

STPEGS UFSAR

TABLE OF CONTENTS

CHAPTER 10

STEAM AND POWER CONVERSION SYSTEM

<u>Section</u>	<u>Title</u>	<u>Page</u>
10.1	SUMMARY DESCRIPTION	10.1-1
10.2	TURBINE GENERATOR	10.2-1
10.2.1	Design Bases	10.2-1
10.2.2	System Description	10.2-1
10.2.3	Section Deleted	10.2-12
10.2.4	Inservice Inspection	10.2-12
10.2.5	Evaluation	10.2-13
10.3	MAIN STEAM SUPPLY SYSTEM	10.3-1
10.3.1	Design Bases	10.3-1
10.3.2	System Description	10.3-3
10.3.3	System Evaluation	10.3-7
10.3.4	Inspection and Testing Requirements	10.3-8
10.3.5	Water Chemistry	10.3-9
10.3.6	Steam and Feedwater System Materials	10.3-11
10.4	OTHER FEATURES OF THE STEAM AND POWER CONVERSION SYSTEM	10.4-1
10.4.1	Condenser	10.4-1
10.4.2	Main Condenser Air Removal System	10.4-4
10.4.3	Turbine Gland Sealing System	10.4-6
10.4.4	Turbine Bypass System	10.4-8
10.4.5	Circulating Water System	10.4-9
10.4.6	Condensate Polishing Demineralizer System	10.4-12
10.4.7	Condensate and Feedwater Systems	10.4-15
10.4.8	Steam Generator Blowdown System	10.4-25
10.4.9	Auxiliary Feedwater System	10.4-30
APPENDIX	AUXILIARY FEEDWATER SYSTEM RELIABILITY	
10A	EVALUATION	10A-1
10A.1	INTRODUCTION	10A-1
10A.1.1	Purpose	10A-1
10A.1.2	Objectives	10A-1
10A.1.3	Scope	10A-1
10A.1.4	General Approach	10A-1
10A.1.5	Assumptions	10A-2

STPEGS UFSAR

TABLE OF CONTENTS

CHAPTER 10

<u>Section</u>	<u>Title</u>	<u>Page</u>
10A.2	SYSTEM DESCRIPTION	10A-4
10A.2.1	Introduction	10A-4
10A.2.2	Component Description	10A-5
10A.2.3	Emergency Operation	10A-7
10A.2.4	Power Sources	10A-7
10A.2.5	Testing	10A-9
10A.3	METHODOLOGY	10A-9
10A.3.1	System Review	10A-9
10A.3.2	Fault Tree Development and Quantification	10A-10
10A.3.3	Common Cause Failure Evaluation	10A-10
10A.3.4	Failure Data	10A-10
10A.3.5	Computer Programs	10A-11
10A.4	RESULTS OF THE RELIABILITY EVALUATION	10A-12
10A.4.1	Qualitative Evaluation	10A-12
10A.4.2	Quantitive Evaluation	10A-14

STPEGS UFSAR

LIST OF TABLES

CHAPTER 10

<u>Table</u>	<u>Title</u>	<u>Page</u>
10.1-1	Summary of Important Design and Performance Characteristics of the Steam and Power Conversion System	10.1-4
10.3-1	Failure Mode and Effects Analysis For the Main Steam System	10.3-13
10.3-1A	HELB Failure Modes and Effects Analysis of Main Steam System Electrical Equipment in IVC	10.3-17
10.3-2	Materials in the Steam and Feedwater Systems	10.3-24
10.4-1	Steam Generator Blowdown System Component Design Parameters	10.4-38
10.4-3	Auxiliary Feedwater System Failure Modes and Effects Analysis	10.4-40
10.4-3A	HELB Failure Modes and Effects Analysis of Auxiliary Feedwater System Electrical Equipment in IVC	10.4-48
10.4-4	Turbine By-Pass System Failure Modes and Effects Analysis	10.4-63
10.4-5	Main Condenser Design Data	10.4-64
10.4-8	Feedwater System Failure Mode and Effects Analysis	10.4-66
10.4-8A	HELB Failure Modes and Effects Analysis of Feedwater System Electrical Equipment in IVC	10.4-71
10.4-9	Steam Generator Blowdown System Failure Modes and Effects Analysis	10.4-74
10.4-9A	HELB Failure Modes and Effects Analysis of SGB System Electrical Equipment in IVC	10.4-76
10A-1	Component Basic Event Failure Probabilities	10A-18
10A-2	Unavailability of Components Due to Testing or Maintenance	10A-20
10A-3	AFWS Qualitative Reliability Characterization Traits	10A-21
10A-4	South Texas AFWS Unavailability (per Demand)	10A-22
10A-5	Fault Tree Component Identification Codes	10A-23

STPEGS UFSAR

LIST OF FIGURES

CHAPTER 10

<u>Figure Number</u>	<u>Title</u>	<u>Reference Number</u>
10.2-1	Electro-Hydraulic Control System	
10.2-2	Throttle and Governor Valve Actuator Assembly	
10.2-4	Emergency and Auxiliary Governor Trip System	
10.2-5	Speed/Load Digital Reference System	
10.2-6	Overspeed Protection Controller	
10.2-7	P&ID Lube Oil Diagram	7T11-9-F-20010#1 7T11-9-F-20010#2
10.2-8	P&ID Electro Hydraulic Fluid System	7T08-9-F-10001#1 7T08-9-F-10001#2
10.3-1	P&ID Main Steam	5S10-9-F-00016#1 5S10-9-F-00016#2
10.3-2	P&ID Main Steam	6S10-9-F-00017#1 6S10-9-F-00017#2
10.3-3	P&ID Main Steam	6S10-9-F-00018#1 6S10-9-F-00018#2
10.3-4	P&ID Extraction Steam	6S15-9-F-00019#1 6S15-9-F-00019#2
10.3-5	MSIV	
10.4.2-1	P&ID Condenser Air Removal	8T21-9-F-00031#1 8T21-9-F-00031#2
10.4.3-1	P&ID Turbine Gland Seals	6T12-9-F-00050#1 6T12-9-F-00050#2

STPEGS UFSAR

LIST OF FIGURES (Continued)

CHAPTER 10

<u>Figure Number</u>	<u>Title</u>	<u>Reference Number</u>
10.4.5-1	Piping Diagram Circulating Water System	9T22-1-F-00032 9T22-2-F-00032
10.4.6-1	P&ID Condensate Polishing Cation Demineralizer System	9S21-9-F-20011#1 9S21-9-F-20011#2
10.4.6-2	P&ID Condensate Polishing Mixed-Bed Demineralizer System	9S21-9-F-20012#1 9S21-9-F-20012#2
10.4.6-3	P&ID Condensate Polishing Demineralizer Air-Water Supply and Sampling System	9S21-9-F-20013#1 9S21-9-F-20013#2
10.4.6-4	P&ID Condensate Polishing Demineralizer Regeneration System	9S21-9-F-20014#1 9S21-9-F-20014#2
10.4.6-5	P&ID Condensate Polishing Waste Disposal System	9S21-9-F-20015#1 9S21-9-F-20015#2
10.4.7-1	P&ID Condensate	6S12-9-F-00021#1 6S12-9-F-00021#2
10.4.7-2	P&ID Condensate	6S12-9-F-00022#1 6S12-9-F-00022#2
10.4.7-3	P&ID Feedwater System	6S13-9-F-20009#1 6S13-9-F-20009#2 6S13-9-F-00061#1 6S13-9-F-00061#2

STPEGS UFSAR

LIST OF FIGURES (Continued)

CHAPTER 10

<u>Figure Number</u>	<u>Title</u>	<u>Reference Number</u>
10.4.7-4	P&ID Feedwater	5S13-9-F-00062#1 5S13-9-F-00062#2 5S13-9-F-00063#1 5S13-9-F-00063#2
10.4.7-5	P&ID Heater Drips	8S17-9-F-00040#1 8S17-9-F-00040#2
10.4.7-6	Not Used	
10.4.7-7	P&ID Heater Drips	8S17-9-F-00042#1 8S17-9-F-00042#2
10.4.7-8	P&ID Heater Drips	8S17-9-F-00043#1 8S17-9-F-00043#2
10.4.7-9	P&ID Heater Drips	8S17-9-F-00044#1 8S17-9-F-00044#2
10.4.8-1	P&ID Steam Generator Blowdown System	5S20-9-F-20001#1 5S20-9-F-20001#2
10.4.8-2	P&ID Steam Generator Blowdown System	5S20-9-F-20002#1 5S20-9-F-20002#2
10.4.8-3	P&ID Steam Generator Blowdown System	7S20-9-F-20003#1 7S20-9-F-20003#2
10.4.9-1	P&ID Auxiliary Feedwater	5S14-1-F-00024 5S14-1-F-00024 5S14-2-F-00024 5S14-2-F-00024
10A-1	Basic Tasks of the STPEGS AFWS Reliability Evaluation	

STPEGS UFSAR

LIST OF FIGURES (Continued)

CHAPTER 10

<u>Figure Number</u>	<u>Title</u>	<u>Reference Number</u>
10A-3	Auxiliary Feedwater System Fault Tree (Sheets 1 through 15)	
10A-4	Qualitative Comparison of the Reliability Characteristics of the STPEGS AFWS, and AFWS Designs for Other Plants Using Westinghouse NSSS	