

**William States Lee III Nuclear Station**

**COL Application**

**Part 2**

**Final Safety Analysis Report**

**Revision 2**

## MASTER TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
<b>CHAPTER 1</b>		
<b>INTRODUCTION AND GENERAL PLANT DESCRIPTION</b>		
1.1	INTRODUCTION .....	1.1-1
1.2	GENERAL PLANT DESCRIPTION .....	1.2-1
1.3	COMPARISONS WITH SIMILAR FACILITY DESIGNS .....	1.3-1
1.4	IDENTIFICATION OF AGENTS AND CONTRACTORS .....	1.4-1
1.5	REQUIREMENTS FOR FURTHER TECHNICAL INFORMATION .....	1.5-1
1.6	MATERIAL REFERENCED .....	1.6-1
1.7	DRAWINGS AND OTHER DETAILED INFORMATION .....	1.7-1
1.8	INTERFACES FOR STANDARD DESIGN .....	1.8-1
1.9	COMPLIANCE WITH REGULATORY CRITERIA .....	1.9-1
1.10	NUCLEAR POWER PLANTS TO BE OPERATED ON MULTI-UNIT SITES .....	1.10-1
APP. 1A	CONFORMANCE WITH REGULATORY GUIDES .....	1A-1
APP. 1AA	CONFORMANCE WITH REGULATORY GUIDES .....	1AA-1
APP. 1B	SEVERE ACCIDENT MITIGATION DESIGN ALTERNATIVES .....	1B-1
<b>CHAPTER 2</b>		
<b>SITE CHARACTERISTICS</b>		
2.0	SITE CHARACTERISTICS .....	2.0-1
2.1	GEOGRAPHY AND DEMOGRAPHY .....	2.1-1
2.2	NEARBY INDUSTRIAL, TRANSPORTATION, AND MILITARY FACILITIES .....	2.2-1
2.3	METEOROLOGY .....	2.3-1
2.4	HYDROLOGIC ENGINEERING .....	2.4-1
2.5	GEOLOGY, SEISMOLOGY, AND GEOTECHNICAL ENGINEERING .....	2.5-1
APP. 2AA	LEE NUCLEAR STATION FIELD EXPLORATION DATA .....	2AA-1
APP. 2BB	CHEROKEE NUCLEAR STATION GEOTECHNICAL BORING LOGS .....	2BB-1
APP. 2CC	EVALUATION OF METEOROLOGICAL DATA .....	2CC-1
<b>CHAPTER 3</b>		
<b>DESIGN OF STRUCTURES, COMPONENTS, EQUIPMENT AND SYSTEMS</b>		
3.1	CONFORMANCE WITH NUCLEAR REGULATORY COMMISSION GENERAL DESIGN CRITERIA .....	3.1-1
3.2	CLASSIFICATION OF STRUCTURES, COMPONENTS, AND SYSTEMS .....	3.2-1
3.3	WIND AND TORNADO LOADINGS .....	3.3-1

## MASTER TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Title</u>	<u>Page</u>
3.4	WATER LEVEL (FLOOD) DESIGN .....	3.4-1
3.5	MISSILE PROTECTION .....	3.5-1
3.6	PROTECTION AGAINST THE DYNAMIC EFFECTS ASSOCIATED WITH THE POSTULATED RUPTURE OF PIPING .....	3.6-1
3.7	SEISMIC DESIGN .....	3.7-1
3.8	DESIGN OF CATEGORY I STRUCTURES .....	3.8-1
3.9	MECHANICAL SYSTEMS AND COMPONENTS .....	3.9-1
3.10	SEISMIC AND DYNAMIC QUALIFICATION OF SEISMIC CATEGORY I MECHANICAL AND ELECTRICAL EQUIPMENT .....	3.10-1
3.11	ENVIRONMENTAL QUALIFICATION OF MECHANICAL AND ELECTRICAL EQUIPMENT .....	3.11-1
APP. 3A	HVAC DUCTS AND DUCT SUPPORTS .....	3A-1
APP. 3B	LEAK-BEFORE-BREAK EVALUATION OF THE AP1000 PIPING .....	3B-1
APP. 3C	REACTOR COOLANT LOOP ANALYSIS METHODS .....	3C-1
APP. 3D	METHODOLOGY FOR QUALIFYING AP1000 SAFETY-RELATED ELECTRICAL AND MECHANICAL EQUIPMENT .....	3D-1
APP. 3E	HIGH-ENERGY PIPING IN THE NUCLEAR ISLAND .....	3E-1
APP. 3F	CABLE TRAYS AND CABLE TRAY SUPPORTS .....	3F-1
APP. 3G	NUCLEAR ISLAND SEISMIC ANALYSES .....	3G-1
APP. 3H	AUXILIARY AND SHIELD BUILDING CRITICAL SECTIONS .....	3H-1
APP. 3I	EVALUATION FOR HIGH FREQUENCY SEISMIC INPUT .....	3I-1

#### CHAPTER 4 REACTOR

4.1	SUMMARY DESCRIPTION .....	4.1-1
4.2	FUEL SYSTEM DESIGN .....	4.2-1
4.3	NUCLEAR DESIGN .....	4.3-1
4.4	THERMAL AND HYDRAULIC DESIGN .....	4.4-1
4.5	REACTOR MATERIALS .....	4.5-1
4.6	FUNCTIONAL DESIGN OF REACTIVITY CONTROL SYSTEMS .....	4.6-1

#### CHAPTER 5 REACTOR COOLANT SYSTEM AND CONNECTED SYSTEMS

5.1	SUMMARY DESCRIPTION .....	5.1-1
5.2	INTEGRITY OF REACTOR COOLANT PRESSURE BOUNDARY .....	5.2-1
5.3	REACTOR VESSEL .....	5.3-1
5.4	COMPONENT AND SUBSYSTEM DESIGN .....	5.4-1

## MASTER TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Title</u>	<u>Page</u>
<b>CHAPTER 6</b>		
<b>ENGINEERED SAFETY FEATURES</b>		
6.0	ENGINEERED SAFETY FEATURES.....	6.0-1
6.1	ENGINEERED SAFETY FEATURES MATERIALS .....	6.1-1
6.2	CONTAINMENT SYSTEMS .....	6.2-1
6.3	PASSIVE CORE COOLING SYSTEM .....	6.3-1
6.4	HABITABILITY SYSTEMS .....	6.4-1
6.5	FISSION PRODUCT REMOVAL AND CONTROL SYSTEMS .....	6.5-1
6.6	INSERVICE INSPECTION OF CLASS 2, 3, AND MC COMPONENTS .....	6.6-1
APP. 6A	FISSION PRODUCT DISTRIBUTION IN THE AP1000 POST-DESIGN BASIS ACCIDENT CONTAINMENT ATMOSPHERE .....	6A-1
<b>CHAPTER 7</b>		
<b>INSTRUMENTATION AND CONTROLS</b>		
7.1	INTRODUCTION .....	7.1-1
7.2	REACTOR TRIP .....	7.2-1
7.3	ENGINEERED SAFETY FEATURES.....	7.3-1
7.4	SYSTEMS REQUIRED FOR SAFE SHUTDOWN .....	7.4-1
7.5	SAFETY-RELATED DISPLAY INFORMATION .....	7.5-1
7.6	INTERLOCK SYSTEMS IMPORTANT TO SAFETY .....	7.6-1
7.7	CONTROL AND INSTRUMENTATION SYSTEMS.....	7.7-1
<b>CHAPTER 8</b>		
<b>ELECTRIC POWER</b>		
8.1	INTRODUCTION .....	8.1-1
8.2	OFFSITE POWER SYSTEM .....	8.2-1
8.3	ONSITE POWER SYSTEMS .....	8.3-1
<b>CHAPTER 9</b>		
<b>AUXILIARY SYSTEMS</b>		
9.1	FUEL STORAGE AND HANDLING.....	9.1-1
9.2	WATER SYSTEMS .....	9.2-1
9.3	PROCESS AUXILIARIES.....	9.3-1
9.4	AIR-CONDITIONING, HEATING, COOLING, AND VENTILATION SYSTEM.....	9.4-1
9.5	OTHER AUXILIARY SYSTEMS .....	9.5-1

## MASTER TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Title</u>	<u>Page</u>
APP. 9A	FIRE PROTECTION ANALYSIS .....	9A-1

**CHAPTER 10  
STEAM AND POWER CONVERSION**

10.1	SUMMARY DESCRIPTION.....	10.1-1
10.2	TURBINE-GENERATOR.....	10.2-1
10.3	MAIN STEAM SUPPLY SYSTEM .....	10.3-1
10.4	OTHER FEATURES OF STEAM AND POWER CONVERSION SYSTEM.....	10.4-1

**CHAPTER 11  
RADIOACTIVE WASTE MANAGEMENT**

11.1	SOURCE TERMS.....	11.1-1
11.2	LIQUID WASTE MANAGEMENT SYSTEMS.....	11.2-1
11.3	GASEOUS WASTE MANAGEMENT SYSTEMS .....	11.3-1
11.4	SOLID WASTE MANAGEMENT .....	11.4-1
11.5	RADIATION MONITORING.....	11.5-1

**CHAPTER 12  
RADIATION PROTECTION**

12.1	ASSURING THAT OCCUPATIONAL RADIATION EXPOSURES ARE AS-LOW-AS-REASONABLY ACHIEVABLE (ALARA).....	12.1-1
12.2	RADIATION SOURCES .....	12.2-1
12.3	RADIATION PROTECTION DESIGN FEATURES .....	12.3-1
12.4	DOSE ASSESSMENT.....	12.4-1
12.5	HEALTH PHYSICS FACILITIES DESIGN.....	12.5-1
APP. 12AA	RADIATION PROTECTION PROGRAM DESCRIPTION ...	12AA-1

**CHAPTER 13  
CONDUCT OF OPERATIONS**

13.1	ORGANIZATIONAL STRUCTURE OF APPLICANT.....	13.1-1
13.2	TRAINING .....	13.2-1
13.3	EMERGENCY PLANNING .....	13.3-1
13.4	OPERATIONAL PROGRAMS .....	13.4-1
13.5	PLANT PROCEDURES.....	13.5-1
13.6	SECURITY .....	13.6-1
13.7	FITNESS FOR DUTY .....	13.7-1

## MASTER TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Title</u>	<u>Page</u>
APP. 13AA	DESIGN AND CONSTRUCTION .....	13AA-1
APP. 13BB	REMOVED	

**CHAPTER 14  
INITIAL TEST PROGRAM**

14.1	SPECIFIC INFORMATION TO BE INCLUDED IN PRELIMINARY/ FINAL SAFETY ANALYSIS REPORTS .....	14.1-1
14.2	SPECIFIC INFORMATION TO BE INCLUDED IN STANDARD SAFETY ANALYSIS REPORTS.....	14.2-1
14.3	CERTIFIED DESIGN MATERIAL.....	14.3-1
14.4	COMBINED LICENSE APPLICANT RESPONSIBILITIES.....	14.4-1

**CHAPTER 15  
ACCIDENT ANALYSES**

15.0	ACCIDENT ANALYSES .....	15.0-1
15.1	INCREASE IN HEAT REMOVAL FROM THE PRIMARY SYSTEM.....	15.1-1
15.2	DECREASE IN HEAT REMOVAL BY THE SECONDARY SYSTEM.....	15.2-1
15.3	DECREASE IN REACTOR COOLANT SYSTEM FLOW RATE .....	15.3-1
15.4	REACTIVITY AND POWER DISTRIBUTION ANOMALIES .....	15.4-1
15.5	INCREASE IN REACTOR COOLANT INVENTORY .....	15.5-1
15.6	DECREASE IN REACTOR COOLANT INVENTORY .....	15.6-1
15.7	RADIOACTIVE RELEASE FROM A SUBSYSTEM OR COMPONENT .....	15.7-1
15.8	ANTICIPATED TRANSIENTS WITHOUT SCRAM .....	15.8-1
APP. 15A	EVALUATION MODELS AND PARAMETERS FOR ANALYSIS OF RADIOLOGICAL CONSEQUENCES OF ACCIDENTS .....	15A-1
APP. 15B	REMOVAL OF AIRBORNE ACTIVITY FROM THE CONTAINMENT ATMOSPHERE FOLLOWING A LOCA .....	15B-1

**CHAPTER 16  
TECHNICAL SPECIFICATIONS**

16.1	TECHNICAL SPECIFICATIONS .....	16.1-1
16.2	DESIGN RELIABILITY ASSURANCE PROGRAM .....	16.2-1
16.3	INVESTMENT PROTECTION.....	16.3-1

## MASTER TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Title</u>	<u>Page</u>
<b>CHAPTER 17</b>		
<b>QUALITY ASSURANCE</b>		
17.1	QUALITY ASSURANCE DURING THE DESIGN AND CONSTRUCTION PHASES .....	17.1-1
17.2	QUALITY ASSURANCE DURING THE OPERATIONS PHASE.....	17.2-1
17.3	QUALITY ASSURANCE DURING DESIGN, PROCUREMENT, FABRICATION, INSPECTION, AND/OR TESTING OF NUCLEAR POWER PLANT ITEMS .....	17.3-1
17.4	DESIGN RELIABILITY ASSURANCE PROGRAM .....	17.4-1
17.5	QUALITY ASSURANCE PROGRAM DESCRIPTION – NEW LICENSE APPLICANTS.....	17.5-1
17.6	MAINTENANCE RULE PROGRAM .....	17.6-1
17.7	COMBINED LICENSE INFORMATION ITEMS.....	17.7-1
17.8	REFERENCES .....	17.8-1
<b>CHAPTER 18</b>		
<b>HUMAN FACTORS ENGINEERING</b>		
18.1	OVERVIEW .....	18.1-1
18.2	HUMAN FACTORS ENGINEERING PROGRAM MANAGEMENT...	18.2-1
18.3	OPERATING EXPERIENCE REVIEW .....	18.3-1
18.4	FUNCTIONAL REQUIREMENTS ANALYSIS AND ALLOCATION...	18.4-1
18.5	AP1000 TASK ANALYSIS IMPLEMENTATION PLAN .....	18.5-1
18.6	STAFFING.....	18.6-1
18.7	INTEGRATION OF HUMAN RELIABILITY ANALYSIS WITH HUMAN FACTORS ENGINEERING .....	18.7-1
18.8	HUMAN SYSTEM INTERFACE DESIGN .....	18.8-1
18.9	PROCEDURE DEVELOPMENT .....	18.9-1
18.10	TRAINING PROGRAM DEVELOPMENT.....	18.10-1
18.11	HUMAN FACTORS ENGINEERING VERIFICATION AND VALIDATION .....	18.11-1
18.12	INVENTORY.....	18.12-1
18.13	DESIGN IMPLEMENTATION.....	18.13-1
18.14	HUMAN PERFORMANCE MONITORING .....	18.14-1
<b>CHAPTER 19</b>		
<b>PROBABILISTIC RISK ASSESSMENT</b>		
19.1	INTRODUCTION .....	19.1-1
19.2	INTERNAL INITIATING EVENTS.....	19.2-1
19.3	MODELING OF SPECIAL INITIATORS.....	19.3-1
19.4	EVENT TREE MODELS.....	19.4-1

## MASTER TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Title</u>	<u>Page</u>
19.5	SUPPORT SYSTEMS .....	19.5-1
19.6	SUCCESS CRITERIA ANALYSIS .....	19.6-1
19.7	FAULT TREE GUIDELINES .....	19.7-1
19.8	PASSIVE CORE COOLING SYSTEM - PASSIVE RESIDUAL HEAT REMOVAL .....	19.8-1
19.9	PASSIVE CORE COOLING SYSTEM - CORE MAKEUP TANKS....	19.9-1
19.10	PASSIVE CORE COOLING SYSTEM - ACCUMULATOR .....	19.10-1
19.11	PASSIVE CORE COOLING SYSTEM - AUTOMATIC DEPRESSURIZATION SYSTEM .....	19.11-1
19.12	PASSIVE CORE COOLING SYSTEM - IN-CONTAINMENT REFUELING WATER STORAGE TANK.....	19.12-1
19.13	PASSIVE CONTAINMENT COOLING .....	19.13-1
19.14	MAIN AND STARTUP FEEDWATER SYSTEM .....	19.14-1
19.15	CHEMICAL AND VOLUME CONTROL SYSTEM .....	19.15-1
19.16	CONTAINMENT HYDROGEN CONTROL SYSTEM .....	19.16-1
19.17	NORMAL RESIDUAL HEAT REMOVAL SYSTEM .....	19.17-1
19.18	COMPONENT COOLING WATER SYSTEM.....	19.18-1
19.19	SERVICE WATER SYSTEM .....	19.19-1
19.20	CENTRAL CHILLED WATER SYSTEM .....	19.20-1
19.21	AC POWER SYSTEM .....	19.21-1
19.22	CLASS 1E DC & UPS SYSTEM.....	19.22-1
19.23	NON-CLASS 1E DC & UPS SYSTEM .....	19.23-1
19.24	CONTAINMENT ISOLATION .....	19.24-1
19.25	COMPRESSED AND INSTRUMENT AIR SYSTEM .....	19.25-1
19.26	PROTECTION AND SAFETY MONITORING SYSTEM .....	19.26-1
19.27	DIVERSE ACTUATION SYSTEM .....	19.27-1
19.28	PLANT CONTROL SYSTEM.....	19.28-1
19.29	COMMON CAUSE ANALYSIS.....	19.29-1
19.30	HUMAN RELIABILITY ANALYSIS .....	19.30-1
19.31	OTHER EVENT TREE NODE PROBABILITIES .....	19.31-1
19.32	DATA ANALYSIS AND MASTER DATA BANK .....	19.32-1
19.33	FAULT TREE AND CORE DAMAGE QUANTIFICATION .....	19.33-1
19.34	SEVERE ACCIDENT PHENOMENA TREATMENT .....	19.34-1
19.35	CONTAINMENT EVENT TREE ANALYSIS .....	19.35-1
19.36	REACTOR COOLANT SYSTEM DEPRESSURIZATION .....	19.36-1
19.37	CONTAINMENT ISOLATION .....	19.37-1
19.38	REACTOR VESSEL REFLOODING .....	19.38-1
19.39	IN-VESSEL RETENTION OF MOLTEN CORE DEBRIS .....	19.39-1
19.40	PASSIVE CONTAINMENT COOLING .....	19.40-1
19.41	HYDROGEN MIXING AND COMBUSTION ANALYSIS .....	19.41-1
19.42	CONDITIONAL CONTAINMENT FAILURE PROBABILITY DISTRIBUTION .....	19.42-1
19.43	RELEASE FREQUENCY QUANTIFICATION .....	19.43-1
19.44	MAAP4.0 CODE DESCRIPTION AND AP1000 MODELING .....	19.44-1
19.45	FISSION PRODUCT SOURCE TERMS .....	19.45-1



## MASTER TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Title</u>	<u>Page</u>
19.46	NOT USED .....	19.46-1
19.47	NOT USED .....	19.47-1
19.48	NOT USED .....	19.48-1
19.49	OFFSITE DOSE EVALUATION .....	19.49-1
19.50	IMPORTANCE AND SENSITIVITY ANALYSIS .....	19.50-1
19.51	UNCERTAINTY ANALYSIS .....	19.51-1
19.52	NOT USED .....	19.52-1
19.53	NOT USED .....	19.53-1
19.54	LOW POWER AND SHUTDOWN PRA ASSESSMENT .....	19.54-1
19.55	SEISMIC MARGIN ANALYSIS .....	19.55-1
19.56	PRA INTERNAL FLOODING ANALYSIS .....	19.56-1
19.57	INTERNAL FIRE ANALYSIS .....	19.57-1
19.58	WINDS, FLOODS, AND OTHER EXTERNAL EVENTS .....	19.58-1
19.59	PRA RESULTS AND INSIGHTS .....	19.59-1
APP. 19A	THERMAL HYDRAULIC ANALYSIS TO SUPPORT SUCCESS CRITERIA .....	19A-1
APP. 19B	EX-VESSEL SEVERE ACCIDENT PHENOMENA .....	19B-1
APP. 19C	ADDITIONAL ASSESSMENT OF AP1000 DESIGN FEATURES .....	19C-1
APP. 19D	EQUIPMENT SURVIVABILITY ASSESSMENT .....	19D-1
APP. 19E	SHUTDOWN EVALUATION .....	19E-1
APP. 19F	MALEVOLENT AIRCRAFT IMPACT .....	19F-1