NUREG-0711, section 10.4.2. The Training Implementation Procedure developed in Phase 2 of the US-APWR HFE program provides specific organization roles, qualifications, facilities and resources.

Impact on DCD

There is no impact on the DCD

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

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QUESTION NO. 18-47_4

NUREG-0711, Section 10.4.3, Criteria 1 & 2 state:

1. Learning objectives should be derived from the analysis that describes desired performance after training. This analysis should include but not be limited to training needs identified in the following:

- Licensing Basis - Final Safety Analysis Report, system description manuals and operating procedures, facility license and license amendments, licensee event reports, and other documents identified by the staff as being important to training*
- Operating Experience Review - previous training deficiencies and operational problems that may be corrected through additional and enhanced training, and positive characteristics of previous training programs*
- Function Analysis and Allocation - functions identified as new or modified*
- Task Analysis - tasks identified during task analysis as posing unusual demands including new or different tasks, and tasks requiring a high degree of coordination, high workload, or special skills*
- Human Reliability Analysis - coordinating individual roles to reduce the likelihood and/or consequences of human error associated with risk-important HAs and the use of advanced technology*
- HSI Design - design features whose purpose or operation may be different from the past experience or expectations of personnel*
- Plant Procedures - tasks that have been identified during procedure development as being problematic (e.g., procedure steps that have undergone extensive revision as a result of plant safety concerns)*
- Verification and Validation (V&V) - training concerns identified during V&V, including HSI usability concerns identified during validation or suitability verification and operator performance concerns (e.g., misdiagnoses of plant event) identified during validation trials*

2. Learning objectives for personnel training should address the knowledge and skill

attributes associated with all relevant dimensions of the trainee's job, such as interactions with the plant, the HSIs, and other personnel. Table 10.1, below, shows these dimensions.

Section 18.9.2.3 of the US-APWR DCD states:

Learning objectives for the training program reflect the desired performance after training. Learning objectives are derived from the following areas:

- *Licensing Basis – Design control document/final safety analysis report, technical specifications, system description manuals and operating procedures, facility license and license amendments, LERs, and other documents identified by the staff as being important to training*
- *OER – Previous training deficiencies and operational problems that may be corrected through additional and enhanced training, and positive characteristics of previous training programs*
- *FRA/FA – Functions identified as new or modified*
- *Task Analysis – Tasks identified during task analysis as posing unusual demands including new or different tasks, and tasks requiring a high degree of coordination, high workload, or special skills*
- *HRA – Coordinating individual roles to reduce the likelihood and/or consequences of human error associated with risk-important HAs and the use of advanced technology*
- *HSI Design – Design features whose purpose or operation may be different from the past experience or expectations of personnel*
- *Plant Procedures – Tasks that have been identified during procedure development as being problematic (e.g., procedure steps that have undergone extensive revision as a result of plant safety concerns)*
- *V&V – Training concerns identified during V&V, including HSI usability concerns identified during validation or suitability verification and operator performance concerns (e.g., misdiagnoses of plant event) identified during validation trials*

Learning objectives for personnel training address the knowledge and skill attributes associated with relevant dimensions of the trainee's job, such as interactions with the plant, the HSIs and procedures, and with other personnel. In developing the learning objectives for each training area, the dimensions of Table 10.1 of NUREG-0711 (Reference 18.9-12) are evaluated for applicability.

The US-APWR DCD restates the NUREG-0711 criteria and does not demonstrate, with sufficient detail, **how** criteria 1 & 2 of NUREG-0711 section 10.4.3 will be met. The information to meet this criterion should:

- Provide complete process descriptions
 - Provide a flow diagram, or similar graphic example, that illustrates the relationship of the different process steps to each other
 - Contain a description of the applicable technical requirements with sufficient quality, to enable the staff to verify that the product conforms to the intent of the methodology
- Please provide detailed information to satisfy criteria 1 & 2 of NUREG-0711, section 10.4.3.

ANSWER:

The complete process description for the Training Program element is provided in Section 5.9 of MUAP-07007, which is referenced in Section 18.9 of the DCD. This description provides numerous technical requirements to demonstrate that the program conforms to criteria 1 & 2 of NUREG-0711 section 10.4.3. Figure 5.1-3 of MUAP-07007 illustrates the relationship of the different HFE program element steps to each other, including where the training program element fits into the overall HFE process. The role of training in the overall HFE program is discussed in Sections 5.1.1.1, 5.1.1.4, and 5.1.2.2, and in numerous subsections of Sections 5.4 Task Analysis, 5.5 Staffing, 5.7 HSI Design, 5.10 V&V, and 5.12 Human Performance Monitoring. For the US-APWR the Training Implementation Procedure will be developed in Phase 2 of the HFE program.

Impact on DCD

There is no impact on the DCD

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/17/2009

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

RAI NO.: NO. COLP 370-2475 REVISION 1
SRP SECTION: 18 - HUMAN FACTORS ENGINEERING
APPLICATION SECTION: 18.9 TRAINING PROGRAM DEVELOPMENT
DATE OF RAI ISSUE: 5/20/2009

QUESTION NO. 18-47_5

NUREG-0711, Section 10.4.4, Criteria 1 - 4 state:

1. *The design of the training program should be defined to specify how learning objectives will be conveyed to the trainee. The definition should include:*
 - *The use of lecture, simulator, and on-the-job training to convey particular categories of learning objectives should be defined.*
 - *Specific plant conditions and scenarios to be used in training programs should be defined.*
 - *Training implementation considerations such as the temporal order and schedule of training segments should be defined.*
2. *Factual knowledge should be taught within the context of actual tasks so that personnel learn to apply it in the work environment. The context of the job should be defined, and it should be represented meaningfully to help trainees to link the knowledge to the job's requirements. Training that addresses theory should be integrated with training in using procedures.*
3. *Training programs for developing skills should be structured so that the training environment is consistent with the level of skill being taught. It should support skill acquisition by allowing trainees to manage cognitive demands. For example, trainees should not be placed in environments teaching high-level skills, such as coordinating control actions among crew members, before they have mastered requisite, low-level skills, such as how to manipulate control devices.*
4. *Training should address rules for decision-making related to plant systems, HSIs, and procedures. It should include rules for accessing and interpreting information and rules for interpreting symptoms of failures of systems, HSIs, and procedures. This training should cover acquiring new decision-making rules and eliminating existing ones that are not appropriate to the design.*

Section 18.9.2.4 of the US-APWR DCD states:

The design of the training program is defined to specify how learning objectives are conveyed to the trainee. The following parameters are included:

- *The mixture of classroom lectures, simulator training, and on-the-job training, to convey*

particular categories of learning objectives

- *The specific plant conditions and scenarios used in training programs*
- *Training implementation considerations, such as the temporal order and schedule of training segments*

Factual knowledge is taught within the context of actual tasks so that personnel learn to apply it in the work environment. The context of the job is defined, and it is represented meaningfully to help trainees to link the knowledge to the job's requirements. Training that addresses theory is integrated with training in using procedures.

Training programs for developing skills is structured so that the training environment is consistent with the level of skill being taught. It supports skill acquisition by allowing trainees to manage cognitive demands. For example, trainees should not be placed in environments teaching high-level skills, such as coordinating control actions among crewmembers, before they have mastered requisite, low-level skills, such as how to manipulate control devices.

The training program addresses rules for decision-making related to plant systems, HSIs, and procedures. It includes rules for accessing and interpreting information and rules for interpreting symptoms of failures of systems, HSIs, and procedures. This training covers acquiring new decision-making rules and eliminating existing ones that are not appropriate to the design.

The US-APWR DCD restates the NUREG-0711 criteria and does not demonstrate, with sufficient detail, **how** criteria 1 – 4 of NUREG-0711 section 10.4.4 will be met. The information to meet this criterion should:

- Provide complete process descriptions
 - Provide a flow diagram, or similar graphic example, that illustrates the relationship of the different process steps to each other
 - Contain a description of the applicable technical requirements with sufficient quality, to enable the staff to verify that the product conforms to the intent of the methodology
- Please provide detailed information to satisfy criteria 1 – 4 of NUREG-0711, section 10.4.4.

ANSWER:

Section 18.9.2.4 of the DCD together with Section 5.9 of MUAP-07007 provide a sufficient level of planning detail to demonstrate compliance to criteria 1 – 4 of NUREG-0711, section 10.4.4. There is nothing unique in the US-APWR that would require a Training Program Implementation Plan that contains key program elements that are different than those defined in NUREG-0711. MHI has followed these key program planning elements for past training conducted in Japan and will continue to apply these same key program planning elements for the US-APWR. The specific US-APWR Training Program Implementation Procedure will be developed in Phase 2 of the US-APWR HFE program.

Impact on DCD

There is no impact on the DCD

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/17/2009

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DATE OF RAI ISSUE: 5/20/2009

QUESTION NO. 18-47_6

NUREG-0711, Section 10.4.5, Criteria 1 - 3 state:

- 1. Methods for evaluating the overall effectiveness of the training programs and trainee mastery of training objectives should be defined, including written and oral tests and review of personnel performance during walkthrough, simulator exercises, and on-the-job. Evaluation criteria for training objectives should be defined for individual training modules. Methods for assessing overall proficiency should be defined and coordinated with regulations, where applicable.*
- 2. Methods for verifying the accuracy and completeness of training course materials should be defined.*
- 3. Procedures for refining and updating the content and conduct of training should be established, including procedures for tracking training course modifications.*

Section 18.9.2.5 of the US-APWR DCD states:

Methods for evaluating the overall effectiveness of the training programs and trainee mastery of training objectives are defined, including written and oral tests and the review of personnel performance during walkthrough, simulator, and on-the-job exercises (or "table top reviews" during the design certification phase). The evaluation criteria for training objectives are defined for individual training modules. The methods for assessing overall proficiency are defined and coordinated with regulations, where applicable. The methods for verifying the accuracy and completeness of training course materials are defined. The procedures for refining and updating both the training content and conduct of training are established, and include procedures for tracking training course modifications.

The US-APWR DCD restates the NUREG-0711 criteria and does not demonstrate, with sufficient detail, **how** criteria 1 – 3 of NUREG-0711 section 10.4.5 will be met. The information to meet this criterion should:

- Provide complete process descriptions
- Provide a flow diagram, or similar graphic example, that illustrates the relationship of the different process steps to each other

- Contain a description of the applicable technical requirements with sufficient quality, to enable the staff to verify that the product conforms to the intent of the methodology Please provide detailed information to satisfy criteria 1 – 3 of NUREG-0711, section 10.4.5.
-

ANSWER:

Section 5.9.6 will be added to MUAP-07007, as follows:

5.9.6 Training Effectiveness

The trainees are evaluated to determine their mastery of the learning objectives taught. Methods for this evaluation include written and oral tests, as well as a review of personnel performance during walkthroughs, simulator exercises, and evaluation of on-the-job performance.

Deficiencies commonly applicable to multiple trainees are considered training program deficiencies. These deficiencies are identified as HEDs and are tracked to resolution. Training courses are maintained under a quality assurance program that contains configuration controls to ensure all training modifications are tracked.

This section will be referenced in DCD Section 18.9.2.5 as shown below. With this addition, compliance to Criteria 1 - 3 of NUREG-0711 section 10.4.5 is documented in the Training Implementation Plan. The method used to evaluate the training effectiveness for each specific training course will be documented in the Training Program Implementation Procedure which will be developed during Phase 2 of HFE process.

Impact on DCD

The following will be added to Section 18.9.2.5: Deficiencies in the training program are identified, tracked and resolved per Reference 18.9-2 Section 5.9.6. The Attachment 1 page 18.9-5 shows the above change.

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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QUESTION NO. 18-47_7

NUREG-0711, Section 10.4.6, Criteria 1 & 2 state:

1. *Personnel should undergo periodic retraining.*
2. *The applicant should evaluate whether any changes or increases in retraining are warranted following plant modernization programs.*

Section 18.9.2.6 of the US-APWR DCD states:

Personnel undergo periodic retraining. The periodicity of the retraining is established based on regulatory requirements (e.g., Reference 18.9-5, Appendix E) and Human Performance Monitoring (see Section 18.12).

Section 18.9.2.6 of the US-APWR DCD restates the first criterion in NUREG-0711 section 10.4.6, it also states that 10 CFR 50.120 is the basis for the periodic retraining. This does not demonstrate, with sufficient detail, **how** the criterion in the regulatory guidance or the regulations will be met. In addition, section 18.9.2.6 does not provide a plan that describes how MHI will evaluate whether any changes or increases in retraining should be warranted following plant modernization programs. Please provide detailed information to satisfy criteria 1 & 2 of NUREG-0711, section 10.4.6. The information to meet this criterion should:

- Provide complete process descriptions
- Provide a flow diagram, or similar graphic example, that illustrates the relationship of the different process steps to each other
- Contain a description of the applicable technical requirements with sufficient quality, to enable the staff to verify that the product conforms to the intent of the methodology

ANSWER:

Section 5.9.7 will be added to MUAP-07007, as follows:

5.9.7 Retraining

Personnel undergo periodic retraining. The periodicity of the retraining is established based on regulatory requirements (e.g., Training and Qualification of Nuclear Power Plant Personnel, NRC Regulations Title 10, Code of Federal Regulations, Part 50.120, Appendix E) and Human Performance Monitoring (see Section 5.12). Human performance deficiencies are identified as HEDs and tracked to resolution. HEDs may indicate the need for retraining based on a previous training program, or retraining based on a program with changes to address the specific deficiency encountered.

For operating plant upgrades or any HSI changes that occur after the initial training and initial HSI design deployment, the training program ensures plant personnel are retrained on all tasks that are affected by the new HSI design. The extent of retraining is dependent on the extent to which the task is impacted. For example, it is unnecessary to retrain personnel on the function of a plant fluid system, if the new HSI does not change the operation or performance of that system.

This section will be referenced in DCD Section 18.9.2.5 as shown below. With this addition, compliance to Criteria 1 & 2 of NUREG-0711, section 10.4.6 is documented in the US-APWR Training Implementation Plan. The periodic retraining schedule and the methods used to evaluate the need for unplanned retraining based on human performance deficiencies or design changes, will be documented in the Training Program Implementation Procedure which will be developed during Phase 2 of HFE process.

Impact on DCD

The following will be added to Section 18.9.2.6:

Human performance deficiencies or changes in the HSI design may indicate the need for retraining, as described in Reference 18.9-2 Section 5.9.7.

The Attachment 1 page 18.9-5 shows the above change.

Impact on COLA

There is no impact on the COLA

Impact on PRA

There is no impact on the PRA

This completes MHI's responses to the NRC's questions.

with NRC regulations, as stated in the following sections. The requirement for operator training simulator fidelity is described in Reference 18.9-2 Subsection 5.9.2.

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. The overall scope of training is defined to include the following:

- Categories of personnel to be trained, as shown below (e.g., SRO) (Reference 18.9-6, Subsection 4.1.4)
- Specific plant conditions (e.g., normal, upset, and emergency, as identified in Section 18.4)
- Specific operational activities (e.g., operations, maintenance, testing, and surveillance, as identified in Section 18.4)
- HSIs (e.g., 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 positions of operations and maintenance personnel whose actions may affect plant safety:
 - Licensed operators
 - Non-licensed operators
 - Shift supervisors
 - Shift technical advisor
 - I&C technicians
 - Electrical maintenance personnel
 - Mechanical maintenance personnel
 - Radiological protection technicians
 - Chemistry technicians

crewmembers, before they have mastered requisite, low-level skills, such as how to manipulate control devices.

The training program addresses rules for decision-making related to plant systems, HSIs, and procedures. It includes rules for accessing and interpreting information and rules for interpreting symptoms of failures of systems, HSIs, and procedures. This training covers acquiring new decision-making rules and eliminating existing ones that are not appropriate to the design.

18.9.2.5 Evaluation and Modification of Training

Methods for evaluating the overall effectiveness of the training programs and trainee mastery of training objectives are defined, including written and oral tests and the review of personnel performance during walkthrough, simulator, and on-the-job exercises (or "table top reviews" during the design certification phase). The evaluation criteria for training objectives are defined for individual training modules. The methods for assessing overall proficiency are defined and coordinated with regulations, where applicable. The methods for verifying the accuracy and completeness of training course materials are defined. The procedures for refining and updating both the training content and conduct of training are established, and include procedures for tracking training course modifications. Deficiencies in the training program are identified, tracked and resolved per Reference 18.9-2 Section 5.9.6.

18.9.2.6 Periodic Retraining

Personnel undergo periodic retraining. The periodicity of the retraining is established based on regulatory requirements (e.g., Reference 18.9-5, Appendix E) and Human Performance Monitoring (see Section 18.12). Human performance deficiencies or changes in the HSI design may indicate the need for retraining, as described in Reference 18.9-2 Section 5.9.7.

18.9.3 Results

Training program modifications are integrated across the training program. The modification process ensures alterations in particular parts of the training program do not cause conflicts or inconsistencies with other parts. Those training program issues that negatively affect human performance are identified as HEDs and are tracked and dispositioned.

The training program report contains a synopsis of training modules developed for the US-APWR.

18.9.4 Combined License Information

No additional information is required to be provided by a COL Applicant in connection with this section.