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Summary of U.S. EPR Human Factors Engineering Audit September 29-30, 2009

1. Introduction

U.S. Nuclear Regulatory Commission (NRC) requested an audit of certain U.S. EPR implementation plans and supporting reference documents for the Human Factors Engineering (HFE) program of Chapter 18 of the U.S. EPR Final Safety Analysis Report (FSAR). An audit plan was prepared and submitted to U.S. EPR representatives prior to the audit. The audit plan is included as Enclosure 1 to this summary. The audit was designed to compare a sample of the NUREG-0711 criteria for each HFE program element against the applicant's submitted implementation plans, and determine if the plans contain sufficient detail for staff to proceed with preparation of the Safety Evaluation Report (SER).

2. Audit Location and Dates

The audit took place at the AREVA NP, Inc., (AREVA) offices located at 1700 Rockville Pike, Rockville, MD 20852. The audit started on Tuesday, September 29 at 9:00 am and ended Wednesday, September 30, at approximately 12:30 pm.

3. NRC Audit Team

Operator Licensing and Human Performance Branch (COLP) personnel include technical reviewers James Bongarra and Julie Marble, with the EPR Projects Branch Lead Project Manager, Getachew Tesfaye, and the Human Factors Engineering Branch Chief, Michael Junge, participating in the kickoff and summary meetings. Chapter PM James Steckel provided project management support throughout the audit process.

4. Applicant Staff

Applicant staff consisted of the following:

1. George Pannell – Licensing Lead for Chapters 8 and 18
2. Vic Fregonese – Head of the I&CE Division
3. Jeffrey Jones – Programs Manager, HFE, Control Room and Simulator
4. Desmond Raymond – Engineering Supervisor, HFE
5. Thomas Graham – Engineering Discipline Lead for HFE and Simulator
6. Ronda Pederson – Licensing Manager for Design Certification

Mr. Brian McIntyre of AREVA attended the close out summary discussion via conference call.

The list of audit attendees is included as Enclosure 2.

5. Documents Audited

The staff prepared a list of documents to be audited and this was sent to AREVA prior to the audit. The staff's list of requested documents is shown as Enclosure 3. The documents requested were made available for staff review, along with several additional items, as shown in the following table. Items 1-10 are already on docket with NRC as a result of an RAI response:

	Document ID Number	Document Title
1.	118 – 9051755 – 002	Human Performance Monitoring Implementation Plan
2.	118 – 9042375 – 002	HSI Design Implementation Plan
3.	118 – 9047891 – 001	HFE Design Implementation Plan

4.	117 – 9015723 – 000 (Note: Rev. – 001 was docketed in March, 2009 in response to RAI 171, Question 18-34)	Initial Staffing Assumptions of the U.S. EPR
5.	118 – 9101665 – 001	U.S. EPR Inheritance Plan for HFE Analysis
6.	117 –1 9039988 – 001	Concept of Operations for the U.S. EPR Control Room
7.	118 – 9023868 – 002	Operating Experience Review Implementation Plan
8.	118 – 9046087 – 001	Verification & Validation Implementation Plan
9.	118 – 9038835 – 002	U.S. EPR Implementation Plan for the Integration of Human Reliability Analysis (HRA) with the Human Factors Engineering (HFE) Program
10.	118 – 9018214 – 002	Functional Requirements Analysis and Functional Allocation Implementation Plan
11.	EPR-EN-PR-1002-001	Design Change Control Process
12.	0405-22 Rev. 22	Design Review Boards
13.	EPR-EN-PR-1004 Rev. 000	Development of System Design Requirements Documents
14.	EPR-EN-PR-1006 Rev. 000	Development of System Description Documents
15.	EPR-EN-PR-1012 Rev.001	Development of I&C Interface Requirements
16.	114 – 5061152 – 008	Plant Technical Requirements for EPR Design Certification
17.	115 – 9010955 – 002	U.S. EPR System Design Requirements Document for the Main Control Room
18.	115 – 9023928 – 02	System Design Requirements Document for the Process Information and Control System (PICS)
19.	115 – 9010969 – 002	U.S. EPR System Design Requirements Document Safety Information Control System (SICS)
20.	15 – 9042365 – 002	System Description Document for the Main Control Room
21.	15 – 9029316 – 002	U.S.EPR System Description Document for the Safety Information and Control System (SICS)
22.	51 – 9075407 – 002	QDS Product Specification Requirements Document
23.	No ID Number	Human Factors Issues Tracking System (an HFE Open Items List – items from June & July, 2009)
24.	GU ARV SHS INS 005 EN	Human Factors Characterization in Nuclear Events
25.	EPR-EN-PR-1002 Rev. 000	Design Control Process
26.	118 – 9101401 – 000	Display Design Desktop Guide
27.	118 – 9098995 – 000 Rev. 000	U.S. EPR Main Control Room and Remote Shutdown Station Minimum Inventory
28.	117 – 9043667 – 001	EPR Display Navigation and Hierarchy
29.	117 – 9041149 – 000	EPR Human System Interface Design Style Guide
30.	117 – 9097806 – 000	U.S. EPR Local Control Station Style Guide

6. Audit Activities

This audit focused on reviewing the US-EPR implementation plans and supporting referenced documents for the HFE Program, emphasizing control room design. The staff also provided detailed, verbal comments on two implementation plans, the Human System Interface Plan and Verification and Validation Plan.

The documents provided to NRC staff, along with the availability and level of interaction provided by AREVA participants, met the staff's audit purpose to sample certain NUREG 0711 criteria to determine whether applicant implementation plans are adequate to continue staff reviews.

In addition, this audit supported the NRC review of the US-EPR design certification application, and helped establish an understanding of potential concerns that could effect future regulatory actions or decisions.

7. Exit Briefing

The staff conducted an exit briefing at approximately noon, Wednesday September 30, 2009. As a result of the audit, the staff determined that for the supporting documents provided for review, those that AREVA identified as "Style Guides" are necessary for docketing; the remaining documents reviewed are acceptable for audit only. The staff indicated that they would request the Style Guides to be placed on the docket using the request for additional information (RAI) process. The staff also stated that AREVA does not need to resubmit the guides as they are revised; the version submitted by AREVA in response to the staff's forthcoming RAI is sufficient. AREVA indicated that the documents would remain at their Rockville office for staff's future review.

The staff and AREVA also discussed the schedule for completing the human factors engineering portion of the AREVA EPR design certification review. The staff indicated that they are actively working to review the latest materials submitted by AREVA and that a schedule for remaining review milestones is being determined by the COLP Branch Chief and the NRC's Project Manager. Although the plans are satisfactory to continue reviewing, the staff emphasized that there likely will be RAIs written against each plan that will require the plans to be revised.

8. Requests for Additional Information (RAIs)

A request for the applicant to provide on docket two of the EPR guidance documents will be generated as a result of this audit. The two guidance documents are:

1. AREVA NP Technical Document 117-9097806-000, "U.S. EPR Local Control Station Style Guide"
2. AREVA NP Technical Document 117-9041149-000, "U.S. EPR Human System Interface Design Guide"

In addition, staff will continue the review of submitted implementation plans to determine whether additional referenced guides or other materials are needed.

9. Deviations from Audit Plan

There were no deviations from the audit plan.

**Audit Plan: Human Factors Engineering Process for the U.S. EPR Control Room Design
September 29 – 30, 2009**

1.0 Audit Bases

- 10 CFR 50.34(f)(2)(iii)
- NUREG-0711, Revision 2, "Human Factors Engineering"
- NUREG-0800, Revision 2, "Human Factors Engineering," Chapter 18

2.0 Audit Scope

This audit will focus on the review of the U.S. EPR implementation plans and supporting referenced documents for the Human Factors Engineering Program, emphasizing control room design.

3.0 Team Assignments

The team will evaluate the current U.S. EPR HSI design using staff review guidance identified in the Audit Bases above.

- M. Junge - Technical branch supervisor
- J. Bongarra - Technical reviewer for conformance to NRC review guidance
- J. Steckel - Chapter PM

4.0 Audit Purpose

This audit supports the NRC review of the U.S. EPR design certification application. The purpose of this audit is to compare a sample of the NUREG-0711 criteria for each HFE Program element against the submitted implementation plans to determine if the plans are described with an appropriate level of detail to allow the staff to proceed with preparing its safety analysis report. The audit will establish an understanding of potential concerns to inform future regulatory actions or decisions.

5.0 Logistics

The audit will take place at AREVA's Twinbrook Office location:
1700 Rockville Pike, Suite 400
Rockville, MD 20852

There will be an entrance meeting at approximately 9:00 am, Tuesday, September 29, 2009, at the AREVA Rockville office location. The exit meeting is tentatively scheduled for 12:00 pm, Wednesday, September 30, 2009.

Time charge Information: The audit team members will charge to TAC # RC2297.

6.0 Special Requests

- Supporting documentation referenced in implementation plans. The list of requested documents is shown in Enclosure 3.

7.0 Deliverables

The audit report format will be written in accordance with NRC Manual Chapter 0614. A separate report section will be written for each of the assigned sections. Report inputs will be forwarded to the team lead within one week following the completion of the audit. The team lead is responsible for the compilation of the report. Positive and negative observations and conclusions of the audit will be documented. The staff will also document how the information acquired from the audit will either support a staff safety finding or highlight areas where more information is needed to reach a safety finding



Audit - U.S. EPR FSAR Chapter 18
September 29 - 30, 2009, AREVA Office, Rockville, MD

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AREVA-EPR AUDIT
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ADDITIONAL DOCUMENT LIST

1. HFE Program Management Plan

- a. Sample of "General Process Procedures" i.e., one from each category
- b. One Plant Technical Requirements Document (PTRD)
- c. One System Design Requirements Document (SDRD)
- d. [One System Design Document \(SDD\)](#)
- e. One/two "Specifications" for HSI equipment and sub-functions (see Section 4.5.8)
- f. Sample of HFE Issues Tracking System Output (see Section 5.0)

2. OER Plan

- a. AREVA Guide-GU-ARV-SHS-INS-O5 EN, "Human Factors Characterization in Nuclear Events," Jan., 2007 (or most recent)

3. FRA/FA Plan

- a. Scenarios Topical Report EMF-2110 (NP) (A), "Teleperm XS: A Digital Reactor Protection System," Revision 1, May, 2000

4. HRA Plan

- a. AREVA NP Document, "EPR Human System Interface Design Style Guide"

5. V/V Plan

- a. AREVA NP – Administrative Procedure, "Design Control Process"

6. HSI Design Implementation Plan

- a. AREVA NP Document, "U.S. EPR Display Design Desktop Guide"
- b. AREVA NP Document, "U.S. EPR Main Control Room and Remote Shutdown Minimum Inventory"

7. Concept of Operations

- a. AREVA NP Document, "EPR Display Navigation and Hierarchy"
- b. ~~AREVA NP Document, "US EPR Human System Interface Design Style Guide"~~
(duplicate entry)
- c. AREVA NP Document, "System Description Document For Main Control Room"
- d. AREVA NP Document, "U.S. EPR System Description For the Safety Information and Control System (SICS)"
- e. AREVA NP Document, "Local Control Station Style Guide"

8. [U.S. EPR FSAR Rev 1, Tier 2, Section 18.7.5.1, and response to RAI 47, Question 18-11](#)

- a. [Human Factors Engineering \(HFE\) Style Guide](#)