

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
CHAPTER 18	HUMAN FACTORS ENGINEERING	18.1-1
18.1	Overview	18.1-1
18.1.1	References	18.1-3
18.2	Human Factors Engineering Program Management	18.2-1
18.2.1	Human Factors Engineering Program Goals, Scope, Assumptions, and Constraints	18.2-1
18.2.1.1	Human Factors Engineering Program Goals	18.2-1
18.2.1.2	Assumptions and Constraints	18.2-1
18.2.1.3	Applicable Facilities	18.2-4
18.2.1.4	Applicable Human System Interfaces	18.2-4
18.2.1.5	Applicable Plant Personnel	18.2-4
18.2.1.6	Technical Basis	18.2-4
18.2.2	Human System Interfaces Design Team and Organization	18.2-4
18.2.2.1	Responsibility	18.2-5
18.2.2.2	Organizational Placement and Authority	18.2-5
18.2.2.3	Composition	18.2-6
18.2.2.4	Team Staffing Qualifications	18.2-9
18.2.3	Human Factors Engineering Processes and Procedures	18.2-12
18.2.3.1	General Process and Procedures	18.2-12
18.2.3.2	Process Management Tools	18.2-15
18.2.3.3	Integration of Human Factors Engineering and Other Plant Design Activities	18.2-15
18.2.3.4	Human Factors Engineering Documentation	18.2-16
18.2.3.5	Human Factors Engineering in Subcontractor Efforts ...	18.2-17
18.2.4	Human Factors Engineering Issues Tracking	18.2-17
18.2.5	Human Factors Engineering Technical Program and Milestones	18.2-18
18.2.6	Combined License Information	18.2-19
18.2.7	References	18.2-19
18.3	Operating Experience Review	18.3-1
18.3.1	Combined License Information	18.3-1
18.3.2	References	18.3-1
18.4	Functional Requirements Analysis and Allocation	18.4-1
18.4.1	Combined License Information	18.4-2
18.4.2	References	18.4-2

TABLE OF CONTENTS (Cont.)

<u>Section</u>	<u>Title</u>	<u>Page</u>
18.5	AP600 Task Analysis Implementation Plan	18.5-1
18.5.1	Task Analysis Scope	18.5-1
18.5.2	Task Analysis Implementation Plan	18.5-2
18.5.2.1	Function-Based Task Analyses	18.5-2
18.5.2.2	OSA-1	18.5-3
18.5.2.3	OSA-2	18.5-4
18.5.2.4	Task Analysis of Maintenance, Test, Inspection and Surveillance Tasks	18.5-5
18.5.3	Job Design Factors	18.5-5
18.5.4	Combined License Information Item	18.5-5
18.5.5	References	18.5-5
18.6	Staffing	18.6-1
18.6.1	Combined License Information Item	18.6-1
18.6.2	References	18.6-1
18.7	Integration of Human Reliability Analysis with Human Factors Engineering . .	18.7-1
18.7.1	Combined License Information	18.7-1
18.7.2	References	18.7-1
18.8	Human System Interface Design	18.8-1
18.8.1	Implementation Plan for the Human System Interface Design	18.8-3
18.8.1.1	Functional Design	18.8-3
18.8.1.2	Design Guidelines	18.8-4
18.8.1.3	Design Specifications	18.8-5
18.8.1.4	Man-In-The-Loop Concept Testing	18.8-6
18.8.1.5	Main Control Room Mockup	18.8-7
18.8.1.6	Human System Interface Design Documentation	18.8-7
18.8.1.7	Task-Related Human System Interface Requirements . . .	18.8-8
18.8.1.8	General Human System Interface Design Feature Selection	18.8-9
18.8.1.9	Human System Interface Characteristics: Identification of High Workload Situations	18.8-9
18.8.1.10	Human System Interface Software Design and Implementation Process	18.8-11
18.8.2	Safety Parameter Display System (SPDS)	18.8-12
18.8.2.1	General Safety Parameter Display System Requirements	18.8-12
18.8.2.2	Display of Safety Parameters	18.8-13
18.8.2.3	Reliability	18.8-15
18.8.2.4	Isolation	18.8-15
18.8.2.5	Human Factors Engineering	18.8-15
18.8.2.6	Minimum Information	18.8-16
18.8.2.7	Procedures and Training	18.8-16

TABLE OF CONTENTS (Cont.)

<u>Section</u>	<u>Title</u>	<u>Page</u>
18.8.3	Operation and Control Centers System	18.8-16
18.8.3.1	Main Control Room Mission and Major Tasks	18.8-16
18.8.3.2	Main Control Area Mission and Major Tasks	18.8-17
18.8.3.3	Switching and Tagging Area Mission and Major Tasks	18.8-18
18.8.3.4	Remote Shutdown Workstation Mission and Major Tasks	18.8-18
18.8.3.5	Technical Support Center Mission and Major Tasks . . .	18.8-19
18.8.3.6	Operational Support Center Mission and Major Tasks	18.8-21
18.8.3.7	Radwaste Control Area Mission and Major Tasks	18.8-21
18.8.3.8	Local Control Stations Mission and Major Tasks	18.8-21
18.8.3.9	Emergency Operation Facility	18.8-21
18.8.4	Human Factors Design for the Non-Human-System Interface Portion of the Plant	18.8-22
18.8.4.1	General Plant Layout and Design	18.8-22
18.8.5	Combined License Information	18.8-25
18.8.6	References	18.8-25
18.9	Procedure Development	18.9-1
18.9.1	Combined License Information	18.9-1
18.9.2	References	18.9-1
18.10	Training Program Development	18.10-1
18.10.1	Combined License Information	18.10-1
18.10.2	References	18.10-1
18.11	Human System Interface Design Test Program	18.11-1
18.11.1	Combined License Information	18.11-2
18.11.2	References	18.11-2
18.12	Inventory	18.12-1
18.12.1	Inventory of Displays, Alarms, and Controls	18.12-1
18.12.2	Minimum Inventory of Main Control Room Fixed Displays, Alarms, and Controls	18.12-1
18.12.3	Remote Shutdown Workstation Displays, Alarms, and Controls . . .	18.12-7
18.12.4	Combined License Information	18.12-8
18.12.5	References	18.12-8

LIST OF TABLES

<u>Table No.</u>	<u>Title</u>	<u>Page</u>
18.11-1	Human Performance Evaluation Issues (Sheets 1 - 2)	18.11-3
18.12.2-1	Minimum Inventory of Fixed Position Controls, Displays, and Alerts (Sheets 1 - 2)	18.12-9

LIST OF FIGURES

<u>Figure No.</u>	<u>Title</u>	<u>Page</u>
18.1-1	Human Factors Engineering (HFE) Design and Implementation Process	18.1-5
18.2-1	Human System Interface (HSI) Design Team Process	18.2-21
18.2-2	Human System Interface (HSI) Design Team Organization and Relationship to AP600 Organization	18.2-22
18.2-3	Overview of the AP600 Human Factors Engineering Process	18.2-23
18.5-1	Top Four Levels of the Normal Power Operation for a Westinghouse PWR . .	18.5-7
18.5-2	Task Analysis Utilized as Design Input	18.5-9
18.8-1	Soft Control Interactions	18.8-29
18.8-2	AP600 Man-in-the-Loop Concept Testing and Verification and Validation Activities	18.8-30
18.8-3	Mapping of Human System Interface Resources to Operator Decision-Making Model	18.8-31
18.11-1	Two-Phase Process Used to Define the Human System Interface Design Test Program	18.11-5