Table of Contents

18.0 Human Factors Engineering 18–2

18.1 Human Factors Engineering Program Management 18–2

18.1.1 Human Factors Engineering Program Goals, Assumptions and Constraints, and Scope 18–2

18.1.2 Human Factors Engineering and Control Room Design Team Organization 18–3

18.1.3 Human Factors Engineering Processes and Procedures 18–3

18.1.4 Human Factors Engineering Issues Tracking 18–3

18.1.5 Technical Program 18–3

18.1.6 References 18–3

18.2 Operating Experience Review 18–3

18.3 Functional Requirements Analysis and Function Allocation 18–3

18.4 Task Analysis 18–3

18.5 Staffing and Qualifications 18–3

18.6 Human Reliability Analysis 18–4

18.7 Human System Interface Design 18–4

18.8 Procedure Development 18–4

18.9 Training Program Development 18–4

18.10 Verification and Validation 18–5

18.11 Design Implementation 18–5

18.12 Human Performance Monitoring 18–5

© 2007-2008 UniStar Nuclear Services, LLC in and to the Reference COLA, namely all text not in brackets
© 2007-2008 Union Electric Company d/b/a AmerenUE in and to all Callaway site specific and
AmerenUE specific COLA material, namely all text in brackets.
All rights reserved. COPYRIGHT PROTECTED

18.0 HUMAN FACTORS ENGINEERING

This chapter of the U.S. EPR Final Safety Analysis Report (FSAR) is incorporated by reference with supplements as identified in the following sections.

18.1 HUMAN FACTORS ENGINEERING PROGRAM MANAGEMENT

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements.

The U.S. EPR FSAR includes the following COL Item in Section 18.1:

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

This COL Item is addressed as follows:

{AmerenUE} shall execute the NRC approved Human Factors Engineering (HFE) program as described in U.S. EPR FSAR Section 18.1.

18.1.1 HUMAN FACTORS ENGINEERING PROGRAM GOALS, ASSUMPTIONS AND CONSTRAINTS, AND SCOPE

18.1.1.1 Goals

No departures or supplements.

18.1.1.2 Assumptions and Constraints

No departures or supplements.

18.1.1.3 Applicable U.S. EPR Facilities

The U.S. EPR FSAR includes the following COL Item in Section 18.1.1.3:

> 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) or changes resulting from the addition of the U.S. EPR to an existing EOF.

This COL Item is addressed as follows:

{The Callaway Plant Unit 2 site has an existing Emergency Operations Facility (EOF) for Callaway Plant Unit 1. A description of the EOF is provided in the Callaway Plant Unit 2 Emergency Response Plan. The Callaway Plant Unit 2 Emergency Response Plan is provided in Part 5 of the COL application. The existing EOF accommodates an interface from Callaway Plant Unit 2. Modifications to the existing EOF will be consistent with the U.S. EPR HFE (Human Factors Engineering) Human Factors Program described in U.S. EPR FSAR Chapter 18 and NUREG-0696 (NRC, 1981). These modifications will be evaluated using the U.S. EPR HFE Design Implementation process described in U.S. EPR FSAR Chapter 18. This process will verify the operability of the EOF features for Callaway Plant Unit 2 and ensure no degradation has occurred to the Callaway Plant Unit 1 features in the EOF. Specifically, the plan will verify that the design changes to the existing EOF consider the effects on personnel performance and that the changes will provide the necessary support to provide reasonable assurance of effective implementation of the Callaway Emergency Response Plan. Also, the modified EOF as-built

© 2007-2008 UniStar Nuclear Services, LLC in and to the Reference COLA, namely all text not in brackets
© 2007-2008 Union Electric Company d/b/a AmerenUE in and to all Callaway site specific and
AmerenUE specific COLA material, namely all text in brackets.
All rights reserved. COPYRIGHT PROTECTED

design will be verified to conform to the verified and validated design that results from the HFE design process.} This verification will be addressed through site-specific ITAAC provided in Part 10 of the COL application.

18.1.1.4 Applicable Human System Interfaces, Procedures, and Training

No departures or supplements.

18.1.1.5 Applicable Plant Personnel

No departures or supplements.

18.1.1.6 Effects of Modifications on Personnel Performance

No departures or supplements.

18.1.2 HUMAN FACTORS ENGINEERING AND CONTROL ROOM DESIGN TEAM ORGANIZATION

No departures or supplements.

18.1.3 HUMAN FACTORS ENGINEERING PROCESSES AND PROCEDURES

No departures or supplements.

18.1.4 HUMAN FACTORS ENGINEERING ISSUES TRACKING

No departures or supplements.

18.1.5 TECHNICAL PROGRAM

No departures or supplements.

18.1.6 REFERENCES

{**NRC, 1981.** Functional Criteria for Emergency Response Facilities, NUREG-0696, U.S. Nuclear Regulatory Commission, February 1981.}

18.2 OPERATING EXPERIENCE REVIEW

This section of the U.S. EPR FSAR is incorporated by reference.

18.3 FUNCTIONAL REQUIREMENTS ANALYSIS AND FUNCTION ALLOCATION

This section of the U.S. EPR FSAR is incorporated by reference.

18.4 TASK ANALYSIS

This section of the U.S. EPR FSAR is incorporated by reference.

18.5 STAFFING AND QUALIFICATIONS

This section of the U.S. EPR FSAR is incorporated by reference with the following departures and/or supplements.

© 2007-2008 UniStar Nuclear Services, LLC in and to the Reference COLA, namely all text not in brackets
© 2007-2008 Union Electric Company d/b/a AmerenUE in and to all Callaway site specific and
AmerenUE specific COLA material, namely all text in brackets.
All rights reserved. COPYRIGHT PROTECTED

The U.S. EPR FSAR includes the following COL Item in Section 18.5:

> A COL applicant that references the U.S. EPR design will confirm that actual staffing levels and qualifications of plant personnel specified in Section 13.1 of the COL application remain bounded by regulatory requirements and results of the staffing and qualifications analysis.

This COL Item is addressed as follows:

Confirmation that actual staffing levels and qualifications of plant personnel specified in Section 13.1 remain bounded by regulatory requirements and results of staffing and qualifications analysis shall be verified by the implementation of ITAAC 5 of Tier 1 Table 3.4-1 of the U.S. EPR FSAR. Tier 1 Table 3.4-1 of the U.S. EPR FSAR is incorporated by reference in Part 10 of the COL application.

18.6 HUMAN RELIABILITY ANALYSIS

This section of the U.S. EPR FSAR is incorporated by reference.

18.7 HUMAN SYSTEM INTERFACE DESIGN

This section of the U.S. EPR FSAR is incorporated by reference.

18.8 PROCEDURE DEVELOPMENT

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements.

The U.S. EPR FSAR includes the following COL Item in Section 18.8:

> A COL applicant that references the U.S. EPR design certification will describe how HFE principles and criteria are incorporated into the development program for site procedures.

This COL Item is addressed as follows:

Plant specific procedures are developed consistent with the guidance of the operational guidelines described in Section 18.8.2 of the U.S. EPR FSAR.

18.9 TRAINING PROGRAM DEVELOPMENT

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements.

The U.S. EPR FSAR includes the following COL item in Section 18.9:

> A COL applicant that references the U.S. EPR design certification will describe how HFE principles and criteria are incorporated into the development of training program scope, structure, and methodology.

This COL Item is addressed as follows:

The training program is addressed in Section 13.2.

© 2007-2008 UniStar Nuclear Services, LLC in and to the Reference COLA, namely all text not in brackets
© 2007-2008 Union Electric Company d/b/a AmerenUE in and to all Callaway site specific and
AmerenUE specific COLA material, namely all text in brackets.
All rights reserved. COPYRIGHT PROTECTED

18.10 VERIFICATION AND VALIDATION

This section of the U.S. EPR FSAR is incorporated by reference.

18.11 DESIGN IMPLEMENTATION

This section of the U.S. EPR FSAR is incorporated by reference.

18.12 HUMAN PERFORMANCE MONITORING

This section of the U.S. EPR FSAR is incorporated by reference with the following supplements.

The U.S. EPR FSAR includes the following COL Item in Section 18.12:

> A COL applicant that references the U.S. EPR design certification will implement an HPM program similar to that which is described in this section.

This COL Item is addressed as follows:

{AmerenUE} shall implement a Human Performance Monitoring (HPM) Program similar to the one described in Section 18.12 of the U.S. EPR FSAR.

© 2007-2008 UniStar Nuclear Services, LLC in and to the Reference COLA, namely all text not in brackets
© 2007-2008 Union Electric Company d/b/a AmerenUE in and to all Callaway site specific and
AmerenUE specific COLA material, namely all text in brackets.
All rights reserved. COPYRIGHT PROTECTED