

Nine Mile Point 3 Nuclear Power Plant

Combined License Application

Part 2: Final Safety Analysis Report

Revision 0
July 2008

© 008 UniStar Nuclear Services, LLC All rights reserved.
COPYRIGHT PROTECTED

Table of Contents

1.0 Introduction and General Description of the Plant	1-4
1.1 Introduction	1-4
1.1.1 Plant Location	1-5
1.1.2 Containment Type	1-7
1.1.3 Reactor Type.....	1-7
1.1.4 Power Output	1-7
1.1.5 Schedule	1-7
1.1.6 Format and Content	1-8
1.1.7 References.....	1-9
1.2 General Plant Description.....	1-21
1.2.1 Principal Design Criteria, Operating Characteristics, and Safety Considerations.....	1-21
1.2.2 Site Description.....	1-21
1.2.3 Plant Description	1-22
1.3 Comparisons with Similar Facility Designs.....	1-25
1.4 Identification of Agents and Contractors	1-25
1.4.1 Applicant – Program Manager.....	1-25
1.4.2 Other Contractors and Participants	1-26
1.5 Requirements for Further Technical Information.....	1-26
1.6 Material Referenced	1-26
1.7 Drawings and Other Detailed Information.....	1-29
1.7.1 Electrical and Instrumentation and Control Drawings	1-29
1.7.2 Piping and Instrumentation Diagrams	1-29
1.8 Interfaces with Standard Designs and Early Site Permits	1-32
1.8.1 COL Information Items	1-32
1.8.2 Departures	1-32
1.9 Conformance with Regulatory Criteria	1-49
1.9.1 Conformance with Regulatory Guides	1-49
1.9.2 Conformance with the Standard Review Plan	1-50
1.9.3 Generic Issues	1-50
1.9.4 Operational Experience (Generic Communications)	1-50
1.9.5 Advanced and Evolutionary Light-Water Reactor Design Issues	1-50
1.9.6 References.....	1-50
2.0 Site Characteristics	2-4
2.1 Geography and Demography.....	2-11
2.1.1 Site Location and Description	2-11
2.1.2 Exclusion Area Authority and Control.....	2-13
2.1.3 Population distribution	2-14
2.1.4 References.....	2-19
2.2 Nearby Industrial, Transportation And Military Facilities	2-63
2.2.1 Location and Routes	2-63
2.2.2 Descriptions	2-64
2.2.3 Evaluation of Potential Accidents.....	2-71
2.2.4 References.....	2-85

Table of Contents

2.3 Meteorology	2-114
2.3.1 Regional Climatology	2-114
2.3.2 Local Meteorology	2-127
2.3.3 On-site Meteorological Measurement Program	2-135
2.3.4 Short Term Atmospheric Dispersion Estimates for Accident Releases.....	2-141
2.3.5 Long-term Atmospheric Dispersion Estimates for Routine Releases	2-145
2.3.6 References.....	2-148
2.4 Hydrologic Engineering	2-925
2.4.1 Hydrologic Description.....	2-925
2.4.2 Floods.....	2-930
2.4.3 Probable Maximum Flood on Streams and Rivers	2-936
2.4.4 Potential Dam Failures	2-941
2.4.5 Probable Maximum Surge and Seiche Flooding	2-944
2.4.6 Probable Maximum Tsunami Flooding.....	2-952
2.4.7 Ice Effects.....	2-954
2.4.8 Cooling Water Canals and Reservoirs	2-961
2.4.9 Channel Diversions	2-962
2.4.10 Flooding Protection Requirements	2-966
2.4.11 Low Water Considerations	2-967
2.4.12 Ground Water	2-971
2.4.13 Pathways of Liquid Effluents in Ground and Surface Waters	2-991
2.4.14 Technical Specification and Emergency Operation Requirements.....	2-1004
2.5 Geology, Seismology, and Geotechnical Engineering.....	2-1133
2.5.1 Basic Geologic and Seismic Information	2-1134
2.5.2 Vibratory Ground Motion	2-1237
2.5.3 Surface Faulting	2-1266
2.5.4 Stability of Subsurface Materials and Foundations	2-1294
2.5.5 Stability of Slopes.....	2-1351
2.5.6 References.....	2-1358

3.0 Design of Structures, Components, Equipment and Systems.....	3-6
3.1 Compliance with Nuclear Regulatory Commission General Design Criteria	3-6
3.1.1 Overall Requirements	3-6
3.1.2 Protection by Multiple Fission Product Barriers.....	3-7
3.1.3 Protection and Reactivity Control Systems	3-7
3.1.4 Fluid Systems.....	3-7
3.1.5 Reactor Containment	3-7
3.1.6 Fuel and Reactivity Control.....	3-7
3.1.7 References.....	3-7
3.2 Classification of Structures, Systems, and Components	3-8
3.2.1 Seismic Classification	3-8
3.2.2 System Quality Group Classification	3-9
3.2.3 References.....	3-9
3.3 Wind and Tornado Loadings	3-19
3.3.1 Wind Loadings.....	3-19
3.3.2 Tornado Loadings.....	3-19
3.3.3 References.....	3-21
3.4 Water Level (Flood) Design	3-22
3.4.1 Internal Flood Protection.....	3-22
3.4.2 External Flood Protection	3-22

Table of Contents

3.4.3 Analysis of Flooding Events	3-22
3.4.4 Analysis Procedures.....	3-24
3.4.5 References.....	3-24
3.5 Missile Protection	3-25
3.5.1 Missile Selection and Description.....	3-25
3.5.2 Structures, Systems, and Components to Be Protected From Externally Generated Missiles	3-29
3.5.3 Barrier Design Procedures.....	3-29
3.5.4 References.....	3-30
3.6 Protection Against Dynamic Effects Associated with Postulated Rupture of Piping	3-31
3.6.1 Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside of Containment.....	3-31
3.6.2 Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping.....	3-31
3.6.3 Leak-Before-Break Evaluation Procedures.....	3-32
3.7 Seismic Design.....	3-33
3.7.1 Seismic Design Parameters.....	3-33
3.7.2 Seismic System Analysis.....	3-37
3.7.3 Seismic Subsystem Analysis	3-43
3.7.4 Seismic Instrumentation	3-46
3.8 Design of Category I Structures	3-93
3.8.1 Concrete Containment.....	3-93
3.8.2 Steel Containment.....	3-94
3.8.3 Concrete and Steel Internal Structures of Concrete Containment	3-94
3.8.4 Other Seismic Category I Structures	3-95
3.8.5 Foundations	3-102
3.8.6 References.....	3-107
3.9 Mechanical Systems and Components	3-112
3.9.1 Special Topics for Mechanical Components	3-112
3.9.2 Dynamic Testing and Analysis of Systems, Components, and Equipment.....	3-112
3.9.3 ASME Code Class 1, 2, and 3 Components, Component Supports, and Core Support Structures	3-114
3.9.4 Control Rod Drive System	3-117
3.9.5 Reactor Pressure Vessel Internals	3-117
3.9.6 Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints.....	3-117
3.10 Seismic And Dynamic Qualification Of Mechanical And Electrical Equipment.....	3-127
3.10.1 Seismic Qualification Criteria.....	3-128
3.10.2 Methods and Procedures for Qualifying Mechanical, Electrical and I&C Equipment..	3-129
3.10.3 Methods and Procedures for Qualifying Supports of Mechanical and Electrical Equipment and Instrumentation	3-129
3.10.4 Test and Analysis Results and Experience Database	3-129
3.10.5 References	3-130
3.11 Environmental Qualification Of Mechanical And Electrical Equipment	3-139
3.11.1 Equipment Identification and Environmental Conditions.....	3-139
3.11.2 Qualification Tests and Analysis	3-140
3.11.3 Qualification Test Results.....	3-140
3.11.4 Loss of Ventilation	3-140
3.11.5 Estimated Chemical and Radiation Environment.....	3-140
3.11.6 Qualification of Mechanical Equipment.....	3-140

Table of Contents

<p>3.11.7 References 3-141</p> <p>3.12 ASME Code Class 1, 2, And 3 Piping Systems, Piping Components, And Their Associated Supports 3-148</p> <p> 3.12.1 Introduction..... 3-148</p> <p> 3.12.2 Codes and Standards 3-148</p> <p> 3.12.3 Piping Analysis Methods 3-148</p> <p> 3.12.4 Piping Modeling Techniques 3-148</p> <p> 3.12.5 Piping Stress Analysis Criteria 3-149</p> <p> 3.12.6 Piping Support Design Criteria 3-150</p> <p> 3.12.7 References 3-150</p> <p>3.13 Threaded Fasteners (ASME Code Class 1, 2, and 3) 3-151</p> <p> 3.13.1 Design Considerations..... 3-151</p> <p> 3.13.2 Inservice Inspection Requirements 3-151</p> <p>3A Criteria for Distribution System Analysis and Support 3-151</p> <p>3B Dimensional Arrangement Drawings 3-151</p> <p>3C Reactor Coolant System Structural Analysis Methods..... 3-151</p> <p>3D Methodology for Qualifying Safety-Related Electrical and Mechanical Equipment 3-151</p> <p>3E Critical Sections for Safety-Related Category I Structures 3-152</p> <p> 3E.1 Nuclear Island Structures 3-152</p> <p> 3E.2 Emergency Power Generating Buildings 3-152</p> <p> 3E.3 Essential Service Water Buildings..... 3-152</p> <p> 3E.4 {UHS Makeup Water Intake, UHS Tunnel, and UHS Encasement Structures 3-152</p> <p>4.0 Reactor 4-2</p> <p>4.1 Summary Description 4-2</p> <p>4.2 Fuel System Design..... 4-2</p> <p>4.3 Nuclear Design..... 4-2</p> <p>4.4 Thermal-Hydraulic Design 4-2</p> <p>4.5 Reactor Materials..... 4-2</p> <p>4.6 Functional Design of Reactivity Control Systems..... 4-2</p> <p>5.0 Reactor Coolant System and Connected Systems 5-2</p> <p>5.1 Summary Description 5-2</p> <p>5.2 Integrity of the Reactor Coolant Pressure Boundary..... 5-2</p> <p> 5.2.1 Compliance with Codes and Code Cases..... 5-2</p> <p> 5.2.2 Overpressure Protection 5-2</p> <p> 5.2.3 Reactor Coolant Pressure Boundary Materials..... 5-2</p> <p> 5.2.4 Inservice Inspection and Testing of the RCPB 5-3</p> <p> 5.2.5 RCPB Leakage Detection 5-4</p> <p> 5.2.6 References..... 5-4</p> <p>5.3 Reactor Vessel..... 5-4</p> <p> 5.3.1 Reactor Vessel Materials..... 5-4</p>	<p style="writing-mode: vertical-rl; transform: rotate(180deg);">FSAR Table of Contents</p>
---	--

Table of Contents

5.3.2 Pressure-Temperature Limits, Pressurized Thermal Shock, and Charpy Upper-Shelf Energy Data and Analyses.....	5-5
5.3.3 Reactor Vessel Integrity	5-5
5.3.4 References.....	5-5
5.4 Component and Subsystem Design.....	5-6
5.4.1 Reactor Coolant Pumps	5-6
5.4.2 Steam Generators (PWR)	5-6
5.4.3 Reactor Coolant Piping.....	5-7
5.4.4 Not Used in U.S. EPR Design	5-8
5.4.5 Not Used in U.S. EPR Design	5-8
5.4.6 Not Used in U.S. EPR Design	5-8
5.4.7 Residual Heat Removal System	5-8
5.4.8 Not Used in U.S. EPR Design	5-8
5.4.9 Not Used in U.S. EPR Design	5-8
5.4.10 Pressurizer	5-8
5.4.11 Pressurizer Relief Tank	5-8
5.4.12 Reactor Coolant System High Point Vents.....	5-8
5.4.13 Safety and Relief Valves	5-8
5.4.14 Component Supports.....	5-8
5.4.15 References	5-8
6.0 Engineered Safety Features	6-3
6.1 Engineered Safety Features Materials	6-3
6.1.1 Metallic Materials	6-3
6.1.2 Organic Materials	6-3
6.1.3 References.....	6-5
6.2 Containment Systems	6-5
6.2.1 Containment Functional Design.....	6-5
6.2.2 Containment Heat Removal Systems	6-5
6.2.3 Secondary Containment Functional Design.....	6-5
6.2.4 Containment Isolation System.....	6-5
6.2.5 Combustible Gas Control in Containment.....	6-5
6.2.6 Containment Leakage Testing	6-5
6.2.7 Fracture Prevention of Containment Pressure Vessel	6-5
6.2.8 References.....	6-5
6.3 Emergency Core Cooling System.....	6-6
6.3.1 Design Bases	6-6
6.3.2 System Design.....	6-6
6.3.3 Performance Evaluation.....	6-7
6.3.4 Tests and Inspections	6-7
6.3.5 Instrumentation Requirements.....	6-7
6.3.6 References.....	6-7
6.4 Habitability Systems.....	6-8
6.4.1 Design Basis	6-8
6.4.2 System Design.....	6-8
6.4.3 System Operational Procedures	6-10
6.4.4 Design Evaluations.....	6-10
6.4.5 Testing and Inspection	6-11
6.4.6 Instrumentation Requirements.....	6-11
6.4.7 References.....	6-11

Table of Contents

6.5 Fission Product Removal and Control Systems.....	6-12
6.6 Inservice Inspection of Class 2 and 3 Components.....	6-12
6.6.1 Components Subject to Examination	6-12
6.6.2 Accessibility	6-12
6.6.3 Examination Techniques and Procedures	6-12
6.6.4 Inspection Intervals	6-13
6.6.5 Examination Categories and Requirements	6-13
6.6.6 Evaluation of Examination Results	6-13
6.6.7 System Pressure Tests	6-13
6.6.8 Augmented ISI to Protect Against Postulated Piping Failures	6-13
6.6.9 References.....	6-13
6.7 Main Steamline Isolation Valve Leakage Control System (BWRS).....	6-15
6.8 Extra Borating System	6-15
 7.0 Instrumentation and Controls	7-2
7.1 Introduction	7-2
7.2 Reactor Trip System	7-2
7.3 Engineered Safety Features Systems	7-2
7.4 Systems Required for Safe Shutdown	7-2
7.5 Information Systems Important to Safety.....	7-2
7.6 Interlock Systems Important to Safety.....	7-2
7.7 Control Systems Not Required For Safety.....	7-2
7.8 Diverse I&C Systems	7-2
7.9 Data Communication Systems	7-2
 8.0 Electric Power	8-4
8.1 Introduction	8-4
8.1.1 Off-site Power Description	8-4
8.1.2 On-site Power System Description.....	8-4
8.1.3 Safety-Related Loads.....	8-4
8.1.4 Design Bases	8-5
8.1.5 References.....	8-6
8.2 Off-site Power System	8-12
8.2.1 Description	8-12
8.2.2 Analysis	8-16
8.2.3 References.....	8-24
8.3 On-site Power System	8-29
8.3.1 Alternating Current Power Systems.....	8-29
8.3.2 DC Power Systems	8-32
8.3.3 References.....	8-32
8.4 Station Blackout.....	8-43
8.4.1 Description	8-43
8.4.2 Analysis	8-44

Table of Contents

8.4.3 References.....	8-45
9.0 Auxiliary Systems	9-4
9.1 Fuel Storage and Handling	9-4
9.1.1 Criticality Safety of New and Spent Fuel Storage and Handling	9-4
9.1.2 New and Spent Fuel Storage	9-4
9.1.3 Spent Fuel Pool Cooling and Purification System	9-5
9.1.4 Fuel Handling System	9-5
9.1.5 Overhead Heavy Load Handling System	9-5
9.2 Water Systems	9-8
9.2.1 Essential Service Water System	9-8
9.2.2 Component Cooling Water System	9-9
9.2.3 Demineralized Water Distribution System.....	9-9
9.2.4 Potable and Sanitary Water Systems (PSWS)	9-9
9.2.5 Ultimate Heat Sink	9-13
9.2.6 Condensate Storage Facilities	9-20
9.2.7 Seal Water Supply System	9-20
9.2.8 Safety Chilled Water System.....	9-20
9.2.9 Raw Water Supply System.....	9-20
9.3 Process Auxiliaries.....	9-31
9.4 Air Conditioning, Heating, Cooling and Ventilation Systems.....	9-31
9.4.1 Main Control Room Air Conditioning System.....	9-31
9.4.2 Fuel Building Ventilation System	9-33
9.4.3 Nuclear Auxiliary Building Ventilation System.....	9-33
9.4.4 Turbine Building Ventilation System	9-33
9.4.5 Safeguard Building Controlled-Area Ventilation System	9-33
9.4.6 Electrical Division of Safeguard Building Ventilation System (SBVSE)	9-33
9.4.7 Containment Building Ventilation System.....	9-33
9.4.8 Radioactive Waste Building Ventilation System.....	9-33
9.4.9 Emergency Power Generating Building Ventilation System	9-33
9.4.10 Switchgear Building Ventilation System	9-33
9.4.11 Essential Service Water Pump Building Ventilation System	9-33
9.4.12 Main Steam and Feedwater Valve Room Ventilation System	9-33
9.4.13 Smoke Confinement System	9-33
9.4.14 Access Building Ventilation System.....	9-33
9.4.15 {UHS Makeup Water Intake Structure Ventilation System.....	9-33
9.5 Other Auxiliary Systems	9-39
9.5.1 Fire Protection System	9-39
9.5.2 Communication System.....	9-53
9.5.3 Lighting System	9-53
9.5.4 Diesel Generator Fuel Oil Storage and Transfer System	9-53
9.5.5 Diesel Generator Cooling Water System.....	9-54
9.5.6 Diesel Generator Starting Air System	9-54
9.5.7 Diesel Generator Lubricating System	9-54
9.5.8 Diesel Generator Air Intake and Exhaust System.....	9-54
9.6 Fire Protection Analysis.....	9-56
9B Fire Protection Analysis - Plant Specific Supplement.....	9B-4

Table of Contents

9B.1 Introduction	9B-4
9B.1.1 Regulatory Bases	9B-4
9B.1.2 Defense-In-Depth	9B-5
9B.1.3 Scope	9B-5
9B.2 Fire Protection Analysis Methodology.....	9B-6
9B.2.1 General Design Criteria	9B-6
9B.2.2 Specific Elements.....	9B-7
9B.2.3 Assumptions	9B-10
9B.3 Fire Area-by-Fire Area Evaluation	9B-14
9B.3.1 Turbine Building.....	9B-14
9B.3.2 Switchgear Building	9B-17
9B.3.3 Auxiliary Power Transformer Area	9B-18
9B.3.4 Generator Transformer Area.....	9B-20
9B.3.5 {Warehouse Building	9B-21
9B.3.6 Security Access Facility.....	9B-21
9B.3.7 Central Gas Supply Building.....	9B-21
9B.3.8 {Grid Systems Control Building}	9B-22
9B.3.9 Fire Protection Building.....	9B-22
9B.3.10 {Circulating Water System Cooling Tower Structure	9B-23
9B.3.11 {Circulating Water System Pump Building	9B-23
9B.3.12 {Makeup Water Intake Structure - UHS Makeup pump area.....	9B-24
9B.3.13 {Circulating Water System Makeup Intake Structure - circulating water makeup pump area	9B-24
9B.4 References.....	9B-25

10.0 Steam and Power Conversion System 10-4

10.1 Summary Description	10-4
10.2 Turbine-Generator	10-4
10.2.1 Design Bases	10-4
10.2.2 General Description	10-4
10.2.3 Turbine Rotor Integrity.....	10-4
10.2.4 Safety Evaluation	10-5
10.2.5 References	10-5
10.3 Main Steam Supply System.....	10-5
10.3.1 Design Bases	10-5
10.3.2 System Description	10-5
10.3.3 Safety Evaluation	10-5
10.3.4 Inspection and Testing Requirements	10-5
10.3.5 Secondary Side Water Chemistry Program.....	10-6
10.3.6 Steam and Feedwater System Materials	10-6
10.3.7 References	10-7
10.4 Other Features Of Steam And Power Conversion System.....	10-7
10.4.1 Main Condensers	10-7
10.4.2 Main Condenser Evacuation System.....	10-8
10.4.3 Turbine Gland Sealing System.....	10-8
10.4.4 Turbine Bypass System.....	10-8
10.4.5 Circulating Water System	10-8
10.4.6 Condensate Polishing System	10-16
10.4.7 Condensate and Feedwater System	10-16

Table of Contents

10.4.8 Steam Generator Blowdown System (PWR)	10-16
10.4.9 Emergency Feedwater System	10-16
11.0 Radioactive Waste Management	11-2
11.1 Source Terms	11-2
11.2 Liquid Waste Management System	11-2
11.3 Gaseous Waste Management Systems	11-2
11.4 Solid Waste Management Systems.....	11-2
11.4.1 Design Basis.....	11-2
11.4.2 System Description	11-2
11.4.3 Radioactive Effluent Releases	11-2
11.4.4 Solid Waste Management System Cost-Benefit Analysis.....	11-2
11.4.5 Failure Tolerance.....	11-3
11.4.6 References	11-3
11.5 Process and Effluent Radiological Monitoring and Sampling Systems	11-3
11.5.1 Design Basis.....	11-3
11.5.2 System Description	11-3
11.5.3 Effluent Monitoring and Sampling	11-3
11.5.4 Process Monitoring and Sampling.....	11-3
11.5.5 References	11-3
12.0 Radiation Protection	12-4
12.1 Ensuring that Occupational Radiation Exposures are As Low As is Reasonably Achievable (ALARA)	12-4
12.1.1 Policy Considerations.....	12-4
12.1.2 Design Considerations.....	12-4
12.1.3 Operational Considerations	12-4
12.1.4 References	12-4
12.2 Radiation Sources.....	12-4
12.2.1 Contained Sources.....	12-4
12.2.2 Airborne Radioactive Material Sources	12-6
12.2.3 References	12-6
12.3 Radiation Protection Design Features.....	12-6
12.3.1 Facility Design Features	12-6
12.3.2 Shielding	12-6
12.3.3 Ventilation	12-6
12.3.4 Area Radiation and Airborne Radioactivity Monitoring Instrumentation	12-6
12.3.5 Dose Assessment.....	12-10
12.3.6 Minimization of Contamination	12-17
12.3.7 References	12-17
12.4 Dose Assessment	12-71
12.5 Operational Radiation Protection Program.....	12-71
12.5.1 References	12-71
13.0 Conduct of Operations.....	13-3

Table of Contents

13.1	Organizational Structure of Applicant.....	13-3
	13.1.1 Management and Technical Support Organization.....	13-3
	13.1.2 Operating Organization.....	13-11
	13.1.3 Qualifications of Nuclear Plant Personnel	13-19
	13.1.4 References	13-20
13.2	Training.....	13-25
	13.2.1 Insert to Section 1 of NEI 06-13A	13-25
	13.2.2 Insert to Section 1.1 of NEI 06-13A.....	13-25
	13.2.3 Insert to Section 1.6 of NEI 06-13A.....	13-28
	13.2.4 References	13-28
13.3	Emergency Planning	13-28
13.4	Operational Program Implementation	13-29
	13.4.1 References	13-29
13.5	Plant Procedures	13-34
	13.5.1 Administrative Procedures	13-34
	13.5.2 Operating and Maintenance Procedures.....	13-37
	13.5.3 References	13-41
13.6	Security.....	13-41
	13.6.1 References	13-42
13.7	Fitness For Duty.....	13-42
	13.7.1 References	13-43
13.8	References.....	13-43

14.0 Verification Programs **14-3**

14.1	Specific Information to be Addressed for the Initial Plant Test Program.....	14-3
14.2	Initial Plant Test Program	14-3
	14.2.1 Summary of Test Program and Objectives	14-3
	14.2.2 Organization and Staffing.....	14-3
	14.2.3 Test Procedures.....	14-7
	14.2.4 Conduct of Test Program.....	14-8
	14.2.5 Review, Evaluation, and Approval of Test Results.....	14-9
	14.2.6 Test Records.....	14-11
	14.2.7 Conformance of Test Programs with Regulatory Guides	14-11
	14.2.8 Utilization of Reactor Operating and Testing Experience in Development of Initial Test Program.....	14-11
	14.2.9 Trial Use of Plant Operating and Emergency Procedures.....	14-11
	14.2.10 Initial Fuel Loading and Initial Criticality.....	14-12
	14.2.11 Test Program Schedule	14-12
	14.2.12 Individual Test Descriptions.....	14-12
	14.2.13 References	14-13
	14.2.14 COL Applicant Site-Specific Tests.....	14-13
14.3	Inspection, Test, Analysis, and Acceptance Criteria.....	14-22
	14.3.1 Tier 1, Chapter 1, Introduction.....	14-22
	14.3.2 Tier 1, Chapter 2, System Based Design Descriptions and ITAAC	14-22
	14.3.3 Tier 1, Chapter 3, Non-System Based Design Descriptions and ITAAC	14-23
	14.3.4 Tier 1, Chapter 4, Interface Requirements	14-23
	14.3.5 Tier 1, Chapter 5, Site Parameters.....	14-23
	14.3.6 References	14-23

Table of Contents

15.0 Transient and Accident Analysis	15-2
15.0.1 Radiological Consequence Analysis	15-2
15.0.2 Computer Codes Used in Analysis	15-2
15.0.3 Radiological Consequences of Design Basis Accidents	15-2
15.0.4 Post Chapter 15 Events Cooldown.....	15-2
15.0.5 Compliance with Section C.I.15, "Transient and Accident Analyses," of Regulatory Guide 1.206	15-2
15.0.6 References	15-2
15.1 Increase in Heat Removal by the Secondary System	15-2
15.2 Decrease in Heat Removal by the Secondary System	15-2
15.3 Decrease in Reactor Coolant System Flow Rate.....	15-2
15.4 Reactivity and Power Distribution Anomalies	15-2
15.5 Increase in Reactor Coolant Inventory.....	15-2
15.6 Decrease in Reactor Coolant Inventory Events.....	15-3
15.7 Radioactive Release from a Subsystem or Component.....	15-3
15.8 Anticipated Transients Without Scram	15-3
15.9 Boiling Water Reactor Stability.....	15-3
15.10 Spent Fuel Pool Criticality and Boron Dilution Analysis.....	15-3
15.10.1 References	15-3
16.0 Technical Specifications	16-2
17.0 Quality Assurance and Reliability Assurance	17-3
17.1 Quality Assurance During Design	17-3
17.2 Quality Assurance During the Operations Phase.....	17-3
17.3 Quality Assurance Program Description.....	17-3
17.4 Reliability Assurance Program	17-3
17.4.1 Reliability Assurance Program Scope, Stages, and Goals.....	17-3
17.4.2 Reliability Assurance Program Implementation	17-3
17.4.3 Organization, Design Control, Procedures and Instructions, Corrective Actions, and Audit Plans	17-4
17.4.4 Reliability Assurance Program Information Needed in a COL Application	17-4
17.4.5 References	17-14
17.5 Quality Assurance Program Guidance.....	17-40
17.5.1 QA Program Responsibilities	17-40
17.5.2 SRP Section 17.5 and the QA Program Description	17-40
17.5.3 Evaluation of the QAPD Against the SRP and QAPD Submittal Guidance	17-40
17.5.4 References	17-40
17.6 Description of Applicant's Program for Implementation of 10 CFR 50.65, the Maintenance Rule	17-41
17.6.1 Scoping Per 10 CFR 50.65(b)	17-41
17.6.2 Monitoring Per 10 CFR 50.65(a).....	17-42
17.6.3 Periodic Evaluation Per 10 CFR 50.65(a)(3)	17-42

Table of Contents

17.6.4 Risk Assessment and Management Per 10 CFR 50.65(a)(4)	17-42
17.6.5 Maintenance Rule Training and Qualification	17-43
17.6.6 Maintenance Rule Program Role in Implementation of Reliability Assurance Program (RAP) in the Operations Phase.....	17-43
17.6.7 Maintenance Rule Program Implementation.....	17-43
17.6.8 References	17-43
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
19.0 Probabilistic Risk Assessment And Severe Accident Evaluation	19-3
19.1 Probabilistic Risk Assessment.....	19-3
19.1.1 Uses and Application of the PRA	19-3
19.1.2 Quality of PRA	19-5
19.1.3 Special Design/Operational Features	19-7
19.1.4 Safety Insights from the Internal Events PRA for Operations at Power.....	19-7
19.1.5 Safety Insights from the External Events PRA for Operations at Power.....	19-10
19.1.6 Safety Insights from the PRA for Other Modes of Operation	19-19
19.1.7 PRA-Related Input to Other Programs and Processes.....	19-19
19.1.8 Conclusions and Findings.....	19-20
19.1.9 References	19-21
19.2 Severe Accident Evaluations.....	19-24
19.3 Open, Confirmatory, and COL Action Items Identified as Unresolved	19-24