**Response to**

**Request for Additional Information No. 39, Revision 0**

**8/01/2008**

**U. S. EPR Standard Design Certification**
**AREVA NP Inc.**
**Docket No. 52-020**
**SRP Section: 18 - Human Factors Engineering**
**Application Sections:**
**COLP Branch**

**Question 18-2:**

NUREG 0711 Criterion 1, General Process and Procedures states:

The applicant should identify the process through which the team will execute its responsibilities, including procedures for the following:

- assigning HFE activities to individual team members (a)
- governing the internal management of the team (b)
- making management decisions regarding HFE (c)
- making HFE design decisions (d)
- governing equipment design changes (e)
- conducting design team review of HFE products (f)

The staff reviewed the DC FSAR section 18.1.3 and the QAP and topical report sections that were referenced. The design control process is not presented in sufficient detail to satisfy review criteria a through d outlined above. Please provide additional information describing how these decision making processes (items a through d) within the HFE design team are managed.

**Response to Question 18-2:**

See also responses to RAI 4, RAI 20, and RAI 21 for ANP-10279.

Section 5.2 of ANP-10279 describes the organization of the HFE and Control Room Design Team and some of the documentation produced by the team.

Section 5.4 of ANP-10279 describes the responsibilities and composition of the team and how the Program Manager, human factors engineering (HFE) and Control Room Design is the technical project manager responsible for the human system interface (HSI) design and for integration of the HSI with the overall plant design. Section 5.4.2.1.3 of ANP-10279, states that the Program Manager, HFE and Control Room Design "leads the team and is responsible for integration of the technological input." This statement is intended to describe the authority of the Program Manager, HFE and Control Room Design to assign activities, manage the team, and make decisions regarding the proper implementation of HFE in the overall design. The HFE advisors (refer to Figure 5.2-1 and Section 5.4.2.1.2 of ANP-10279) are responsible to provide input for complex HFE decisions. The design control process described in ANP-10279, Section 5, and in the quality assurance program (QAP) includes interdisciplinary reviews and an approval process for all design documentation to maintain the balance of HFE influences on design decisions. Section 5 also discusses Design Review Boards and the management hierarchy which combines to oversee the design and design change processes. Section 5.4.2.1.4 addresses the individual responsibilities for the members or consultants of the HFE Team. The Program Manager is the key lead person in the overall process, is accountable and has the authority to make important project decisions as well as assuring adequate qualified resources are available for the various tasks in the HFE program.

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

**Question 18-3:**

NUREG 0711 criteria (5) states:

HFE documentation items should be identified and briefly described, along with the procedures for retention and access.

In the DC FSAR Tier 2, Section 18.1.3.4, the applicant addresses HFE documentation. No specific criteria are provided other than "procedures establish requirements, methods, and responsibilities for preparing, reviewing, and approving initial design documents as well as for changing previously released documentation." Also there is a brief description of how system descriptions document how design requirement bases are met. While not referenced in this DC FSAR section, the staff identified additional pertinent documentation information in the topical report section 5.3.

Please provide a description of the procedures for retention and access.

Please explain why topical report ANP-10279 section 5.3 is not referenced.

RAIs 24, 25, and 26 from the topical report are related to this RAI.

**Response to Question 18-3:**

Retention of and access to any documentation released to the AREVA Records Management System (RMS) is governed by corporate policy and described in Section 6 of ANP-10266 (QAP). Once released to RMS, the human factors engineering (HFE) and Control Room Design Team has authority only to access and update HFE program documentation (i.e., the previous revisions are retained for the periods of time established by corporate policy).

U.S. EPR FSAR Tier 2, Section 18.1.3.4 will be revised as described in the response and indicated on the enclosed markup.

**FSAR Impact:**

U.S. EPR FSAR, Tier 2, Section 18.1.3.4 will be revised as described in the response and indicated on the enclosed markup.

**Question 18-4:**

NUREG 0711 section 4.4 criteria 6 states:

The applicant should document a technical basis for all function allocations, including the allocation criteria, rationale, and analyses methods.

DC FSAR Sections 8.3.2 and 8.3.3 refer to a Functional Requirements analysis (FRA) report and a Functional Allocation (FR) report. The description of these reports suggests they contain all the information required by this criterion. Both reports are stated as being "included with the US-EPR V&V documentation" but the V&V section of the DCD does not contain any similar material.

1. Please submit these documents for staff review or provide a description of how the technical basis for function allocation is being accomplished.

2. In the standard HFE Program the FRA/FA provide input into the HSI design. The design is implemented and then verified and validated. Are there additional relationships between the FRA/FA and V&V in the US-EPR HFE program? Please explain why the FRA/FA documentation would be associated with V&V other than as basis documentation for the design.

3. The response to RAI 7 from topical report ANP-10279 is inconsistent with information that the DC FSAR states is documented in these two reports. Are these reports intended to provide the documentation requested in RAI 7?

**Response to Question 18-4:**

1. An implementation plan describing the technical basis for functional allocation is complete and available for inspection at AREVA offices

2. NUREG-0711 guidance for applicant submittals, for all human factors engineering (HFE) Program elements other than Program Management, includes providing both an implementation plan and a results summary for staff review. Implementation plans are intended to describe the process to be followed during design. Results summaries are intended to describe how the process was followed to obtain the complete and final design.

   Because the U.S. EPR FSAR Tier 2, Chapter 18 will remain part of the licensing basis for the life of any EPR constructed, it is written in present tense. The verb tense is not intended to imply that HFE design analyses or documentation of those results are complete. Chapter 18 describes the HFE Program in terms of a process to be followed. It summarizes information which would appear in an implementation plan were the NUREG-0711 model followed precisely. Design features are described where the conceptual design is sufficiently advanced. The design process is inherently iterative. Analyses which have been completed are generally not yet integrated with the U.S. EPR human system interface (HSI) and Control Room designs to a degree sufficient to support staff review.

   An implementation plan describing how information inherited from predecessor designs (see paragraph 1 of response to RAI No. 31) will be integrated into the U.S. EPR design

process is under development. This implementation plan will specifically address activities which apply to the U.S. EPR evaluation and implementation of functional requirements (FR) and functional allocation (FA) analyses as recommended in NUREG-0711 guidance.

Section 5.4.4.3 of ANP-10279 describes automation criteria as:

-"tasks which will be automated regardless of plant state,"

-functions for which automation may be preferred, and

-other contributing rules for automation.

As described in Section 5.4.4.4 of ANP-10279, U.S. EPR design documentation describes the design basis for each function and the type of control. The type of control is decided based on the automation criteria described above. V&V documentation is not intended to be the source of the FRA/FA summary, but rather a means of comparing these analyses against predecessor designs and "as built" information.

3. The inconsistency between ANP-10279, Section 5.4 and the U.S. EPR FSAR Tier 2, Section 18.3 will be addressed in the response to RAI 7 for ANP-10279.

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

**Question 18-5:**

NUREG 0711 section 4.4 criterion 7 states:

The OER should be used to identify modifications to function allocations; if necessary. If problematic OER issues are identified, then an analysis should be performed to (a) justify the original analysis of the function, (b) justify the original human-machine allocation, and (c) identify solutions such as training, personnel selection, and procedure design that will be implemented to address the OER issues.

There is no information provided on how OER is used as part of the continuing functional allocation process.

Please describe how criterion 7 will be implemented.

**Response to Question 18-5:**

The relationship between operating experience review (OER) and functional allocation (FA) is described in the U.S. EPR Functional Allocation Implementation Plan. This implementation plan is complete and available for inspection at AREVA offices.

The implementation plan identifies how OER is used in the FA decision making process, describes how the initial allocation decision is made and iterative nature of the analysis, and describes how to evaluate the FA decision and insure that the OER issues have been adequately resolved in the design.

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

**Question 18-6:**

NUREG 0711 section 8.4.2 criterion 2 states:

A concept of operations should be developed indicating crew composition and the roles and responsibilities of individual crew members based on anticipated staffing levels. The concept of operations should:

- Identify the relationship between personnel and plant automation by specifying the responsibilities of the crew for monitoring, interacting, and overriding automatic systems and for interacting with computerized procedures systems and other computerized operator support systems.
- Provide a high-level description of how personnel will work with HSI resources. Examples of the types of information that should be identified is the allocation of task to the main control room or local control stations, whether personnel will work at a single large workstation or individual workstations, what types of information each crew member will have access to, and what types of information should be displayed to the entire crew.
- Address the coordination of crew member activities, such as the interaction with auxiliary operators and coordination of maintenance and operations should be addressed.

DC section 18.7.2 presents the design basis for manning levels and an appropriate level of detail describing crew composition and the roles and responsibilities of individual crew members based on anticipated staffing levels. Information addressing the bullets contained in this criterion was not provided. Of specific interest to the staff is the policy on over-riding automatic equipment given the predominance of automatic controls, the use of video displays and large screen plant status display, interfaces with computerized alarm and procedure systems, and the use of Human-System Interfaces to facilitate coordination of plant activities (in addition to what has been provided on communications between the crew members).

Please address this criterion to the level of detail outlined within NUREG 0711.

**Response to Question 18-6:**

The Concept of Operations for the U.S. EPR Control Room will be available for staff inspection at AREVA offices on October 1, 2008. This document addresses the criteria related to the relationship between personnel and plant automation, how personnel will work with human system interface (HSI) resources, and coordination of crew member activities. It will also address NUREG 0711 section 8.4.2 criterion 2.

**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

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identifying HFE program milestones to allow evaluations of the effectiveness of the HFE effort to be made at critical checkpoints is shown in Figure 18.1-1—HFE Program Milestones.

### 18.1.3.4 HFE Documentation

Documentation of the HFE and control room design is addressed by procedures that apply to U.S. EPR design activities. The applicable procedures establish requirements, methods, and responsibilities for preparing, reviewing, and approving initial design documents as well as for changing previously released documentation. Section 5.3 of Reference 2 provides a discussion of the types of document prepared for HFE design and their usage.

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System descriptions for control rooms and for HSI platforms contain the bases for how design requirements are met; this includes HFE-related design requirements. The documentation of the HFE and control room design is included in the system descriptions, equipment specifications, and implementation plans for the various analyses, or in reports generated as a result of the analyses. Appendix A of Reference 2 provides a summary and schedule of the documentation associated with the HFE program elements.

### 18.1.3.5 Subcontractor HFE Efforts

Subcontractors for the HFE portions of the U.S. EPR design are subject to the requirements of the U.S. EPR QAP described in Reference 3. The QAP identifies the procedures that apply to subcontractor design organizations. Effective implementation of a subcontract supplier organization QAP is monitored by respective internal audit programs and by individual supplier audits.

## 18.1.4 Human Factors Engineering Issues Tracking

Section 5.5 of Reference 2 describes the method used to track HFE issues throughout the life of the design.

HFE issues are tracked in a standard corrective action program database and are generated, verified, and implemented as described in Section 16 of Reference 3.

## 18.1.5 Technical Program

As described in Section 5.3 of Reference 2, the HFE and control room design program is performed in accordance with the process specified in Reference 1. Figure 18.1-2—HFE Design Control Process illustrates the design control process and how the HFE implementation plans, analyses, and evaluations required as part of the program fit the overall process flow.