

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
1.0	INTRODUCTION AND GENERAL DESCRIPTION OF PLANT	
1.1	INTRODUCTION	1.1-1
1.2	GENERAL PLANT DESCRIPTION	1.2-1
1.2.1	Site Characteristics	1.2-1
1.2.2	Facility Description	1.2-2
1.2.3	General Arrangement of Major Structures and Equipment	1.2-13
1.3	COMPARISON TABLES	1.3-1
1.3.1	Comparisons With Similar Facility Designs	1.3-1
1.3.2	Comparison Of Final And Preliminary Designs	1.3-1
1.4	IDENTIFICATION OF AGENTS AND CONTRACTORS	1.4-1
1.5	REQUIREMENTS FOR FURTHER TECHNICAL INFORMATION	1.5-1
1.5.1	17 x 17 Fuel Assembly	1.5-1
1.5.2	Heat Transfer Tests (17 x 17)	1.5-2
1.6	MATERIAL INCORPORATED BY REFERENCE	1.6-1
1.7	ELECTRICAL, INSTRUMENTATION, AND CONTROL DRAWINGS	1.7-1
1.8	TECHNICAL QUALIFICATION OF APPLICANT	1.8-1
1.9	NUCLEAR PERFORMANCE PLAN	1.9-1
1.9.1	Corrective Action Plans	1.9-1
1.9.2	Special Programs (SPs)	1.9-5
1.9.3	REFERENCES	1.9-7
2.0	SITE CHARACTERISTICS	
2.1	GEOGRAPHY AND DEMOGRAPHY	2.1-1
2.1.1	Site Location and Description	2.1-1
2.1.2	Exclusion Area Authority And Control	2.1-2
2.1.3	Population Distribution	2.1-2
2.2	NEARBY INDUSTRIAL, TRANSPORTATION, AND MILITARY FACILITIES	2.2-1
2.2.1	Location and Route	2.2-1
2.2.2	Descriptions	2.2-1
2.2.3	Evaluation of Potential Accidents	2.2-2
2.3	METEOROLOGY	2.3-1
2.3.1	Regional Climate	2.3-1
2.3.2	Local Meteorology	2.3-5

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
2.3.3	Onsite Meteorological Measurements Program	2.3-9
2.3.4	Short-Term (Accident) Diffusion Estimates	2.3-13
2.3.5	Long-Term (Routine) Diffusion Estimates	2.3-16
2.4	HYDROLOGIC ENGINEERING	2.4-1
2.4.1	Hydrological Description	2.4-1
2.4.2	Floods	2.4-6
2.4.3	Probable Maximum Flood (PMF) on Streams and Rivers	2.4-12
2.4.4	Potential Dam Failures, Seismically Induced	2.4-28
2.4.5	Probable Maximum Surge and Seiche Flooding	2.4-40
2.4.6	Probable Maximum Tsunami Flooding	2.4-40
2.4.7	Ice Effects	2.4-40
2.4.8	Cooling Water Canals and Reservoirs	2.4-41
2.4.9	Channel Diversions	2.4-42
2.4.10	Flooding Protection Requirements	2.4-42
2.4.11	Low Water Considerations	2.4-42
2.4.12	Dispersion, Dilution, and Travel Times of Accidental Releases of Liquid Effluents	2.4-45
2.4.13	Groundwater	2.4-48
2.4.14	Flooding Protection Requirements	2.4-51
2.5	GEOLOGY, SEISMOLOGY, AND GEOTECHNICAL ENGINEERING SUMMARY OF FOUNDATION CONDITIONS	2.5-1
2.5.1	Basic Geology and Seismic Information	2.5-2
2.5.2	Vibratory Ground Motion	2.5-34
2.5.3	Surface Faulting	2.5-45
2.5.4	Stability of Subsurface Materials	2.5-56
2.5.5	Stability of Slopes	2.5-118
2.5.6	Embankments	2.5-127
3.0	DESIGN OF STRUCTURES, COMPONENTS, EQUIPMENT, AND SYSTEMS	
3.1	CONFORMANCE WITH NRC GENERAL DESIGN CRITERIA	3.1-1
3.1.1	Introduction	3.1-1
3.1.2	WBNP Conformance with GDCs	3.1-1
3.2	CLASSIFICATION OF STRUCTURES, SYSTEMS, AND COMPONENTS	3.2-1
3.2.1	<u>Seismic Classifications</u>	<u>3.2-1</u>
3.2.2	System Quality Group Classification	3.2-1
3.2.3	Code Cases and Code Editions and Addenda	3.2-3
3.3	Wind and Tornado Loading	3.3-1
3.3.1	Wind Loadings	3.3-1
3.3.2	Tornado Loadings	3.3-1

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
3.4	WATER LEVEL (FLOOD) DESIGN	3.4-1
3.4.1	Flood Protection	3.4-1
3.4.2	Analysis Procedure	3.4-1
3.5	MISSILE PROTECTION	3.5-1
3.5.1	Missile Selection and Description	3.5-2
3.5.2	Systems To Be Protected	3.5-28
3.5.3	Barrier Design Procedures	3.5-29
3.5.A	ESTIMATES OF VELOCITIES OF JET PROPELLED MISSILES	3.5-1
3.6	PROTECTION AGAINST DYNAMIC EFFECTS ASSOCIATED WITH THE POSTULATED RUPTURE OF PIPING	3.6-1
3.6A	PROTECTION AGAINST DYNAMIC EFFECTS ASSOCIATED WITH THE POSTULATED RUPTURE OF PIPING (EXCLUDING REACTOR COOLANT SYSTEM PIPING)	3.6A-1
3.6A.1	Postulated Piping Failures in Fluid Systems Inside and Outside Containment	3.6A-7
3.6A.2	Determination of Break Locations and Dynamic Effects Associated with the Postulated Rupture of Piping	3.6A-10
3.6B	PROTECTION AGAINST DYNAMIC EFFECTS ASSOCIATED WITH THE POSTULATED RUPTURE OF PIPING	3.6A-24
3.6B.1	Break Locations And Dynamic Effects Associated With Postulated Primary Loop Pipe Rupture	3.6A-24
3.6B.2	Analytical Methods to Define Forcing Function and Response Models	3.6A-25
3.6B.3	Dynamic Analysis of the Reactor Coolant Loop Piping Equipment Supports and Pipe Whip Restraints	3.6A-27
3.7	SEISMIC DESIGN	3.7-1
3.7.1	Seismic Input	3.7-2
3.7.2	Seismic System Analysis	3.7-3
3.7.3	Seismic Subsystem Analysis	3.7-31
3.7.4	Seismic Instrumentation Program	3.7-61
3.8	DESIGN OF CATEGORY I STRUCTURES	3.8-1
3.8.1	Concrete Shield Building	3.8-1
3.8.2	Testing and Inservice Surveillance Requirements	3.8-13
3.8.2	Steel Containment System	3.8-1
3.8.2.1	Description of the Containment and Penetrations	3.8-1
3.8.2.2	Applicable Codes, Standards and Specifications	3.8-3
3.8.2.3	Loads and Loading Combinations	3.8-7
3.8.2.4	Design and Analysis Procedures	3.8-11
3.8.2.5	Structural Acceptance Criteria	3.8-18
3.8.2.6	Materials, Quality Control, and Special Construction Techniques	3.8-18

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
3.8.2.7	Testing and Inservice Inspection Requirements	3.8-25
3.8.3	Concrete Interior Structure	3.8-1
3.8.3.1	Description of the Interior Structure	3.8-1
3.8.3.13	Applicable Codes, Standards and Specifications	3.8-7
3.8.3.14	Loads and Loading Combinations	3.8-13
3.8.3.15	Design and Analysis Procedures	3.8-16
3.8.3.29	Structural Acceptance Criteria	3.8-31
3.8.3.42	Materials, Quality Control and Special Construction Techniques	3.8-34
3.8.3.47	Testing and Inservice Surveillance Requirements	3.8-38
3.8.3.48	Environmental Effects	3.8-38
3.8.3.49	Interface Control	3.8-39
3.8.4	Other Category I Structures	3.8-1
3.8.4.1	Description of the Structures	3.8-1
3.8.4.10	Applicable Codes, Standards, and Specifications	3.8-17
3.8.4.13	Loads and Loading Combinations	3.8-21
3.8.4.16	Design and Analysis Procedures	3.8-23
3.8.4.25	Structural Acceptance Criteria	3.8-35
3.8.4.32	Materials, Quality Control, and Special Construction Techniques General	3.8-37
3.8.4.36	Testing and Inservice Surveillance Requirements	3.8-38
3.8.5	Foundations and Concrete Supports	3.8-1
3.8.5.1	Description of Foundations and Supports	3.8-1
3.8.5.2	Applicable Codes, Standards, and Specifications	3.8-3
3.8.5.3	Loads and Loading Combinations	3.8-3
3.8.5.4	Design and Analysis Procedure	3.8-4
3.8.5.5	Structural Acceptance Criteria	3.8-5
3.8.5.6	Materials, Quality Control, and Special Construction Techniques	3.8-6
3.8.6	Category I(L) Cranes	3.8-1
3.8.6.1	Polar Cranes	3.8-1
3.8.6.2	Auxiliary Building Crane	3.8-4
3.8A	SHELL TEMPERATURE TRANSIENTS	3.8-1
3.8B	BUCKLING STRESS CRITERIA	3.8-1
3.8B.1	INTRODUCTION	3.8-1
3.8B.2	SHELLS STIFFENED WITH CIRCUMFERENTIAL STIFFENERS	3.8-1
3.8B.3	SHELLS STIFFENED WITH A COMBINATION OF CIRCUMFERENTIAL AND VERTICAL STIFFENERS	3.8-5
3.8B.4	SPHERICAL SHELLS	3.8-7
3.8B.3	FACTOR OF SAFETY	3.8-8
3.8C	DOCUMENTATION OF CB&I COMPUTER PROGRAMS	3.8-1

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
3.8C.1	INTRODUCTION	3.8-1
3.8C.2	PROGRAM 1017-MODAL ANALYSIS OF STRUCTURES USING THE EIGEN VALUE TECHNIQUE	3.8-1
3.8C.3	PROGRAM 1044-SEISMIC ANALYSIS of VESSEL APPENDAGES	3.8-1
3.8C.4	PROGRAM E1668-SPECTRAL ANALYSIS FOR ACCELERATION RECORDS DIGITIZED AT EQUAL INTERVALS	3.8-3
3.8C.5	PROGRAM 1642-TRANSIENT PRESSURE BEAM ANALYSIS	3.8-3
3.8C.6	PROGRAM E1623-POST PROCESSOR PROGRAM FOR PROGRAM E1374	3.8-4
3.8C.7	PROGRAM E1374-SHELL DYNAMIC ANALYSIS	3.8-5
3.8C.8	PROGRAM E1622-LOAD GENERATION PREPROCESSOR FOR PROGRAM E1374	3.8-6
3.8C.9	PROGRAM E1624 SPCGEN-SPECTRAL CURVE GENERATION	3.8-7
3.8C.10	PROGRAM 781, METHOD OF MODELING VERTICAL STIFFENERS	3.8-7
3.8C.11	PROGRAM 119-CHECK of FLANGE DESIGN	3.8-7
3.8C.12	PROGRAM 772-NOZZLE REINFORCEMENT CHECK	3.8-7
3.8C.13	PROGRAM 1027-WRC 107 STRESS INTENSITIES AT LOADED ATTACHMENTS FOR SPHERES OR CYLINDERS WITH ROUND OR SQUARE ATTACHMENT	3.8-8
3.8C.14	PROGRAM 1036M-STRESS INTENSITIES IN JUMBO INSERT PLATES	3.8-8
3.8D	COMPUTER PROGRAMS FOR STRUCTURAL ANALYSIS	3.8-1
3.8E	CODES, LOAD DEFINITIONS AND LOAD COMBINATIONS FOR THE MODIFICATION AND EVALUATION OF EXISTING STRUCTURES AND FOR THE DESIGN OF NEW FEATURES ADDED TO EXISTING STRUCTURES AND THE DESIGN OF STRUCTURES INITIATED AFTER JULY 1979	3.8-1
3.8E.1	Application Codes and Standards	3.8-1
3.8E.2	Load Definitions	3.8-1
3.8E.3	Load Combinations - Concrete	3.8-3
3.8E.4	Load Combinations - Structural Steel	3.8-5
3.9	MECHANICAL SYSTEMS AND COMPONENTS	3.9-1
3.9.1	General Topic for Analysis of Seismic Category I ASME Code and Non-Code Items	3.9-1
3.9.2	Dynamic Testing and Analysis	3.9-4
3.9.3	ASME Code Class 1, 2 and 3 Components, Component Supports and Core Support Structures	3.9-20
3.9.4	Control Rod System	3.9-46
3.9.5	Reactor Pressure Vessel Internals	3.9-47
3.9.6	Inservice Testing of Pumps and Valves	3.9-47
3.10	SEISMIC DESIGN OF CATEGORY I INSTRUMENTATION AND ELECTRICAL EQUIPMENT	3.10-1
3.10.1	Seismic Qualification Criteria	3.10-1

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
3.10.2	Methods And Procedures For Qualifying Electrical Equipment And Instrumentation	
3.10-4		
3.10.3	Methods of Qualifying TVA-Designed Supports for Electrical Equipment Instrumentation and Cables	3.10-4
3.10.4	Operating License Review	3.10-7
3.11	ENVIRONMENTAL DESIGN OF MECHANICAL AND ELECTRICAL EQUIPMENT	3.11-1
3.11.1	Equipment Identification and Environmental Conditions	3.11-1
3.11.2	Environmental Conditions	3.11-2
3.11.3	Electrical Equipment Within the Scope of 10 CFR 50.49	3.11-4
3.11.4	Qualification Tests and Analyses	3.11-4
3.11.5	Qualification Test Results	3.11-4
3.11.6	Loss of Heating, Ventilating, and Air-Conditioning (HVAC)	3.11-4
3.11.7	Estimated Chemical and Radiation Environment	3.11-4
4.0	REACTOR	
4.1	SUMMARY DESCRIPTION	4.1-1
4.2	MECHANICAL DESIGN	4.2-1
4.2.1	Fuel	4.2-2
4.2.2	Reactor Vessel Internals	4.2-22
4.2.3	Reactivity Control System	4.2-29
4.3	NUCLEAR DESIGN	4.3-1
4.3.1	DESIGN BASES	4.3-1
4.3.2	Description	4.3-6
4.3.3	Analytical Methods	4.3-33
4.4	THERMAL AND HYDRAULIC DESIGN	4.4-1
4.4.1	Design Bases	4.4-1
4.4.2	Description	4.4-3
4.4.3	EVALUATION	4.4-21
4.4.4	Testing and Verification	4.4-31
4.4.5	Instrumentation Application	4.4-32
5.0	REACTOR COOLANT SYSTEM	
5.1	SUMMARY DESCRIPTION	5.1-1
5.1.1	Schematic Flow Diagram	5.1-6
5.1.2	Piping and Instrumentation Diagrams	5.1-6
5.1.3	Elevation Drawing	5.1-6
5.2	INTEGRITY OF REACTOR COOLANT PRESSURE BOUNDARY	5.2-1

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
5.2.1	Design of Reactor Coolant Pressure Boundary Components	5.2-2
5.2.2	Overpressurization Protection	5.2-35
5.2.3	General Material Considerations	5.2-40
5.2.4	Fracture Toughness	5.2-43
5.2.5	Austenitic Stainless Steel	5.2-46
5.2.6	Pump Flywheels	5.2-53
5.2.7	RCPB Leakage Detection Systems	5.2-55
5.2.8	Inservice Inspection of ASME Code Class 1 Components	5.2-65
5.3	THERMAL HYDRAULIC SYSTEM DESIGN	5.3-1
5.3.1	Analytical Methods and Data	5.3-1
5.3.2	Operating Restrictions On Pumps	5.3-1
5.3.3	Power-Flow Operating Map (BWR)	5.3-1
5.3.4	Temperature-Power Operating Map	5.3-1
5.3.5	Load Following Characteristics	5.3-1
5.3.6	Transient Effects	5.3-1
5.3.7	Thermal and Hydraulic Characteristics Summary Table	5.3-1
5.4	REACTOR VESSEL AND APPURTENANCES	5.4-1
5.4.1	Design Bases	5.4-1
5.4.2	Description	5.4-2
5.4.3	Evaluation	5.4-4
5.4.4	Tests and Inspections	5.4-12
5.5	COMPONENT AND SUBSYSTEM DESIGN	5.5-1
5.5.1	Reactor Coolant Pumps	5.5-1
5.5.2	Steam Generators	5.5-7
5.5.3	Reactor Coolant Piping	5.5-15
5.5.4	Steam Outlet Flow Restrictor (Steam Generator)	5.5-20
5.5.5	Main Steam Line Isolation System	5.5-20
5.5.6	Reactor Vessel Head Vent System	5.5-21
5.5.7	Residual Heat Removal System	5.5-23
5.5.8	Reactor Coolant Cleanup System	5.5-31
5.5.9	Main Steam Line and Feedwater Piping	5.5-31
5.5.10	Pressurizer	5.5-32
5.5.11	Pressurizer Relief Tank	5.5-37
5.5.12	Valves	5.5-38
5.5.13	Safety and Relief Valves	5.5-40
5.5.14	Component Supports	5.5-41
5.6	INSTRUMENTATION APPLICATION	5.6-1
6.0	ENGINEERED SAFETY FEATURES	
6.1	ENGINEERED SAFETY FEATURE MATERIALS	6.1-1

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
6.1.1	Metallic Materials	6.1-1
6.1.2	Organic Materials	6.1-3
6.1.3	Post-Accident Chemistry	6.1-4
6.1.4	Degree of Compliance with Regulatory Guide 1.54 for Paints and Coatings Inside Containment	6.1-5
6.2	CONTAINMENT SYSTEMS	6.2-1
6.2.1	Containment Functional Design	6.2-1
6.2.2	CONTAINMENT HEAT REMOVAL SYSTEMS	6.2-1
6.2.3	Secondary Containment Functional Design	6.2-1
6.2.3.1	Design Bases	6.2-1
6.2.3.2	System Design	6.2-2
6.2.3.3	Design Evaluation	6.2-12
6.2.3.4	Test and Inspections	6.2-21
6.2.3.5	Instrumentation Requirements	6.2-23
6.2.4	Containment Isolation Systems	6.2-1
6.2.4.1	Design Bases	6.2-1
6.2.4.2	System Design	6.2-4
6.2.4.3	Design Evaluation	6.2-12
6.2.4.4	Tests and Inspections	6.2-16
6.2.5	Combustible Gas Control in Containment	6.2-1
6.2.5.1	Design Bases	6.2-1
6.2.5.2	System Design	6.2-2
6.2.5.3	Design Evaluation	6.2-5
6.2.5.4	Testing and Inspections	6.2-5
6.2.5.5	Instrumentation Application	6.2-5
6.2.5.6	Materials	6.2-6
6.2.5.7	Hydrogen Mitigation System	6.2-6
6.2.6	Containment Leakage Testing	6.2-1
6.2.6.1	Containment Integrated Leak Rate Test	6.2-1
6.2.6.2	Containment Penetration Leakage Rate Test	6.2-2
6.2.6.3	Scheduling and Reporting of Periodic Tests	6.2-6
6.2.6.4	Special Testing Requirements	6.2-6
6.3	EMERGENCY CORE COOLING SYSTEM	6.3-1
6.3.1	Design Bases	6.3-1
6.3.2	System Design	6.3-2
6.3.3	Performance Evaluation	6.3-25
6.3.4	Tests and Inspections	6.3-31
6.3.5	Instrumentation Application	6.3-33

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
6.4	HABITABILITY SYSTEMS	6.4-1
6.4.1	Design Bases	6.4-1
6.4.2	System Design	6.4-1
6.4.3	System Operational Procedures	6.4-5
6.4.4	Design Evaluations	6.4-7
6.4.5	Testing and Inspection	6.4-9
6.4.6	Instrumentation Requirements	6.4-9
6.5	FISSION PRODUCT REMOVAL AND CONTROL SYSTEMS	6.5-1
6.5.1	Engineered Safety Feature (ESF) Filter Systems	6.5-1
6.5.2	Containment Spray System for Fission Product Cleanup	6.5-8
6.5.3	Fission Product Control Systems	6.5-8
6.5.4	Ice Condenser as a Fission Product Cleanup System	6.5-10
6.6	INSERVICE INSPECTION OF ASME CODE CLASS 2 AND 3 COMPONENTS	6.6-1
6.6.1	Components Subject to Examination and/or Test	6.6-1
6.6.2	Accessibility	6.6-1
6.6.3	Examination Techniques and Procedures	6.6-1
6.6.4	Inspection Intervals	6.6-1
6.6.5	Examination Categories and Requirements	6.6-1
6.6.6	Evaluation of Examination Results	6.6-1
6.6.7	System Pressure Tests	6.6-2
6.6.8	Protection against Postulated Piping Failures	6.6-2
6.7	ICE CONDENSER SYSTEM	6.7-1
6.7.1	Floor Structure and Cooling System	6.7-1
6.7.2	Wall Panels	6.7-8
6.7.3	Lattice Frames and Support Columns	6.7-9
6.7.4	Ice Baskets	6.7-14
6.7.5	Crane and Rail Assembly	6.7-20
6.7.6	Refrigeration System	6.7-21
6.7.7	Air Handling Units	6.7-29
6.7.8	Lower Inlet Doors	6.7-31
6.7.9	Lower Support Structure	6.7-37
6.7.10	Top Deck and Doors	6.7-49
6.7.11	Intermediate Deck and Doors	6.7-54
6.7.12	Air Distribution Ducts	6.7-57
6.7.13	Equipment Access Door	6.7-58
6.7.14	Ice Technology, Ice Performance, and Ice Chemistry	6.7-59
6.7.15	Ice Condenser Instrumentation	6.7-65
6.7.16	Ice Condenser Structural Design	6.7-68
6.7.17	Seismic Analysis	6.7-70
6.7.18	Materials	6.7-74
6.7.19	Tests and Inspections	6.7-78

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
6.8	AIR RETURN FANS	6.8-1
6.8.1	Design Bases	6.8-1
6.8.2	System Description	6.8-1
6.8.3	Safety Evaluation	6.8-2
6.8.4	Inspection and Testing	6.8-3
6.8.5	Instrumentation Requirements	6.8-3
7.0	INSTRUMENTATION AND CONTROLS	
7.1	INTRODUCTION	7.1-1
7.1.1	Identification of Safety-Related Systems	7.1-4
7.1.2	Identification of Safety Criteria	7.1-5
7.2	REACTOR TRIP SYSTEM	7.2-1
7.2.1	Description	7.2-1
7.2.2	Analyses	7.2-19
7.2.3	Tests and Inspections	7.2-36
7.3	ENGINEERED SAFETY FEATURES ACTUATION SYSTEM	7.3-1
7.3.1	Description	7.3-1
7.3.2	Analysis	7.3-8
7.4	SYSTEMS REQUIRED FOR SAFE SHUTDOWN	7.4-1
7.4.1	Description	7.4-1
7.4.2	Analysis	7.4-6
7.5	INSTRUMENTATION SYSTEMS IMPORTANT TO SAFETY	7.5-1
7.5.1	Post Accident Monitoring Instrumentation (PAM)	7.5-1
7.5.2	Emergency Response Facilities Data System (ERFDS)	7.5-8
7.6	ALL OTHER SYSTEMS REQUIRED FOR SAFETY	7.6-1
7.6.1	120V ac and 125V dc Vital Plant Control Power System	7.6-1
7.6.2	Residual Heat Removal Isolation Valves	7.6-1
7.6.3	Refueling Interlocks	7.6-2
7.6.4	Deleted by Amendment 63.	7.6-2
7.6.5	Accumulator Motor-Operated Valves	7.6-2
7.6.6	Spurious Actuation Protection for Motor Operated Valves	7.6-3
7.6.7	Loose Part Monitoring System (LPMS) System Description	7.6-4
7.6.8	Interlocks for RCS Pressure Control During Low Temperature Operation	7.6-6
7.6.9	Switchover From Injection to Recirculation	7.6-8
7.7	CONTROL SYSTEMS	7.7-1
7.7.1	Description	7.7-1
7.7.2	Analysis	7.7-20
7.7.3	Deleted by Amendment 81	7.7-26

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
7A	INSTRUMENTATION IDENTIFICATIONS AND SYMBOLS	
7A.1	IDENTIFICATION SYSTEM	7A.1-1
7A.1.1	FUNCTIONAL IDENTIFICATION	7A.1-1
7A.1.2	SYSTEM IDENTIFICATION	7A.1-3
7A.1.3	LOOP IDENTIFICATION	7A.1-3
7A.2	SYMBOLS	7A.1-3
7A.2.1	INSTRUMENT SYMBOL	7A.1-4
8.0	ELECTRIC POWER	
8.1	INTRODUCTION	8.1-1
8.1.1	Utility Grid and Interconnections	8.1-1
8.1.2	Plant Electrical Power System	8.1-1
8.1.3	Safety-Related Loads	8.1-2
8.1.4	Design Bases	8.1-3
8.1.5	Design Criteria and Standards	8.1-4
8.2	OFFSITE (PREFERRED) POWER SYSTEM	8.2-1
8.2.1	Description	8.2-1
8.2.2	Analysis	8.2-19
8.3	ONSITE (STANDBY) POWER SYSTEM	8.3-1
8.3.1	AC Power System	8.3-1
8.3.2	DC Power System	8.3-55
8.3.3	Fire Protection for Cable Systems	8.3-70
8A	Analysis of Submerged Electrical Equipment (During Post LOCA) Powered from Auxiliary Power System	8-1
8B	Analysis of Submerged Electrical Equipment (During Post LOCA) Powered from Instrumentation and Control Power System	8-3
8C	Deleted by Amendment 75	8-5
8D	IEEE STD 387-1984 FOR DIESEL-GENERATING UNITS APPLIED AS STANDBY POWER	8-6
8E	Probability/Reliability Analysis of Protection Device Schemes for Associated and Non-Class 1E Cables	8-8
9.0	AUXILIARY SYSTEMS	
9.1	FUEL STORAGE AND HANDLING	9.1-1

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
9.1.1	New Fuel Storage	9.1-1
9.1.2	SPENT FUEL STORAGE	9.1-2
9.1.3	Spent Fuel Pool Cooling and Cleanup System (SFPCCS)	9.1-4
9.1.4	FUEL HANDLING SYSTEM	9.1-12
9.2	WATER SYSTEMS	9.2-1
9.2.1	Essential Raw Cooling Water (ERCW)	9.2-1
9.2.2	Component Cooling System (CCS)	9.2-10
9.2.3	Demineralized Water Makeup System	9.2-23
9.2.4	Potable and Sanitary Water Systems	9.2-25
9.2.5	Ultimate Heat Sink	9.2-30
9.2.6	Condensate Storage Facilities	9.2-33
9.2.7	Refueling Water Storage Tank	9.2-35
9.2.8	Raw Cooling Water System	9.2-39
9.3	PROCESS AUXILIARIES	9.3-1
9.3.1	Compressed Air System	9.3-1
9.3.2	Process Sampling System	9.3-5
9.3.3	Equipment and Floor Drainage System	9.3-12
9.3.4	Chemical and Volume Control System	9.3-16
9.3.5	Failed Fuel Detection System	9.3-39
9.3.6	Auxiliary Charging System	9.3-40
9.3.7	Boron Recycle System	9.3-42
9.3.8	Heat Tracing	9.3-51
9.4	AIR CONDITIONING, HEATING, COOLING, AND VENTILATION SYSTEMS	9.4-1
9.4.1	Control Room Area Ventilation System	9.4-1
9.4.2	Fuel Handling Area Ventilation System	9.4-8
9.4.3	Auxiliary and Radwaste Area Ventilation System	9.4-12
9.4.4	Turbine Building Area Ventilation System	9.4-23
9.4.5	Engineered Safety Feature Ventilation Systems	9.4-27
9.4.6	Reactor Building Purge Ventilating System	9.4-40
9.4.7	Containment Air Cooling System	9.4-45
9.4.8	Condensate Demineralizer Waste Evaporator Building Environmental Control System	9.4-49
9.4.9	Postaccident Sampling Facility Environmental Control System	9.4-49
9.5	OTHER AUXILIARY SYSTEMS	9.5-1
9.5.1	Fire Protection System	9.5-1
9.5.2	Plant Communications System	9.5-1
9.5.3	Lighting Systems	9.5-7
9.5.4	Diesel Generator Fuel Oil Storage and Transfer System	9.5-10
9.5.5	Diesel Generator Cooling Water System	9.5-15
9.5.6	Diesel Generator Starting System	9.5-16
9.5.7	Diesel Engine Lubrication System	9.5-18

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
9.5.8	Diesel Generator Combustion Air Intake and Exhaust System	9.5-21
10.0	MAIN STEAM AND POWER CONVERSION SYSTEMS	
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	Description	10.2-1
10.2.3	Turbine Rotor and Disc Integrity	10.2-5
10.2.4	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	10.3-1
10.3.3	Design Evaluation	10.3-2
10.3.4	Inspection and Testing Requirements	10.3-3
10.3.5	Water Chemistry	10.3-3
10.3.6	Steam and Feedwater System Materials	10.3-5
10.4	OTHER FEATURES OF STEAM AND POWER CONVERSION SYSTEM	10.4-1
10.4.1	Main Condenser	10.4-1
10.4.2	Main Condenser Evacuation System	10.4-5
10.4.3	Turbine Gland Sealing System	10.4-7
10.4.4	Turbine Bypass System	10.4-8
10.4.5	Condenser Circulating Water System	10.4-10
10.4.6	Condensate Polishing Demineralizer System	10.4-15
10.4.7	Condensate and Feedwater Systems	10.4-19
10.4.8	Steam Generator Blowdown System	10.4-28
10.4.9	Auxiliary Feedwater System	10.4-32
11.0	RADIOACTIVE WASTE MANAGEMENT	
11.1	SOURCE TERMS	11.1-1
11.1.1	Historical Design Model for Radioactivities in Systems and Components	11.1-1
11.1.2	Realistic Model for Radioactivities in Systems and Components	11.1-2
11.1.3	Plant Leakage	11.1-3
11.1.4	Additional Sources	11.1-3
11.2	LIQUID WASTE SYSTEMS	11.2-1
11.2.1	DESIGN OBJECTIVES	11.2-1
11.2.2	SYSTEMS DESCRIPTIONS	11.2-1
11.2.3	SYSTEM DESIGN	11.2-5
11.2.4	Operating Procedure	11.2-11
11.2.5	PERFORMANCE TESTS	11.2-18

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
11.2.6	ESTIMATED RELEASES	11.2-18
11.2.7	RELEASE POINTS	11.2-20
11.2.8	DILUTION FACTORS	11.2-20
11.2.9	ESTIMATED DOSES FROM RADIONUCLIDES IN LIQUID EFFLUENTS	11.2-21
11.3	GASEOUS WASTE SYSTEMS	11.3-1
11.3.1	Design Bases	11.3-1
11.3.2	SYSTEM DESCRIPTIONS	11.3-1
11.3.3	SYSTEM DESIGN	11.3-3
11.3.4	Operating Procedure	11.3-4
11.3.5	Performance Tests	11.3-6
11.3.6	Deleted by Amendment 77	11.3-6
11.3.7	Radioactive Releases	11.3-6
11.3.8	Release Points	11.3-7
11.3.9	Atmospheric Dilution	11.3-8
11.3.10	Estimated Doses from Radionuclides in Gaseous Effluents	11.3-9
11.4	PROCESS AND EFFLUENT RADIOLOGICAL MONITORING AND SAMPLING SYSTEM	11.4-1
11.4.1	Design Objectives	11.4-1
11.4.2	Continuous Monitors	11.4-2
11.4.3	SAMPLING	11.4-9
11.4.4	CALIBRATION AND MAINTENANCE	11.4-9
11.5	SOLID WASTE MANAGEMENT SYSTEM	11.5-1
11.5.1	Design Objectives	11.5-1
11.5.2	System Inputs	11.5-1
11.5.3	Systems Description	11.5-1
11.5.4	Equipment Operation	11.5-4
11.5.5	Storage Facilities	11.5-4
11.5.6	Shipment	11.5-5
11.6	Offsite Radiological Monitoring Program	11.6-1
11.6.1	Expected Background	11.6-2
11.6.2	Critical Pathways to Man	11.6-2
11.6.3	Sampling Media, Locations, and Frequency	11.6-4
11.6.4	Analytical Sensitivity	11.6-4
11.6.5	Data Analysis and Presentation	11.6-4
11.6.6	Program Statistical Sensitivity	11.6-4
11A	TRITIUM CONTROL	
11A.1	SYSTEM SOURCES	11A.1-1
11A.1.1	The Fission Source	11A.1-1

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
11A.1.2	Control Rod Source	11A.1-1
11A.1.3	Boric Acid Source	11A.1-1
11A.1.4	Burnable Shim Rod Source	11A.1-2
11A.2	Tritium Releases	11A.1-2
11A.3	Design Bases	11A.1-2
11A.4	Design Evaluation	11A.1-2
11A.5	Tritium Lead Test Assembly (This section to be provided at a later date)	11A.1-3
11A.6	Tritium Producing Burnable Absorber Rod (TPBAR) Source (Unit 1 Only)	11A.1-3
12.0	RADIATION PROTECTION	
12.1	Assuring that Occupational Radiation Exposures Are as Low as Reasonably Achievable (ALARA)	12.1-1
12.1.1	Policy Considerations	12.1-1
12.1.2	Design Considerations	12.1-1
12.1.3	ALARA Operational Considerations	12.1-1
12.2	RADIATION SOURCES	12.2-3
12.2.1	Contained Sources	12.2-3
12.2.2	Airborne Radioactive Material Sources	12.2-11
12.3	RADIATION PROTECTION DESIGN FEATURES	12.3-1
12.3.1	Facility Design Features	12.3-1
12.3.2	Shielding	12.3-3
12.3.3	Ventilation	12.3-15
12.3.4	Area Radiation and Airborne Radioactivity Monitoring Instrumentation	12.3-17
12.4	DOSE ASSESSMENT	12.4-1
12.5	RADIOLOGICAL CONTROL (RADCON) PROGRAM	12.5-1
12.5.1	Organization	12.5-1
12.5.2	Equipment, Instrumentation, and Facilities	12.5-2
12.5.3	Procedures	12.5-4
13.0	CONDUCT OF OPERATIONS	
13.1	ORGANIZATIONAL STRUCTURE OF APPLICANT	13.1-1
13.1.1	Corporate Organization	13.1-1
13.1.2	Nuclear Power	13.1-1
13.1.3	Qualification Requirements for Nuclear Facility Personnel	13.1-2

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
13.2	TRAINING PROGRAMS	13.2-1
13.2.1	Accredited Training Programs	13.2-1
13.2.2	General Employee and Fitness for Duty Training Programs	13.2-1
13.2.3	Other Training Programs	13.2-2
13.3	Emergency Planning	13.3-1
13.4	REVIEW AND AUDIT	13.4-1
13.4.1	Onsite Review	13.4-1
13.4.2	Independent Review and Audit	13.4-1
13.5	SITE PROCEDURES	13.5-1
13.5.1	SYSTEM OF SITE PROCEDURES	13.5-1
13.5.2	Operating and Maintenance Procedures	13.5-2
13.6	PLANT RECORDS	13.6-1
13.6.1	Plant History	13.6-1
13.6.2	Operating Records	13.6-1
13.6.3	Event Records	13.6-1
13.7	NUCLEAR SECURITY	13.7-1
13.7.1	Physical Security and Contingency Plan	13.7-1
13.7.2	Personnel and Program Evaluation	13.7-1
13.7.3	Physical Security of TPBARs	13.7-1
14.0	INITIAL TEST PROGRAM	
14.1	SPECIFIC INFORMATION TO BE INCLUDED IN PRELIMINARY SAFETY ANALYSIS REPORT	14.1-1
14.2	TEST PROGRAM	14.2-1
14.2.1	Summary of Test Program and Objectives	14.2-1
14.2.2	Organization and Staffing	14.2-3
14.2.3	Test Procedures	14.2-9
14.2.4	Conduct of Test Program	14.2-12
14.2.5	Review, Evaluation, and Approval of Test Results	14.2-14
14.2.6	Test Records	14.2-14
14.2.7	Conformance of Test Programs with Regulatory Guides	14.2-15
14.2.8	Utilization of Reactor Operating and Testing Experience in Development of Test Program	14.2-29
14.2.9	Trial Use of Plant Operating and Emergency Procedures	14.2-30
14.2.10	Initial Fuel Loading, Postloading Tests, Initial Criticality, Low Power Tests and Power Ascension	14.2-30
14.2.11	Test Program Schedule	14.2-34
14.2.12	Individual Test Descriptions	14.2-35

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
15.0	ACCIDENT ANALYSES	
15.1	CONDITION I - NORMAL OPERATION AND OPERATIONAL TRANSIENTS	15.1-1
15.1.1	Optimization of Control Systems	15.1-2
15.1.2	Initial Power Conditions Assumed In Accident Analyses	15.1-3
15.1.3	Trip Points And Time Delays To Trip Assumed In Accident Analyses	15.1-4
15.1.4	Instrumentation Drift And Calorimetric Errors - Power Range Neutron Flux	15.1-5
15.1.5	Rod Cluster Control Assembly Insertion Characteristic	15.1-5
15.1.6	Reactivity Coefficients	15.1-6
15.1.7	Fission Product Inventories	15.1-7
15.1.8	Residual Decay Heat	15.1-9
15.1.9	Computer Codes Utilized	15.1-11
15.2	CONDITION II - FAULTS OF MODERATE FREQUENCY	15.2-1
15.2.1	Uncontrolled Rod Cluster Control Assembly Bank Withdrawal from a Subcritical Condition	15.2-2
15.2.2	UNCONTROLLED ROD CLUSTER CONTROL ASSEMBLY BANK WITHDRAWAL AT POWER	15.2-5
15.2.3	ROD CLUSTER CONTROL ASSEMBLY MISALIGNMENT	15.2-9
15.2.4	UNCONTROLLED BORON DILUTION	15.2-13
15.2.5	PARTIAL LOSS OF FORCED REACTOR COOLANT FLOW	15.2-17
15.2.6	Startup of an Inactive Reactor Coolant Loop	15.2-19
15.2.7	LOSS OF EXTERNAL ELECTRICAL LOAD AND/OR TURBINE TRIP	15.2-21
15.2.8	LOSS OF NORMAL FEEDWATER	15.2-24
15.2.9	COINCIDENT LOSS OF ONSITE AND EXTERNAL (OFFSITE) AC POWER TO THE STATION - LOSS OF OFFSITE POWER TO THE STATION AUXILIARIES	15.2-28
15.2.10	EXCESSIVE HEAT REMOVAL DUE TO FEEDWATER SYSTEM MALFUNCTIONS	15.2-28
15.2.11	Excessive Load Increase Incident	15.2-31
15.2.12	ACCIDENTAL DEPRESSURIZATION OF THE REACTOR COOLANT SYSTEM	15.2-33
15.2.13	ACCIDENTAL DEPRESSURIZATION OF THE MAIN STEAM SYSTEM	15.2-34
15.2.14	Inadvertent Operation of Emergency Core Cooling System	15.2-38
15.3	CONDITION III - INFREQUENT FAULTS	15.3-1
15.3.1	Loss of Reactor Coolant From Small Ruptured Pipes or From Cracks in Large Pipes Which Actuate the Emergency Core Cooling System	15.3-1
15.3.2	Minor Secondary System Pipe Breaks	15.3-5
15.3.3	Inadvertent Loading of a Fuel Assembly Into an Improper Position	15.3-5
15.3.4	Complete Loss of Forced Reactor Coolant Flow	15.3-7
15.3.5	Waste Gas Decay Tank Rupture	15.3-9
15.3.6	Single Rod Cluster Control Assembly Withdrawal at Full Power	15.3-10

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
15.4	CONDITION IV - LIMITING FAULTS	15.4-1
15.4.1	Major Reactor Coolant System Pipe Ruptures (Loss of Coolant Accident)	15.4-1
15.4.2	Major Secondary System Pipe Rupture	15.4-12
15.4.3	Steam Generator Tube Rupture	15.4-23
15.4.4	Single Reactor Coolant Pump Locked Rotor	15.4-32
15.4.5	Fuel Handling Accident	15.4-35
15.4.6	Rupture of a Control Rod Drive Mechanism Housing (Rod Cluster Control Assembly Ejection)	15.4-35
15.5	ENVIRONMENTAL CONSEQUENCES OF ACCIDENTS	15.5-1
15.5.1	Environmental Consequences of a Postulated Loss of AC Power to the Plant Auxiliaries	15.5-1
15.5.2	Environmental Consequences of a Postulated Waste Gas Decay Tank Rupture	15.5-2
15.5.3	Environmental Consequences of a Postulated Loss of Coolant Accident	15.5-2
15.5.4	Environmental Consequences of a Postulated Steam Line Break	15.5-19
15.5.5	Environmental Consequences of a Postulated Steam Generator Tube Rupture	15.5-20
15.5.6	Environmental Consequences of a Postulated Fuel Handling Accident	15.5-21
15.5.7	Environmental Consequences of a Postulated Rod Ejection Accident	15.5-23
15A DOSE MODELS USED TO EVALUATE THE ENVIRONMENTAL CONSEQUENCES OF ACCIDENTS		
15A.1	INTRODUCTION	15A-1
15A.2	ASSUMPTIONS	15A-1
15A.3	GAMMA DOSE AND BETA DOSE	15A-1
15A.4	THYROID INHALATION DOSE	15A-2
16.0	TECHNICAL SPECIFICATIONS	
16.1	PROPOSED TECHNICAL SPECIFICATIONS (NOT USED)	16.1-1
16.2	PROPOSED FINAL TECHNICAL SPECIFICATIONS	16.2-1
16.3	RELOCATED SPECIFICATIONS	16.1-1
16.3.1	Discussion	16.1-1
16.3.2	Document Control	16.1-1
16.3.3	Changes to the Relocated Specifications	16.1-1
17.0	QUALITY ASSURANCE	17-1
17.1	Quality Assurance During Design and Construction	17-1

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
17.2	QUALITY ASSURANCE FOR STATION OPERATION	17.2-1
17.2.1	Identification of Safety-Related Features	17.2-1