

**Chapter 5
Table of Contents**

List of Tables 5.0-v

List of Figures 5.0-vii

5.0 Reactor Coolant System and Connected Systems 5.1-1

5.1 Summary Description 5.1-1

 5.1.1 Schematic Flow Diagrams 5.1-3

 5.1.2 Piping and Instrumentation Diagrams (P&IDs) 5.1-3

 5.1.3 Elevation Drawings 5.1-3

5.2 Integrity of Reactor Coolant Pressure Boundary (RCBP) 5.2-1

 5.2.1 Compliance with Codes and Code Cases 5.2-1

 5.2.1.1 Compliance with 10CFR50, Section 50.55a 5.2-1

 5.2.1.2 Applicable Code Cases 5.2-1

 5.2.2 Overpressure Protection 5.2-1

 5.2.2.1 Design Basis 5.2-1

 5.2.2.2 Design Evaluation 5.2-3

 5.2.2.3 Piping and Instrument Diagrams (P&IDs) 5.2-5

 5.2.2.4 Equipment and Component Description 5.2-6

 5.2.2.5 Mounting of Safety/Relief Valves 5.2-9

 5.2.2.6 Applicable Codes and Classification 5.2-9

 5.2.2.7 Material Specifications 5.2-9

 5.2.2.8 Process Instrumentation 5.2-9

 5.2.2.9 System Reliability 5.2-9

 5.2.2.10 Inspection and Testing 5.2-10

 5.2.3 Reactor Coolant Pressure Boundary Materials 5.2-10

 5.2.3.1 Material Specifications 5.2-10

 5.2.3.2 Compatibility with Reactor Coolant 5.2-11

 5.2.3.3 Fabrication and Processing of Ferritic Materials 5.2-19

 5.2.3.4 Fabrication and Processing of Austenitic Stainless Steels 5.2-22

 5.2.4 Preservice and Inservice Inspection and Testing of Reactor Coolant Pressure Boundary 5.2-23

 5.2.4.1 Class 1 System Boundary 5.2-24

 5.2.4.2 Accessibility 5.2-26

 5.2.4.3 Examination Categories and Methods 5.2-28

 5.2.4.4 Inspection Intervals 5.2-31

 5.2.4.5 Evaluation of Examination Results 5.2-31

 5.2.4.6 System Leakage and Hydrostatic Pressure Tests 5.2-31

 5.2.4.7 Code Exemptions 5.2-32

 5.2.5 Reactor Coolant Pressure Boundary and Core Cooling Systems Leakage Detection 5.2-32

 5.2.5.1 Leakage Detection Methods 5.2-32

 5.2.5.2 Leak Detection Instrumentation and Monitoring 5.2-36

 5.2.5.3 Indication in the Control Room 5.2-42

 5.2.5.4 Limits for Reactor Coolant Leakage 5.2-43

 5.2.5.5 Unidentified Leakage Inside the Drywell 5.2-43

 5.2.5.6 Differentiation Between Identified and Unidentified Leaks 5.2-44

 5.2.5.7 Sensitivity and Operability Tests 5.2-44

Table of Contents (Continued)

	5.2.5.8	Testing and Calibration	5.2-45
	5.2.5.9	Regulatory Guide 1.45: Compliance	5.2-45
5.2.6	References		5.2-46
5.3	Reactor Vessel		5.3-1
5.3.1	Reactor Vessel Materials		5.3-1
	5.3.1.1	Materials Specifications	5.3-1
	5.3.1.2	Special Procedures Used for Manufacturing and Fabrication	5.3-1
	5.3.1.3	Special Methods for Nondestructive Examination	5.3-2
	5.3.1.4	Special Controls for Ferritic and Austenitic Stainless Steels	5.3-2
	5.3.1.5	Fracture Toughness	5.3-4
	5.3.1.6	Material Surveillance	5.3-6
	5.3.1.7	Reactor Vessel Fasteners	5.3-8
	5.3.1.8	Regulatory Guide 1.65	5.3-8
5.3.2	Pressure/Temperature Limits		5.3-9
	5.3.2.1	Limit Curves	5.3-9
	5.3.2.2	Operating Procedures	5.3-11
5.3.3	Reactor Vessel Integrity		5.3-11
	5.3.3.1	Design	5.3-13
	5.3.3.2	Materials of Construction	5.3-17
	5.3.3.3	Fabrication Methods	5.3-17
	5.3.3.4	Inspection Requirements	5.3-17
	5.3.3.5	Shipment and Installation	5.3-18
	5.3.3.6	Operating Conditions	5.3-18
	5.3.3.7	Inservice Surveillance	5.3-19
5.3.4	References		5.3-19
5.4	Component and Subsystem Design		5.4-1
5.4.1	Reactor Recirculation System (RCIR)		5.4-1
	5.4.1.1	Safety Design Bases	5.4-1
	5.4.1.2	Power Generation Design Bases	5.4-1
	5.4.1.3	Description	5.4-1
	5.4.1.4	Operation	5.4-5
	5.4.1.5	Safety Evaluation	5.4-6
	5.4.1.6	Inspection and Testing	5.4-8
5.4.2	Steam Generators (PWR)		5.4-8
5.4.3	Reactor Coolant Piping		5.4-8
5.4.4	Main Steamline Flow Restrictors		5.4-9
	5.4.4.1	Safety Design Bases	5.4-9
	5.4.4.2	Power Generation Design Basis	5.4-9
	5.4.4.3	Description	5.4-9
	5.4.4.4	Safety Evaluation	5.4-10
	5.4.4.5	Inspection and Testing	5.4-10
5.4.5	Main Steamline Isolation System		5.4-11
	5.4.5.1	Safety Design Bases	5.4-11
	5.4.5.2	Description	5.4-11
	5.4.5.3	Safety Evaluation	5.4-13
	5.4.5.4	Inspection and Testing	5.4-15

Table of Contents (Continued)

5.4.6	Reactor Core Isolation Cooling System (RCIC)	5.4-16
5.4.6.1	Design Basis	5.4-17
5.4.6.2	System Design	5.4-21
5.4.6.3	Performance Evaluation	5.4-27
5.4.6.4	Preoperational Testing	5.4-27
5.4.7	Residual Heat Removal System (RHR)	5.4-27
5.4.7.1	Design Basis	5.4-27
5.4.7.2	Systems Design	5.4-36
5.4.7.3	Performance Evaluation	5.4-43
5.4.7.4	Pre-operational Testing	5.4-45
5.4.8	Reactor Water Cleanup System (RWCU)	5.4-45
5.4.8.1	Design Basis	5.4-45
5.4.8.2	System Description	5.4-46
5.4.8.3	System Evaluation	5.4-48
5.4.9	Main Steamlines and Feedwater Piping	5.4-50
5.4.9.1	Safety Design Bases	5.4-50
5.4.9.2	Power Generation Design Bases	5.4-50
5.4.9.3	Description	5.4-50
5.4.9.4	Safety Evaluation	5.4-51
5.4.9.5	Inspection and Testing	5.4-52
5.4.10	Pressurizer	5.4-52
5.4.11	Pressurizer Relief Discharge System	5.4-52
5.4.12	Valves	5.4-52
5.4.12.1	Safety Design Bases	5.4-52
5.4.12.2	Description	5.4-52
5.4.12.3	Safety Evaluation	5.4-53
5.4.12.4	Inspection and Testing	5.4-53
5.4.13	Safety/Relief Valves	5.4-53
5.4.13.1	Safety Design Bases	5.4-54
5.4.13.2	Description	5.4-54
5.4.13.3	Safety Evaluation	5.4-54
5.4.14	Component Supports	5.4-54
5.4.14.1	Safety Design Bases	5.4-54
5.4.14.2	Description	5.4-54
5.4.14.3	Safety Evaluation	5.4-54
5.4.14.4	Inspection and Testing	5.4-55
5.4.15	References	5.4-55
5A	Method Of Compliance For Regulatory Guide 1.150	5A-1
5B	RHR Injection Flow And Heat Capacity Analysis Outlines	5B-1