

ArevaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Thursday, December 16, 2010 3:16 PM
To: Tesfaye, Getachew
Cc: DELANO Karen (AREVA); ROMINE Judy (AREVA); BENNETT Kathy (AREVA); NOXON David (AREVA); PANNELL George (AREVA); Miernicki, Michael; Ford, Tanya
Subject: Response to U.S. EPR Design Certification Application RAI No. 348, FSAR Ch. 18, Supplement 2
Attachments: RAI 348 Supplement 2 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. provided a technically correct and complete response to all 22 questions for RAI No. 348 on March 4, 2010. Supplement 1 response was sent on May 7, 2010 to provide the U.S. EPR HFE Program Management Plan 118-9110637-001. The attached file, "RAI 348 Supplement 2 Response US EPR DC.pdf" provides a revised response to Question 18-90.

The AREVA NP U.S. EPR HFE Program Management Plan supporting RAI 348, has been revised, and the plan is submitted under a separate cover letter.

Appended to this file are affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 348 Question 18-90.

The following table indicates the respective pages in the response document, "RAI 348 Supplement 2 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

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RAI 348 — 18-90	2	2

This concludes the formal AREVA NP response to RAI 348, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
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From: BRYAN Martin (EXT)
Sent: Friday, May 07, 2010 8:05 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); PANNELL George L (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 348, FSAR Ch. 18, Supplement 1

Getachew,

In RAI 348, a date of May 7, 2010 was provided for submittal of the " U.S. EPR HFE Program Management Plan 118-9110637-001". This date applied to RAI 348, Question 18-90, submitted March 4, 2010.

This submittal provides the " U.S. EPR HFE Program Management Plan 118-9110637-001" as committed in RAI 348.

The proprietary and non-proprietary versions of " U.S. EPR HFE Program Management Plan 118-9110637-001. are submitted via AREVA NP Inc. letter, " U.S. EPR HFE Program Management Plan 118-9110637-001, U.S. EPR Design Certification Application RAI No. 348, Supplement 1," NRC 10:045, dated May 7, 2010. An affidavit to support withholding of information from public disclosure, per 10CFR2.390(b), is provided as an enclosure to that letter.

Sincerely,

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From: BRYAN Martin (EXT)
Sent: Thursday, March 04, 2010 7:40 PM
To: 'Tefaye, Getachew'
Cc: DELANO Karen V (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); ROMINE Judy (AREVA NP INC); PANNELL George L (AREVA NP INC)
Subject: Response to U.S. EPR Design Certification Application RAI No. 348, FSAR Ch. 18

Getachew,

The proprietary and non-proprietary versions of the response to RAI No. 348 are submitted via AREVA NP Inc. letter, "Response to U.S. EPR Design Certification Application RAI No. 348, " NRC 10:015, dated March 4, 2010. The enclosure to that letter provides technically correct and complete responses to 22 of the 22 questions of RAI No. 348. An affidavit to support withholding of information from public disclosure, per 10CFR2.390(b), is provided as an enclosure to that letter.

The following table indicates the respective page(s) in the response document that contain AREVA NP's response to the subject questions.

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This concludes the formal AREVA NP response to RAI 348, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]

Sent: Tuesday, February 02, 2010 11:26 AM

To: ZZ-DL-A-USEPR-DL

Cc: Marble, Julie; Keefe, Molly; Junge, Michael; Steckel, James; Colaccino, Joseph; ArevaEPRDCPEm Resource

Subject: U.S. EPR Design Certification Application RAI No. 348 (4085, 4092),FSAR Ch. 18

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on December 18, 2009, and discussed with your staff on January 14, 2010. Draft RAI Questions 18-90 and 18-92 were modified as a result of that discussion. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 2375

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Subject: Response to U.S. EPR Design Certification Application RAI No. 348, FSAR Ch. 18, Supplement 2
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Response to

Request for Additional Information No. 348 (4085, 4092), Revision 0, Supplement 2

2/2/2010

U.S. EPR Standard Design Certification

AREVA NP Inc.

Docket No. 52-020

SRP Section: 18 - Human Factors Engineering

Application Section: FSAR Chapter 18

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

Question 18-90:

Section 2.2.2 in the Human Factors Program Management Plan is titled "Assumptions". The subsections that follow are described as the operating philosophy of the plant. The Applicant states that these sections are subject to change based on analysis and evaluation during plant design. Therefore, staff does not perceive the descriptions in the following sections to represent a commitment to those features described. Staff requires information to clarify how and where changes to these assumptions will be documented. NUREG-0711, 2.4.1(2) discusses the identification of assumptions.

Response to Question 18-90:

The titles for Sections 2.2 and 2.2.2 will be changed for clarification. These assumptions may change based on analysis results from FRA/FA/TA. This is related to the response to Question 18-93.

The Human Factors Program Management Plan, Section 2.2 title will be changed as follows:

"2.2 Design Assumption and Constraints:

Changes made to these assumptions can be made throughout the entire HFE analysis and evaluations (FRA/FA/TA/HSI design/V&V). The HFE design process will be followed and changes documented throughout the design process elements."

The Human Factors Program Management Plan, Section 2.2.2 title and content will be changed as follows:

"2.2.2 Concept of Operations Assumptions:

The following sections address design assumptions for the U.S. EPR. These assumptions are made concerning the plant operation of the U.S. EPR and are subject to change based on additional analyses and evaluations during detail design. Significant changes to these assumptions are not expected, but any required changes will be documented within the HFE design process."

The Step 2.2.2 statement explains that the goal is for plant design to adhere as closely as possible to these assumptions. This goal will not change, but the assumptions may need to be modified within the existing process framework. Deviations from these assumptions have not yet been determined, but are expected to be minimal.

The AREVA NP U.S. EPR HFE Program Management Plan has been revised, and the proprietary plan is submitted under a separate cover letter. Additional changes are made to U.S. EPR FSAR Tier 1, Section 3.4 and Tier 2, Section 18.1 to reflect the revised implementation plan.

FSAR Impact:

U.S. EPR FSAR, Tier 2, Section 18.1 and Tier 1, Section 3.4 will be revised as described in the response and indicated on the enclosed markup.

U.S. EPR Final Safety Analysis Report Markups

3.4 Human Factors Engineering

1.0 Description

The HFE program design process is employed to design the control rooms and the human-system interfaces (HSI) and associated equipment while relating the high-level goal of plant safety into individual, discrete focus areas for the design.

The HFE program enables a design which supports the goal of providing plant operators and technicians safe and efficient access to the required information and controls to monitor and manage the plant processes and equipment. The HFE program also establishes the time and performance criteria for required equipment operations via human reliability analyses (HRA) and recognized guidelines.

The HFE and Control Room Design Team establishes design guidelines, defines program-specific design processes, and verifies that the guidelines and processes are followed. The scope of the HFE program includes the following:

- Location and accessibility requirements for the control rooms and other control stations.
- Layout requirements of the control rooms, including requirements regarding the locations and design of individual displays and panels.
- Basic concepts and detailed design requirements for the information displays, controls, and alarms for HSI control stations.
- Coding and labeling conventions for control room components and plant displays.
- HFE design requirements and guidelines for the screen-based HSI, including the actual screen layout and the standard dialogues for accessing information and controls.
- Requirements for the physical environment of the control rooms (e.g., lighting, acoustics, heating, ventilation and air conditioning (HVAC)).
- HFE requirements and guidelines regarding the layout of operator work stations and work spaces.

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Corporate policies and procedures regarding the verification and validation (V&V) of the design of HSI.

The HFE and Control Room Design Team is also responsible for program concepts for ~~development of operating procedures, staffing requirements, and designer's input to the training program.~~

The HFE program applies to the design of the main control room (MCR), the Technical Support Center (TSC), the Instrumentation and Control Service Center (I&CSC), the remote shutdown station (RSS), and local control stations (LCS) associated with operation or maintenance. The design of LCS is accomplished concurrent with the

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applicable system design and follows guidelines established by the HFE and Control Room Design Team. ~~The HFE and Control Room Design Team also participates in the design of the Emergency Operations Facility (EOF).~~

The scope of the HFE program includes HSI that are related to plant process monitoring and control, as well as input to procedures and training associated with monitoring and controlling instrumentation and control (I&C) systems. The I&C systems include those required during normal operating modes as well as those required during tests, inspections, surveillances, maintenance, abnormal, emergency, and accident conditions. HSI associated with non-I&C systems (e.g., manual valve operators and other LCS) follow guidelines established by the HFE and Control Room Design Team.

2.0 Design Features

1.0 HFE operating experience review (OER) is performed in accordance with the prescribed process described in the U.S. EPR Human Factors Operating Experience Review Implementation Plan.

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2.0 Functional requirements ~~are analysis is~~ performed in accordance with the prescribed process described in the Functional Requirements Analysis and Functional Allocation Implementation Plan.

3.0 Functional allocation decisions are made based on a set of automation criteria which is defined and validated with the prescribed process described in the Functional Requirements Analysis and Functional Allocation Implementation Plan.

4.0 A task analysis is performed in accordance with the prescribed process described in the U.S. EPR Task Analysis (TA) Implementation Plan.

5.0 The staffing and qualification analysis includes an evaluation of the number and qualifications of personnel needed to operate, maintain, and test the U.S. EPR based on HSI design features ~~as described in the TA Implementation Plan.~~

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6.0 Human reliability analysis evaluates the potential for, and mechanisms of, human errors that may affect plant safety. Integration of human reliability analysis findings with HFE design is performed in accordance with the U.S. EPR Implementation Plan for the Integration of Human Reliability Analysis (HRA) into the Human Factors Engineering (HFE) Program.

7.0 HSI design is performed in accordance with the prescribed process described in the U.S. EPR Human System Interface Design Implementation Plan.

8.0 The selection of the minimum inventory is performed in accordance with the U.S. EPR Human System Interface Design Implementation Plan.

9.0 ~~Procedures are developed in accordance with the Procedure Implementation Plan which directs the integration of the U.S. EPR Human Factors procedure development~~ Deleted.

10.0 ~~Training is developed in accordance with the U.S. EPR Training Implementation Plan~~ Deleted.

Table 3.4-1—Human Factors Engineering ITAAC (8 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
1.0	<p>HFE operating experience review (OER) is performed in accordance with the prescribed process described in the U.S. EPR Human Factors Operating Experience Review Implementation Plan.</p> <div style="border: 1px solid red; padding: 2px; width: fit-content; margin: 10px auto;">RAI 348, Q18-90</div> 	<p>An analysis of the output summary report has been performed.</p> <p>{{DAC}}</p>	<p>An output summary report exists and concludes that the lessons learned from the reviewed operating experience have been incorporated into the HSI design. The report addresses the scope and results of the OER process including:</p> <ul style="list-style-type: none"> • A list of databases used for searching. • A list of analyzed documents. • A list of significant issues found along with their implementation status at the time of the report. <p>{{DAC}}</p>
2.0	<p>Functional requirements are analysis is performed in accordance with the prescribed process described in the Functional Requirements Analysis and Functional Allocation Implementation Plan.</p>	<p>An analysis of the output summary report has been performed.</p> <p>{{DAC}}</p>	<p>An output summary report exists and includes:</p> <ul style="list-style-type: none"> • A list of functions in-scope for meeting plant safety objectives. • Details of the differences between functional requirements for safety functions between predecessor designs and the U.S. EPR. • Technical justification and design basis for each difference between predecessor and U.S. EPR functional requirement. • The output summary report includes documentation that shows functional requirements process was conducted in accordance with the U.S. EPR Functional Requirements Analysis and Functional Allocation Implementation Plan. <p>{{DAC}}</p>

Table 3.4-1—Human Factors Engineering ITAAC (8 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
			<p>b. The output summary report includes documentation that shows the task analysis process was conducted in accordance with the U.S. EPR Task Analysis Implementation Plan. This includes the functional branch tree database which contains the results of TA as described in the U.S. EPR Task Analysis Implementation Plan.</p> <p>{{DAC}}</p>
5.0	<p>The staffing and qualification analysis includes an evaluation of the number and qualifications of personnel needed to operate, maintain, and test the U.S. EPR based on HSI design features <u>as described in the TA Implementation Plan.</u></p>	<p>An analysis of the output summary report has been performed.</p> <p>{{DAC}}</p>	<p>a. The <u>TA</u> output summary report of the U.S. EPR staffing and qualifications analyses demonstrates that the HSI design supports the number, roles, and responsibilities of the plant operating staff to meet the demands of the processes of the plant.</p> <p>{{DAC}}</p> <p>b. The <u>TA</u> output summary report includes documentation that shows the staffing and qualifications design process was conducted in accordance with the U.S. EPR Task Analysis Implementation Plan.</p> <p>{{DAC}}</p>

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18.0 Human Factors Engineering

18.1 Human Factors Engineering Program Management

The human factors engineering (HFE) program management section describes the technical program for the U.S. EPR. The HFE program involves applying human factors principles to the design of the U.S. EPR human system interfaces (HSI) and engineering the incorporation of the HSI with the control and information systems. The program governs HFE design activities and provides guidance for certain aspects of the design of systems which interface with the control rooms via the HSI.

A COL applicant that references the U.S. EPR design will execute the NRC approved HFE program as described in this section.

18.1.1 Human Factors Engineering Program Goals, Assumptions and Constraints, and Scope

18.1.1.1 Goals

The goal of the HFE program is to provide the plant operators with task support and access to the information required to control plant processes and equipment safely and efficiently. The HFE program also establishes the time and performance criteria for required equipment operations via human reliability analyses and recognized guidelines.

18.1.1.2 Assumptions and Constraints

The U.S. EPR is an evolutionary PWR design based on years of operation and design experience from the precursor PWR plants (e.g., based on European N4 and Konvoi plants which are based on Westinghouse-designed PWRs currently operating in the U.S.). The U.S. EPR also uses similar control of system functions and instrumentation and control (I&C) concepts as the predecessor PWRs ~~and the Olkiluoto 3 (OL3) EPR.~~

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~~The assumptions and constraints that apply to the U.S. EPR HFE program include the following:~~

- ~~1. The initial main control room (MCR) staffing level is similarly established based on experience with previous four loop PWR plants and takes into account the increased levels of automation and the minimum number of operators required by 10 CFR 50.54(m). For further details on staffing levels, see Section 18.5.~~
- ~~2. The platforms for both the safety related and non safety related human machine interfaces (HMI)—safety information and control system (SICS) and process information and control system (PICS) respectively—were selected prior to determining all HFE requirements. Development activities for both platforms have been identified based on HFE requirements as defined for SICS and PICS.~~

3. ~~For the U.S. EPR, the SICS platform concept involves extensive use of the qualified display system (QDS)—a series of touch-screen capable, seismically qualified, 1E-supplied visual display units (VDU). The QDS is an AREVA NP product and development activities have been identified for the QDS to support these needs.—Because the QDS will replace many conventional indications and controls and to maintain divisional separation requirements, each control QDS is assigned to manage a respective electrical division or mechanical train.~~

4. ~~To minimize differences between HMI platforms in the control rooms, local control stations (LCS) which allow for communication with computer-based HMIs (e.g., turbine generator and emergency diesel generator controls) will be integrated with the PIGS. LCSs will follow guidelines established by the HFE and Control Room Design Team.~~

~~Other~~The assumptions and constraints ~~that apply to the U.S. EPR HFE program~~ related to standard features of EPR control rooms, HSI design operating philosophy, and the concept of operations are described in Section 18.7.2 of this FSAR and in Section 2.2 of Reference 2.

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The U.S. EPR HFE design process addresses the applicable review criteria specified in NUREG-0711 (Reference 1).

18.1.1.3 Applicable U.S. EPR Facilities

The HFE program scope includes the design of the MCR, the Technical Support Center (TSC), and the remote shutdown station (RSS). The design of LCSs is typically accomplished concurrent with the applicable system and follows guidelines established by the HFE and Control Room Design Team (see Section 18.1.2). In addition, the Instrumentation and Control Service Center (I&CSC), the central location for maintaining the digital I&C systems for the plant, is included in the application of the HFE program. A COL applicant that references the U.S. EPR design certification will be responsible for HFE design implementation for a new emergency operations facility (EOF) ~~and/or Operational Support Center (OSC) and/or~~ changes resulting from the addition of the U.S. EPR to an existing EOF ~~and/or OSC~~. The HFE and Control Room Design Team provides guidance to that design. Execution of the HFE program guidance described herein provides reasonable assurance that HFE principles are both comprehensively and properly applied for the design of the EOF. This HFE guidance also provides a level of consistency for all HSI facilities in the U.S. EPR.

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18.1.1.4 Applicable Human System Interfaces, ~~Procedures, and Training~~

The scope of the HFE program includes HSIs, ~~procedures, and training~~ associated with monitoring and controlling U.S. EPR plant processes and equipment through the system functions. These system functions include those required during the various normal operating modes as well as those required during tests, inspections,

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surveillances, and maintenance, and during abnormal, emergency, and accident conditions. HSIs associated with non-I&C systems (e.g., manual valve operators and other LCSs) follow guidelines established by the HFE and Control Room Design Team. See Section 18.1.3.2 for information on implementation of these guidelines.

HSIs for the U.S. EPR design are implemented ~~as described in Section 7.1.1. in the following hardware and software with the following I&C systems:~~

- ~~• Process Information and Control System (PICS).~~
- ~~• Safety Information and Control System (SICS).~~
- ~~• LCSs.~~

Details of the design and the concept of operations associated with each of these HSIs can be found in Section 18.7 and associated references.

~~The U.S. EPR HFE program also includes the application of appropriate HFE principles and techniques to support the development of operating procedures for the applicable interfacing facilities (see Section 18.1.1.3) and the operator training program. A generic set of operational guidelines (i.e., not specific to owner and site requirements or constraints), for the U.S. EPR, is provided for use in the development of site-specific operating procedures. The requisite set of knowledge, skills, attributes, and training objectives and goals required to operate a U.S. EPR are also provided for use in the development of a site-specific training program based on the Systematic Approach to Training (SAT) development protocol accredited by INPO. The training program and procedure development program are described in Sections 18.9 and 18.8, respectively.~~

18.1.1.5 Applicable Plant Personnel

The HFE program is tailored allowing licensed control room operators the capability to attain, view, assimilate, and act on process data in order to maintain plant safety. HFE principles are also applied to the tasks which relate to plant safety that are performed by personnel as listed.

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

- Non-licensed operators.
- Shift manager.
- Shift technical advisor.
- Instrument and control technicians.

18.1.4 Human Factors Engineering Issues Tracking

Section 5.0 of the U.S. EPR HFE Program Management Plan (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 the U.S. EPR HFE Program Management Plan (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.

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18.1.5.1 HFE Program Process Drawing

Figure 18.1-2 illustrates how the HFE aspects of the plant are developed, designed, and evaluated on the basis of a structured analysis using accepted HFE principles in an iterative manner. It shows the relationships between:

- The implementation plans for the various analysis and validation activities.
- The HFE design guidelines and the design products.

In conjunction with the U.S. EPR HFE Program Management Plan (Reference 2) and Section 18.1 of this FSAR, Figure 18.1-2 illustrates that the HFE and Control Room Design Team is guided by a plan that is properly developed, executed, overseen, and documented. Specific elements of Figure 18.1-2 include:

- The relationship between the different HFE program elements.
- The input and output documents.
- A general sequence for the different HFE elements.

18.1.5.1.1 U.S. EPR Design Phases

The U.S. EPR design occurs in four design phases. The milestone schedule shown in Figure 18.1-1 is developed with an understanding of the relationship between design phases.

The conceptual design phase consists of producing high level descriptions (e.g., program plans and the plant technical requirements) and system engineering tasks (e.g., such as design requirements and system descriptions). Initial HSI and control room layout designs are developed during this phase. In the U.S. EPR HFE Program

Management Plan (Reference 2), conceptual design phase activities are described in Section 4.5.

As described in Section 4.5.8 of the U.S. EPR HFE Program Management Plan (Reference 2), the basic design phase includes preparation of design specifications to support ordering equipment. The HSI and control room layout designs are iterated with the initial input from procedure developers and the training specialists during this phase.

The detailed design phase involves performing design support and configuration measures. Support measures such as calculations, selection and suitability reviews, and design reviews (as described in Section 4.5.1 of the U.S. EPR HFE Program Management Plan (Reference 2)) are used to validate the design and maintain or manage the design configuration. HFE design evaluation activities are conducted throughout basic and detailed design. Verification and validation (V&V) activities are performed after the iterative design/evaluation process in order to develop a design that meets requirements.

The construction and operation phase involves acceptance testing before and after installation, verifying configuration management for design documentation (see Section 18.11), and monitoring system and operator performance throughout the life of the plant (see Section 18.12).

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18.1.5.1.2 HFE Program General Activities

~~The four HFE program general activities (see Figure 1.1 of Reference 1) categorize the twelve HFE program elements. These four general activities roughly coincide with U.S. EPR HFE design phases (see Section 18.1.5.1.1). There is significant overlap between general activities and the HFE design process, which often requires iteration or feedback to activities conducted earlier in the sequence.~~

~~HFE activities in planning and analysis are a subset of the conceptual design phase. During planning and analysis, the HFE and Control Room Design Team:~~

- ~~• Studies the details of the predecessor plant designs and compares them against the applicable industry codes, standards, regulatory requirements, and customer requirements.~~
- ~~• Conducts analysis of operating experience and formulates the concept of operations including initial staffing and qualification analyses.~~
- ~~• Writes implementation plans for the applicable HFE program activities.~~
- ~~• Completes initial design documentation (i.e., design requirements and system descriptions for control rooms and HSIs).~~

~~As in the basic design phase, HFE design activities involve iteration of the HSI based on input from other elements such as procedure development and analysis activities.~~

~~During the HFE V&V program activity (coincides with detailed design phase), the HSI and control room design is substantiated (see Section 18.10). Changes may cause revisions in the functions and documentation that were completed during the planning and analysis or design stages.~~

~~The implementation and operation activity coincides with the construction and operation phase. Changes to the design at this phase may cause re-engineering and revision of documentation produced in any of the previous stages.~~

18.1.5.2 Relationship Between HFE and Other Engineering Disciplines

Reference 3 requires that the HFE and Control Room Design Team follow the same design processes as other engineering disciplines. Section 4.0 of the U.S. EPR HFE Program Management Plan (Reference 2) describes the relationship between HFE program design documentation and general design documentation.

18.1.5.3 HFE Program Element Documentation

The U.S. EPR HFE program is described in Section 18.1. Section 2.0 of the U.S. EPR HFE Program Management Plan (Reference 2) describes the general HFE requirements, standards, and specifications utilized in the design of the U.S. EPR. Section 18.10 of this FSAR and Section 6.3 of the U.S. EPR HFE Program Management Plan (Reference 2) describe the uses of HFE facilities such as mockups and simulators as well as methods and tools employed for the various testing and validation techniques.

Sections 18.2 through 18.12 provide information on the types of documents generated as part of the U.S. EPR HFE program.

18.1.6 References

1. NUREG-0711, "Human Factors Engineering Program Review Model," Revision 2, U.S. Nuclear Regulatory Commission, 2004.
2. U.S. EPR HFE Program Management Plan, AREVA NP Inc., 20092010.
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Figure 18.1-2—HFE Design Control Process

