

SECTIONS

1.1	INTRODUCTION	1.1-1
	1.1.1 GENERAL.....	1.1-1
	1.1.2 LICENSING HISTORY.....	1.1-1
1.2	GENERAL PLANT DESCRIPTION.....	1.2-1
	1.2.1 PLANT SITE	1.2-1
	1.2.2 PLANT ARRANGEMENT	1.2-1
	1.2.3 CONTAINMENT.....	1.2-2
	1.2.4 NUCLEAR STEAM SUPPLY SYSTEM (NSSS)	1.2-3
	1.2.5 TURBINE GENERATOR	1.2-10
1.3	IDENTIFICATION OF CONTRACTORS	1.3-1
1.4	PRINCIPAL DESIGN CRITERIA.....	1.4-1
	1.4.1 STATION DESIGN.....	1.4-1
	1.4.2 REACTOR	1.4-1
	1.4.3 PRIMARY COOLANT AND AUXILIARY SYSTEMS	1.4-2
	1.4.4 CONTAINMENT SYSTEM.....	1.4-3
	1.4.5 ENGINEERED SAFEGUARDS.....	1.4-3
	1.4.6 INSTRUMENTATION AND CONTROL	1.4-4
	1.4.7 ELECTRICAL SYSTEMS	1.4-4
	1.4.8 RADIOACTIVE WASTES AND RADIATION PROTECTION.....	1.4-4
	1.4.9 FUEL HANDLING AND STORAGE.....	1.4-4
	1.4.10 FIRE PROTECTION	1.4-4
	1.4.11 CIRCULATING WATER SYSTEM.....	1.4-5
	1.4.12 SECURITY	1.4-5
	1.4.13 EMERGENCY PLANNING.....	1.4-5
	1.4.14 PLANT OPERATION	1.4-5
	1.4.15 STRUCTURES	1.4-6
	1.4.16 SINGLE FAILURE CRITERIA.....	1.4-6
	1.4.16.1 Licensing Basis.....	1.4-6
	1.4.16.2 Active And Passive Failures	1.4-7

	1.4.16.3	Current Design Considerations	1.4-8
1.5		MAJOR PLANT MODIFICATIONS (DESIGN/CONSTRUCTION)	1.5-1
1.6		INSERVICE INSPECTION.....	1.6-1
	1.6.1	HISTORICAL BACKGROUND	1.6-1
	1.6.2	GENERAL.....	1.6-1
1.7		RESEARCH AND DEVELOPMENT REQUIREMENTS	1.7-1
	1.7.1	FLOW MIXING AND FLOW DISTRIBUTION	1.7-1
	1.7.2	CONTROL ROD TESTS.....	1.7-1
	1.7.3	CONTROL ROD DRIVE MECHANISMS	1.7-1
	1.7.4	FUEL BUNDLE DESIGN	1.7-2
	1.7.5	REACTOR VESSEL FLOW TESTS	1.7-2
1.8		SPECIAL MAJOR PROGRAMS	1.8-1
	1.8.1	SYSTEMATIC EVALUATION PROGRAM	1.8-1
	1.8.1.1	Description of Program	1.8-1
	1.8.1.2	SEP Reviews Confirmed Safety of Palisades Design.....	1.8-3
	1.8.1.3	Continuing Applicability and Interpretation of SEP Information	1.8-4
	1.8.2	TMI ACTION ITEMS (NUREG-0737).....	1.8-5
	1.8.3	PIPE SUPPORT BASEPLATE DESIGNS USING CONCRETE EXPANSION ANCHOR BOLTS (IE BULLETIN 79-02)	1.8-5
	1.8.4	SEISMIC ANALYSIS FOR AS-BUILT SAFETY-RELATED PIPING SYSTEMS (IE BULLETIN 79-14).....	1.8-6
	1.8.5	UNRESOLVED SAFETY ISSUES (NUREG-0410).....	1.8-7
	1.8.6	ENVIRONMENTAL QUALIFICATION OF "SAFETY-RELATED" ELECTRICAL EQUIPMENT (EEQ) (NUREG-0588) (USI A-24)	1.8-8
	1.8.7	CONTROL ROOM HABITABILITY (NUREG-0696).....	1.8-8
	1.8.8	EFFECTS OF PIPE RUPTURE (SEP TOPICS III.5.A AND B)	1.8-8
	1.8.9	STATION BLACKOUT (10 CFR 50.63) (USI A-44)	1.8-9
	1.8.10	SAFE SHUTDOWN	1.8-9

1.8.11	HEAVY LOADS	1.8-10
1.9	RENEWED FACILITY OPERATING LICENSE.....	1.9-1
1.9.1	SUMMARY DESCRIPTIONS OF AGING MANAGEMENT PROGRAMS	1.9-1
1.9.1.1	Nickel Alloy Program	1.9-2
1.9.1.2	ASME Section XI, Subsections IWB, IWC, IWD, IWF Inservice Inspection Program	1.9-3
1.9.1.3	Bolting Integrity Program	1.9-3
1.9.1.4	Boric Acid Corrosion Program.....	1.9-3
1.9.1.5	Buried Services Corrosion Monitoring Program ..	1.9-4
1.9.1.6	Closed Cycle Cooling Water Program	1.9-4
1.9.1.7	Containment Inservice Inspection Program.....	1.9-4
1.9.1.8	Containment Leakage Testing Program.....	1.9-5
1.9.1.9	Diesel Fuel Monitoring and Storage Program.....	1.9-5
1.9.1.10	Fire Protection Program	1.9-6
1.9.1.11	Flow Accelerated Corrosion Program	1.9-6
1.9.1.12	Non-EQ Electrical Commodities Condition Monitoring Program	1.9-7
1.9.1.13	One-Time Inspection Program	1.9-7
1.9.1.14	Open Cycle Cooling Water Program.....	1.9-9
1.9.1.15	Overhead Load Handling Systems Inspection Program.....	1.9-9
1.9.1.16	Reactor Vessel Integrity Surveillance Program..	1.9-10
1.9.1.17	Reactor Vessel Internals Inspection Program	1.9-10
1.9.1.18	Steam Generator Tube Integrity Program	1.9-11
1.9.1.19	Structural Monitoring Program	1.9-12
1.9.1.20	System Monitoring Program.....	1.9-12
1.9.1.21	Water Chemistry Program	1.9-13
1.9.1.22	Inspections of Opportunity for Internal Surfaces Of Selected Components and Corrosion Under Insulation	1.9-13
1.9.1.23	Compressed Air Monitoring Program.....	1.9-14

1.9.1.24	Oil Sampling and Analysis	1.9-14
1.9.1.25	Electrical Equipment Qualification Program.....	1.9-15
1.9.1.26	Fatigue Monitoring Program	1.9-15
1.9.2	SUMMARY DESCRIPTIONS OF TIME-LIMITED AGING ANALYSES.....	1.9-15
1.9.2.1	Reactor Vessel Neutron Embrittlement.....	1.9-16
1.9.2.2	Metal Fatigue	1.9-19
1.9.2.3	Environmental Qualification of Electrical Equipment.....	1.9-38
1.9.2.4	Containment Liner Plate, Metal Containments And Penetrations Fatigue Analysis	1.9-40
1.9.2.5	Other Plant-Specific Time-Limited Aging Analyses.....	1.9-42
1.9.3	NEWLY IDENTIFIED STRUCTURES, SYSTEMS, AND COMPONENTS	1.9-47
	REFERENCES	1-1

LIST OF TABLES

1-1	Chronological Licensing Events
1-2	Palisades Design Characteristics (Nominal Values)
1-3	Systematic Evaluation Program (SEP) and Integrated Assessment Program (IAP), Palisades Plant - NUREG-0820
1-4	Post-TMI Requirements for Consumers Power Company's, Palisades Plant - NUREG-0737
1-5	Unresolved Safety Issues
1-6	Estimated Use on March 24, 2031
1-7	Estimated RT _{PTS} on March 24, 2031
1-8	Summary of Fatigue Usage Factors at NUREG/CR-6260 Sample Locations Applicable to Palisades
1-9	Long-Term Commitments for License Renewal of Palisades Nuclear Plant
1-10	Listing of Newly Identified Systems, Structures, and Components per 10 CFR 50.37(b)

LIST OF FIGURES

1-1 Sh 1	Plant Site Plan
1-1 Sh 2	Plant Area Plan
1-2	Equipment Location - Reactor Building, Plan of Elevation 570'-0"
1-3	Equipment Location - Auxiliary Building, Radwaste Modifications Plan of Elevation 590'-0"
1-4	Equipment Location - Auxiliary and Reactor Building, Radwaste Modifications Plan of Elevation 607'-6"
1-5	Equipment Location - Auxiliary and Reactor Building, Radwaste Modifications Plan of Elevation 625'-0"
1-6	Equipment Location - Auxiliary Building, Radwaste Modifications Plan of Elevation 649'-0"
1-7	Equipment Location - Reactor Building, Sections A-A, B-B, C-C, D-D and E-E
1-8	Equipment Location - Auxiliary Building, Radwaste Modifications Section F-F
1-9	Equipment Location - Reactor Building, Section G-G
1-10	Equipment Location - Reactor Building, Plan of Elevation 602'-0" and Sections H-H, J-J and K-K
1-11	Equipment Location - Reactor Building, Plan of Elevation 700'-0"
1-12 Sh 1	Equipment Location - Turbine Building, Plan of Elevation 590'-0"
1-12 Sh 2	Equipment Location - Turbine Building, Pump Structure Plan of Elevation 590'-0"
1-13	Equipment Location - Turbine Building, Plan of Elevation 607'-6"
1-14	Equipment Location - Turbine Building, Plan of Elevation 625'-0"
1-15	Equipment Location - Turbine Building, Sections
1-16	Equipment Location - Turbine Building, Sections
1-17	Equipment Location - Auxiliary Building, Radwaste Modifications Sections
1-18	General Arrangement - Condensate and Makeup Demin Building

SECTIONS

2.1	LOCATION.....	2.1-2
	2.1.1 TOPOGRAPHY AND LAND USAGE	2.1-2
	2.1.2 POPULATION	2.1-3
	2.1.3 NEARBY INDUSTRIAL, TRANSPORTATION AND MILITARY FACILITIES.....	2.1-5
2.2	HYDROLOGY	2.2-1
	2.2.1 GROUNDWATER.....	2.2-1
	2.2.2 GENERAL LAKE HYDROLOGY.....	2.2-4
2.3	GEOLOGY	2.3-1
	2.3.1 PREGLACIAL GEOLOGY.....	2.3-1
	2.3.2 GLACIAL GEOLOGY.....	2.3-2
	2.3.3 FAULTS.....	2.3-3
	2.3.4 ENGINEERING GEOLOGY.....	2.3-3
	2.3.5 CONCLUSIONS	2.3-5
2.4	SEISMICITY	2.4-1
	2.4.1 SITE GEOLOGY.....	2.4-1
	2.4.2 SEISMIC HISTORY	2.4-2
	2.4.3 DISCUSSION.....	2.4-3
	2.4.4 CONCLUSIONS	2.4-4
2.5	METEOROLOGY	2.5-1
	2.5.1 GENERAL CLIMATOLOGY OF PALISADES PLANT AREA.....	2.5-1
	2.5.2 METEOROLOGICAL PROGRAM HISTORY	2.5-3
	2.5.2.1 Preoperational Program.....	2.5-3
	2.5.2.2 Interim Program.....	2.5-4
	2.5.2.3 Present Program.....	2.5-4

2.5.3	DISCUSSION OF EXISTING 1977/1978 DATA	2.5-5
2.5.3.1	Wind Frequency Distributions	2.5-5
2.5.3.2	Stability Wind Roses	2.5-6
2.5.3.3	Persistence	2.5-6
2.5.3.4	Hourly Data	2.5-7
2.5.3.5	Data Recovery	2.5-8
2.5.4	DIFFUSION CLIMATOLOGY	2.5-8
2.5.4.1	Turbulence and Diffusion Regimes	2.5-8
2.5.4.2	Shoreline Influences	2.5-9
2.5.5	SHORT-TERM DISPERSION PARAMETERS	2.5-9
2.5.5.1	X/Q Determination for TID Analyses.....	2.5-9
2.5.5.2	X/Q Determination for AST Analyses.....	2.5-10
2.5.5.2.1	Offsite X/Q Determination.....	2.5-11
2.5.5.2.2	Control Room X/Q Determination.....	2.5-12
2.5.6	LONG-TERM DISPERSION PARAMETERS	2.5-12
2.6	ENVIRONMENTAL SURVEILLANCE.....	2.6-1
2.6.1	SAMPLE SENSITIVITY	2.6-2
2.6.2	SAMPLE TYPE AND FREQUENCY.....	2.6-2
2.6.3	SAMPLING STATIONS	2.6-2
2.6.4	SAMPLE TYPES	2.6-3
2.6.5	SUMMARY OF PREOPERATIONAL RESULTS.....	2.6-3
2.6.6	ADJUSTMENTS TO THE ENVIRONMENTAL SURVEY	2.6-5
	REFERENCES	2-1

LIST OF TABLES

2-1	Agricultural Statistics
2-2	Population Related to Selected Land Use Categories
2-3	People per Dwelling by Township and City
2-4	Permanent Resident Population Distribution
2-5	Transient Population Related to Educational Facilities Within 10 Miles of Palisades
2-6	Major Employer's Work Force Distribution Within 10 Miles of the Palisades Plant
2-7	Motels and Cottages Within 10 Miles of Palisades Plant
2-8	Campsites Within 10 Miles of Palisades Plant
2-9	Maximum Probable Population for All Categories
2-10	Population Growth and Density by County
2-11	Field Permeability Test Results
2-12	Analyses of Soil Samples
2-13	Epicenter Distance From Site Versus Reported Intensity
2-14	Stability Class Comparison by Wind Sector
2-15	Meteorological Data Recovery Rates
2-16	Physical Characteristics of the Routine Release Points for the Palisades Nuclear Plant
2-17	Relative Dispersion (X/Q) Values (s/m ³) Versus Averaging Time, Turbine Building Vent - Ground Level Release Exclusion Area Boundary
2-18	Relative Dispersion (X/Q) Values (s/m ³) Versus Averaging Time, Turbine Building Vent - Ground Level Release Low Population Zone
2-19	Annual Average X/Q (sec/m ³) Values, Turbine Building Vent - Ground Level Release
2-20	Detection Capabilities for Environmental Sample Analysis
2-21	X/Q Values (s/m ³) – Ground Level Release – Exclusion Area Boundary
2-22	X/Q Values (s/m ³) – Ground Level Release – Low Population Zone

LIST OF FIGURES

- 2-1 Population Centers - 1990 Census Over 10,000, 0 to 50 Miles
- 2-2 Site Layout
- 2-3 Site Topography, Boring Locations, and Seismic Profiles
- 2-4 Topography Cross Sections
- 2-5 Selected Land Use Categories
- 2-6 Population Centers - 1990 Census Over 1,000, 0 to 50 Miles
- 2-7 Permanent Residential Population Breakdown (1990)
- 2-8 Population Distribution (1990), 10 to 50 Miles
- 2-9 Groundwater Elevations and Area Gradients
- 2-10 Geologic Map and Cross Section
- 2-11 1966 Drilling Program, Drill Hole and Cross Section Locations
- 2-12 1966 Drilling Program, Drill Logs and Soil Penetration Test Results
- 2-13 1966 Drilling Program, Subsurface Sections
- 2-14 Regional Structures, Bedrock Geology, Major Faulting and Epicenters
- 2-15 Compressional (P)Wave Velocities From Seismic Survey
- 2-16 Seismic Regionalization: Zones of Probable Maximum Intensity (MM)
- 2-17 Meteorological Tower Locations
- 2-18 10 Meter Wind Frequency Distribution - Palisades Site, December 1, 1977 through February 28, 1978
- 2-19 60 Meter Wind Frequency Distribution - Palisades Site, December 1, 1977 through February 28, 1978
- 2-20 10 Meter Wind Frequency Distribution - Palisades Site, March 1 through May 31, 1978
- 2-21 60 Meter Wind Frequency Distribution - Palisades Site, March 1 through May 31, 1978
- 2-22 10 Meter Wind Frequency Distribution - Palisades Site, June 1 through August 31, 1978
- 2-23 60 Meter Wind Frequency Distribution - Palisades Site, June 1 through August 31, 1978
- 2-24 10 Meter Wind Frequency Distribution - Palisades Site, September 1 through November 30, 1978
- 2-25 60 Meter Wind Frequency Distribution - Palisades Site, September 1 through November 30, 1978
- 2-26 10 Meter Wind Frequency Distribution - Palisades Site, December 1, 1977 through November 30, 1978
- 2-27 60 Meter Wind Frequency Distribution - Palisades Site, December 1, 1977 through November 30 1978

SECTIONS

3.1	INTRODUCTION	3.1-1
3.2	DESIGN BASES.....	3.2-1
	3.2.1 PERFORMANCE OBJECTIVES	3.2-1
	3.2.2 DESIGN OBJECTIVES.....	3.2-1
	3.2.3 DESIGN LIMITS	3.2-2
3.3	REACTOR DESIGN	3.3-1
	3.3.1 GENERAL SUMMARY	3.3-1
	3.3.2 NUCLEAR DESIGN AND EVALUATION	3.3-2
	3.3.2.1 Reactivity and Control Requirements.....	3.3-2
	3.3.2.2 Reactivity Coefficients.....	3.3-4
	3.3.2.3 Control Blade Worths	3.3-6
	3.3.2.4 Reactivity Insertion Rates.....	3.3-7
	3.3.2.5 Power Distribution and Power Escalation Rates..	3.3-7
	3.3.2.6 Neutron Fluence on Pressure Vessel	3.3-9
	3.3.2.7 Nuclear Evaluation	3.3-10
	3.3.2.8 Reactor Stability.....	3.3-10
	3.3.3 THERMAL-HYDRAULIC DESIGN AND EVALUATION	3.3-14
	3.3.3.1 Thermal-Hydraulic Design Criteria	3.3-14
	3.3.3.2 Plant Parameter Variations.....	3.3-15
	3.3.3.3 Core Flow Distribution.....	3.3-15
	3.3.3.4 Trip Set Points.....	3.3-16
	3.3.4 MECHANICAL DESIGN AND EVALUATION.....	3.3-17
	3.3.4.1 Reactor Internals	3.3-17
	3.3.4.2 Control Rod Drive Mechanism	3.3-22
	3.3.4.3 Core Mechanical Design	3.3-28
	REFERENCES	3-1

LIST OF TABLES

- 3-1 Primary Stress Limits for Critical Reactor Vessel Internal Structures
- 3-2 Fuel Bundle Component Description

LIST OF FIGURES

- 3-1 Reactor Arrangement
- 3-2 Position of Fuel Assemblies and Control Rod Groups in the Palisades Core
- 3-3 Control Rod Insertion Limits
- 3-4 Reactivity Difference Between Fundamental and Excited States of a Bare Cylindrical Reactor
- 3-5 Thermal Neutron Flux at the Center of the Core vs Time
- 3-6 Damping Coefficient vs Reactivity Difference Between Fundamental and Excited State
- 3-7 End of Life Axial Oscillations With Doppler Feedback, Full Power (2-Hour Time Steps)
- 3-8 Split Detector Response to Axial Power Profiles in the Core
- 3-9 Reactor Core Cross Section
- 3-10 Reactor Arrangement
- 3-11 Upper Guide Structure Assembly
- 3-12 Hold Down Ring
- 3-13 Control Rod Drive Mechanism
- 3-14 Fuel Bundle Assembly, Sheet 1 of 2
- 3-15 Fuel Bundle Assembly, Sheet 2 of 2
- 3-16 Deleted
- 3-17 Spacer Assembly, HTP
- 3-18 UO₂ Fuel Rod Assembly
- 3-19 Fuel Rod Assembly, Gadolinia Bearing
- 3-20 Control Rod

SECTIONS

4.1	INTRODUCTION	4.1-1
4.2	DESIGN BASIS	4.2-1
	4.2.1 PERFORMANCE OBJECTIVES AND PARAMETERS FOR NORMAL CONDITIONS	4.2-1
	4.2.2 DESIGN CYCLIC LOADS	4.2-1
	4.2.3 DESIGN SERVICE LIFE CONSIDERATIONS.....	4.2-2
	4.2.4 CODES ADHERED TO AND COMPONENT CLASSIFICATION ...	4.2-3
	4.2.5 SAFETY CONSIDERATIONS OF DESIGN PARAMETERS	4.2-3
	4.2.6 PRIMARY COOLANT SYSTEM ASYMMETRIC LOADS.....	4.2-4
4.3	SYSTEM DESIGN AND OPERATION	4.3-1
	4.3.1 GENERAL DESCRIPTION	4.3-1
	4.3.2 INTERFACES WITH OTHER SYSTEMS	4.3-2
	4.3.3 REACTOR VESSEL	4.3-3
	4.3.4 STEAM GENERATOR	4.3-5
	4.3.4.1 Steam Generator Tube Degradation	4.3-8
	4.3.4.2 Steam Generator Replacement	4.3-8
	4.3.5 PRIMARY COOLANT PUMPS	4.3-9
	4.3.6 PRIMARY COOLANT PIPING.....	4.3-11
	4.3.7 PRESSURIZER	4.3-13
	4.3.8 QUENCH TANK	4.3-19
	4.3.9 VALVES.....	4.3-20
	4.3.9.1 General Criteria	4.3-20
	4.3.9.2 Pressurizer Throttling (Spray) Control Valves....	4.3-21
	4.3.9.3 Power-Operated Relief Valves (PORV) and Block Valves	4.3-22
	4.3.9.4 Spring-Actuated Primary Safety Valves	4.3-23
	4.3.10 ENVIRONMENTAL PROTECTION	4.3-24
	4.3.11 MATERIALS EXPOSED TO COOLANT	4.3-24
	4.3.12 INSULATION	4.3-24
	4.3.13 SYSTEM CHEMICAL TREATMENT	4.3-25

4.4	SYSTEM DESIGN EVALUATION	4.4-1
	4.4.1 DESIGN MARGIN.....	4.4-1
	4.4.2 PREVENTION OF BRITTLE FRACTURE.....	4.4-2
4.5	TESTS AND INSPECTIONS	4.5-1
	4.5.1 GENERAL	4.5-1
	4.5.2 NIL DUCTILITY TRANSITION TEMPERATURE DETERMINATION.....	4.5-1
	4.5.3 SURVEILLANCE PROGRAM.....	4.5-2
	4.5.4 NONDESTRUCTIVE TESTS.....	4.5-7
	4.5.5 ADDITIONAL TESTS	4.5-9
	4.5.6 INSERVICE INSPECTION.....	4.5-10
	4.5.7 NDTT OF OTHER PRIMARY SYSTEM COMPONENTS.....	4.5-13
	4.5.8 NONDESTRUCTIVE TESTS OF OTHER PRIMARY SYSTEM COMPONENTS.....	4.5-13
4.6	OPERATING LIMITATIONS.....	4.6-1
4.7	PRIMARY COOLANT PRESSURE BOUNDARY LEAKAGE DETECTION.....	4.7-1
	4.7.1 LEAK DETECTION	4.7-1
	4.7.2 OPERATOR ACTION FOLLOWING LEAK DETECTION.....	4.7-2
4.8	PRIMARY COOLANT GAS VENT SYSTEM.....	4.8-1
	REFERENCES	4-1

LIST OF TABLES

4-1	Primary Coolant System Parameters
4-2	Primary Coolant System Code Requirements
4-3	Reactor Vessel Parameters
4-4	Steam Generator Parameters
4-5	Secondary Safety Valve Parameters
4-6	Primary Coolant Pump Parameters
4-7	Piping List
4-8	Pressurizer Parameters
4-9	Pressurizer Normal Level Control Program/Pressurizer Backup Level Control Program
4-10	Pressurizer Safety Valve Parameters
4-11	Quench Tank Parameters
4-12	Actuator-Operated Throttling Valve Parameters
4-13	Actuator-Operated Block Valve Parameters
4-14	Pressurizer Power-Operated Relief Valve Parameters
4-15	Materials Exposed to Coolant
4-16	Primary Coolant Chemistry
4-17	Summary of Specimens Provided for Each Exposure Location / Summary of Specimens Provided for Each Supplemental Surveillance Capsule
4-18	Primary Coolant System Preservice Quality Assurance Program
4-19	Primary Coolant System Inspection CE Requirements
4-20	Reactor Vessel Surveillance Coupon Removal Schedule

LIST OF FIGURES

4-1 Sh 1	Piping and Instrumentation Diagram, Primary Coolant System
4-1 Sh 2	Piping and Instrumentation Diagram, Primary Coolant System
4-2	Reactor Vessel
4-3	Steam Generator
4-4	Primary Coolant Circulating Pump
4-5	Deleted
4-6	Enlarged View of Pump Seal Area
4-7	Primary Coolant Pump Characteristics Curve
4-8	Pressurizer
4-9	Temperature Control Program
4-10	Pressurizer Level Set Point vs T_{AVG}
4-11	Location of Surveillance Capsule Assemblies
4-12	Typical Surveillance Capsule Assembly
4-13	Typical Charpy Impact Compartment Assembly
4-14	Typical Tensile - Monitor Compartment Assembly
4-15	Variable LTOP Setpoints

SECTIONS

5.1	GENERAL DESIGN CRITERIA	5.1-1
5.1.1	INTRODUCTION	5.1-1
5.1.2	GROUP I: OVERALL REQUIREMENTS (CRITERIA 1-5).....	5.1-2
5.1.2.1	Criterion 1 - Quality Standards and Records.....	5.1-2
5.1.2.2	Criterion 2 - Design Bases for Protection Against Natural Phenomena	5.1-3
5.1.2.3	Criterion 3 - Fire Protection.....	5.1-3
5.1.2.4	Criterion 4 - Environmental and Missile Design Bases	5.1-4
5.1.2.5	Criterion 5 - Sharing of Structures, Systems and Components.....	5.1-5
5.1.2.6	Conclusions	5.1-5
5.1.3	GROUP II: PROTECTION BY MULTIPLE FISSION PRODUCT BARRIERS (CRITERIA 10-19)	5.1-5
5.1.3.1	Criterion 10 - Reactor Design.....	5.1-5
5.1.3.2	Criterion 11 - Reactor Inherent Protection.....	5.1-6
5.1.3.3	Criterion 12 - Suppression of Reactor Power Oscillations.....	5.1-6
5.1.3.4	Criterion 13 - Instrumentation and Control.....	5.1-7
5.1.3.5	Criterion 14 - Reactor Coolant Pressure Boundary	5.1-8
5.1.3.6	Criterion 15 - Reactor Coolant System Design.....	5.1-8
5.1.3.7	Criterion 16 - Containment Design	5.1-9
5.1.3.8	Criterion 17 - Electrical Power Systems.....	5.1-9
5.1.3.9	Criterion 18 - Inspection and Testing of Electrical Power Systems.....	5.1-11
5.1.3.10	Criterion 19 - Control Room	5.1-12
5.1.3.11	Conclusions	5.1-13
5.1.4	GROUP III: PROTECTION AND REACTIVITY CONTROL SYSTEMS (CRITERIA 20-29).....	5.1-13
5.1.4.1	Criterion 20 - Protection System Functions	5.1-13
5.1.4.2	Criterion 21 - Protection System Reliability and Testability.....	5.1-14
5.1.4.3	Criterion 22 - Protection System Independence.....	5.1-15
5.1.4.4	Criterion 23 - Protection System Failure Modes.....	5.1-16
5.1.4.5	Criterion 24 - Separation of Protection and Control Systems.....	5.1-16
5.1.4.6	Criterion 25 - Protection System Requirements for Reactivity Control Malfunctions.....	5.1-17
5.1.4.7	Criterion 26 - Reactivity Control System Redundancy and Capability	5.1-17
5.1.4.8	Criterion 27 - Combined Reactivity Control Systems Capability	5.1-18
5.1.4.9	Criterion 28 - Reactivity Limits	5.1-18

	5.1.4.10	Criterion 29 - Protection Against Anticipated Operational Occurrences	5.1-19
	5.1.4.11	Conclusions	5.1-19
5.1.5	GROUP IV: FLUID SYSTEMS (CRITERIA 30-46).....		5.1-20
	5.1.5.1	Criterion 30 - Quality of Reactor Coolant Pressure Boundary	5.1-20
	5.1.5.2	Criterion 31 - Fracture Prevention of Reactor Coolant Pressure Boundary.....	5.1-21
	5.1.5.3	Criterion 32 - Inspection of Reactor Coolant Pressure Boundary	5.1-22
	5.1.5.4	Criterion 33 - Reactor Coolant Makeup	5.1-22
	5.1.5.5	Criterion 34 - Residual Heat Removal	5.1-23
	5.1.5.6	Criterion 35 - Emergency Core Cooling	5.1-24
	5.1.5.7	Criterion 36 - Inspection of Emergency Core Cooling System.....	5.1-25
	5.1.5.8	Criterion 37 - Testing of Emergency Core Cooling System.....	5.1-25
	5.1.5.9	Criterion 38 - Containment Heat Removal	5.1-26
	5.1.5.10	Criterion 39 - Inspection of Containment Heat Removal System	5.1-27
	5.1.5.11	Criterion 40 - Testing of Containment Heat Removal System	5.1-27
	5.1.5.12	Criterion 41 - Containment Atmosphere Cleanup.....	5.1-28
	5.1.5.13	Criterion 42 - Inspection of Containment Atmosphere Cleanup Systems	5.1-28
	5.1.5.14	Criterion 43 - Testing of Containment Atmosphere Cleanup Systems	5.1-29
	5.1.5.15	Criterion 44 - Cooling Water.....	5.1-29
	5.1.5.16	Criterion 45 - Inspection of Cooling Water System and Criterion 46 - Testing of Cooling Water System	5.1-30
	5.1.5.17	Conclusions	5.1-30
5.1.6	GROUP V: REACTOR CONTAINMENT (CRITERIA 50-57)		5.1-31
	5.1.6.1	Criterion 50 - Containment Design Basis.....	5.1-31
	5.1.6.2	Criterion 51 - Fracture Prevention of Containment Pressure Boundary	5.1-32
	5.1.6.3	Criterion 52 - Capability for Containment Leakage Rate Testing	5.1-32
	5.1.6.4	Criterion 53 - Provisions for Containment Testing and Inspection.....	5.1-33
	5.1.6.5	Criterion 54 - Piping Systems Penetrating Containment.....	5.1-33
	5.1.6.6	Criterion 55 - Primary Coolant Pressure Boundary Penetrating Containment.....	5.1-34
	5.1.6.7	Criterion 56 - Primary Containment Isolation	5.1-35
	5.1.6.8	Criterion 57 - Closed System Isolation Valves.....	5.1-36
	5.1.6.9	Conclusions	5.1-38

5.1.7	GROUP VI: FUEL AND RADIOACTIVITY CONTROL (CRITERIA 60-64)	5.1-39
5.1.7.1	Criterion 60 - Control of Releases of Radioactive Materials to the Environment.....	5.1-39
5.1.7.2	Criterion 61 - Fuel Storage and Handling and Radioactivity Control	5.1-40
5.1.7.3	Criterion 62 - Prevention of Criticality in Fuel Storage and Handling	5.1-41
5.1.7.4	Criterion 63 - Monitoring Fuel and Waste Storage.....	5.1-42
5.1.7.5	Criterion 64 - Monitoring Radioactivity Releases	5.1-42
5.1.7.6	Conclusions	5.1-43
5.1.8	OVERALL CONCLUSION	5.1-43
5.2	CLASSIFICATION OF STRUCTURES, SYSTEMS AND COMPONENTS	5.2-1
5.2.1	BACKGROUND INFORMATION	5.2-1
5.2.1.1	Classification Overview	5.2-1
5.2.1.2	Original Palisades Design Review.....	5.2-2
5.2.2	CONSUMERS DESIGN CLASSIFICATIONS	5.2-3
5.2.2.1	Design - Class 1	5.2-3
5.2.2.2	Design - Class 2	5.2-4
5.2.2.3	Design - Class 3	5.2-4
5.2.2.4	Design - Palisades Modifications	5.2-4
5.2.2.5	Inservice Inspection.....	5.2-5
5.2.2.6	Service Quality Group Classification	5.2-5
5.2.2.7	Service - Electrical and Instrumentation and Controls Equipment Classification.....	5.2-5
5.2.2.8	Safety-Related Classification.....	5.2-6
5.2.2.8.1	Safety-Related	5.2-6
5.2.2.8.2	Important to Safety	5.2-6
	REFERENCES	5.2-7
5.3	WIND AND TORNADO LOADINGS	5.3-1
5.3.1	WIND	5.3-1
5.3.1.1	Design Parameters.....	5.3-1
5.3.1.2	Forces on Structures	5.3-1
5.3.2	TORNADO	5.3-2
5.3.2.1	Design Parameters.....	5.3-2
5.3.2.2	Forces on Structures	5.3-2
5.3.3	PLANT REEVALUATION	5.3-3
	REFERENCES	5.3-4

5.4	WATER LEVEL DESIGN	5.4-1
5.4.1	FLOODING FROM NATURAL SOURCES	5.4-1
5.4.1.1	Description of Events	5.4-1
5.4.1.2	Effects on Consumers Design Class 1 Structures and Safety-Related Equipment	5.4-1
5.4.2	FLOODING AND WETTING FROM PLANT SOURCES	5.4-2
	REFERENCES	5.4-4
5.5	MISSILE PROTECTION.....	5.5-1
5.5.1	TORNADO MISSILES.....	5.5-1
5.5.1.1	Design Parameters.....	5.5-1
5.5.1.1.1	Containment Structure, Auxiliary Building, Turbine Building.....	5.5-1
5.5.1.1.2	Intake Structure	5.5-2
5.5.1.1.3	Auxiliary Building Radwaste Addition.....	5.5-2
5.5.1.1.4	Auxiliary Building TSC/EER/HVAC Addition.....	5.5-3
5.5.1.1.5	Diesel Fuel Oil Storage Tank Housing	5.5-3
5.5.1.1.6	Condensate Storage Tank.....	5.5-3
5.5.1.2	Structural Considerations	5.5-4
5.5.1.3	Plant Reevaluation	5.5-4
5.5.1.3.1	Review Parameters	5.5-4
5.5.1.3.2	Summary	5.5-5
5.5.2	TURBINE MISSILES.....	5.5-6
5.5.2.1	Background	5.5-6
5.5.2.2	High-Pressure Turbine Missiles.....	5.5-6
5.5.2.3	Low-Pressure Turbine Missiles	5.5-7
5.5.2.4	Turbine Overspeed Protection System	5.5-8
5.5.3	INTERNALLY GENERATED MISSILES.....	5.5-8
5.5.3.1	Containment Missiles	5.5-8
5.5.3.2	Plant Reevaluation	5.5-9
5.5.4	SITE PROXIMITY MISSILES	5.5-10
	REFERENCES	5.5-12
5.6	DYNAMIC EFFECTS OF PIPE RUPTURE	5.6-1
5.6.1	DEFINITIONS.....	5.6-1
5.6.2	DESIGN BASES	5.6-2
5.6.2.1	Systems in Which Design Basis Failures Occur..	5.6-2
5.6.2.2	Identification of Essential Systems and Components	5.6-2
5.6.2.3	Limiting Conditions	5.6-3
5.6.2.4	Safety Evaluation	5.6-4
5.6.3	CRITERIA USED TO DEFINE BREAKS	5.6-5
5.6.3.1	ASME Section III, Class 1 Piping	5.6-5
5.6.3.2	ASME Section III Class 2 and 3 Piping (other than between containment isolation valves)	5.6-6
5.6.3.3	Non-nuclear Class Piping.....	5.6-7
5.6.3.4	Piping Penetrating Containment.....	5.6-8

5.6.4	PROTECTIVE MEASURES	5.6-9
5.6.5	JET IMPINGEMENT.....	5.6-10
5.6.6	PLANT MODIFICATION LINE-BREAK ANALYSIS	5.6-11
5.6.6.1	Plant Modifications Involving High- or Moderate-Energy Piping.....	5.6-11
5.6.6.2	Plant Modifications Involving Essential Systems and Components	5.6-11
5.6.7	HISTORY OF PALISADES HIGH-ENERGY LINE-BREAK ANALYSIS	5.6-11
5.6.7.1	High-Energy Line Breaks Outside Containment	5.6-11
5.6.7.2	High-Energy Line Breaks Inside Containment ...	5.6-15
5.6.7.3	Moderate-Energy System Pipe-Break Evaluation	5.6-16
	REFERENCES	5.6-18
5.7	SEISMIC DESIGN	5.7-1
5.7.1	SEISMIC INPUT	5.7-1
5.7.1.1	Design Bases	5.7-1
5.7.1.2	Ground Design Response Spectra.....	5.7-2
5.7.1.3	Floor Design Response Spectra.....	5.7-2
5.7.1.4	Damping Values	5.7-3
5.7.2	SEISMIC ANALYSIS OF MAJOR CP CO DESIGN CLASS 1 STRUCTURES.....	5.7-4
5.7.2.1	Containment Building.....	5.7-5
5.7.2.2	Auxiliary Building.....	5.7-6
5.7.3	SEISMIC ANALYSIS OF OTHER CP CO DESIGN CLASS 1 STRUCTURES.....	5.7-7
5.7.3.1	Turbine Building.....	5.7-7
5.7.3.1.1	CP Co Design Class 1 Portion.....	5.7-7
5.7.3.1.2	CP Co Design Class 3 Portion.....	5.7-7
5.7.3.2	Intake Structure.....	5.7-9
5.7.3.3	Auxiliary Building Radwaste Addition	5.7-9
5.7.3.4	Auxiliary Building TSC/EER Addition.....	5.7-10
5.7.3.5	Other Auxiliary Building Additions.....	5.7-12
5.7.3.6	CP Co Design Class 1 Tank Foundations	5.7-12
5.7.3.7	Miscellaneous Frames and Trusses.....	5.7-12

5.7.4	SEISMIC ANALYSIS OF CP CO DESIGN CLASS 1 PIPING	5.7-13
5.7.5	SEISMIC ANALYSIS OF MAJOR CP CO DESIGN CLASS 1 SYSTEM AND COMPONENTS	5.7-16
5.7.5.1	Primary Coolant System.....	5.7-16
5.7.5.1.1	Reactor Vessel Assembly.....	5.7-17
5.7.5.1.2	Steam Generators	5.7-17
5.7.5.1.3	Primary Coolant Pumps.....	5.7-17
5.7.5.1.4	Pressurizer.....	5.7-17
5.7.5.1.5	Primary Coolant System Piping.....	5.7-18
5.7.5.1.6	Pressurizer Quench Tank.....	5.7-18
5.7.5.1.7	Pressurizer Safety and Power-Operated Relief Valves	5.7-18
5.7.5.2	Other Major CP Co Design Class 1 Systems and Components	5.7-18
5.7.6	SEISMIC ANALYSIS OF SPENT FUEL STORAGE RACKS	5.7-19
5.7.6.1	Region 1 Racks	5.7-19
5.7.6.2	Region 2 Racks (See Section 9.11).....	5.7-21
5.7.7	SEISMIC ANALYSIS AND TESTING OF OTHER CP CO DESIGN CLASS 1 COMPONENTS.....	5.7-22
5.7.7.1	Electrical Equipment and Instrumentation	5.7-24
5.7.7.2	Tanks.....	5.7-24
5.7.7.3	Appendages to CP Co Design Class 1 Components	5.7-24
5.7.7.4	Overhead Cranes	5.7-25
5.7.7.5	Containment Air Locks.....	5.7-25
5.7.8	SEISMIC ANALYSIS OF BURIED STRUCTURES AND COMPONENTS.....	5.7-25
5.7.9	SEISMIC INSTRUMENTATION	5.7-25
	REFERENCES.....	5.7-26
5.8	CONTAINMENT STRUCTURE.....	5.8-1
5.8.1	DESIGN BASIS.....	5.8-1
5.8.2	GENERAL DESCRIPTION	5.8-2
5.8.3	LOADS AND LOAD COMBINATIONS	5.8-6
5.8.3.1	Containment Structure Concrete.....	5.8-6
5.8.3.1.1	Construction Condition	5.8-6
5.8.3.1.2	Working Stress Condition	5.8-6
5.8.3.1.3	Yield Strength Condition	5.8-7
5.8.3.2	Liner Plate System.....	5.8-9
5.8.3.2.1	Liner Plate.....	5.8-9
5.8.3.2.2	Liner Plate Anchors	5.8-9
5.8.3.3	Penetrations	5.8-10

5.8.4	ANALYSIS	5.8-10
5.8.4.1	Containment Structure Concrete	5.8-10
5.8.4.1.1	General	5.8-10
5.8.4.1.2	Axisymmetric Loads	5.8-11
5.8.4.1.3	Nonaxisymmetric Loads	5.8-15
5.8.4.2	Prestressing System	5.8-15
5.8.4.2.1	Tendon Anchorage Zones	5.8-15
5.8.4.3	Liner Plate System	5.8-19
5.8.4.3.1	Liner Plate	5.8-19
5.8.4.3.2	Liner Plate Anchors	5.8-19
5.8.4.4	Penetrations	5.8-20
5.8.5	DESIGN	5.8-21
5.8.5.1	Design Basis	5.8-21
5.8.5.2	Containment Structure Concrete	5.8-23
5.8.5.2.1	General Criteria	5.8-23
5.8.5.2.2	Construction Condition	5.8-24
5.8.5.2.3	Working Stress Condition	5.8-25
5.8.5.2.4	Yield Strength Condition	5.8-26
5.8.5.2.5	Results	5.8-31
5.8.5.3	Prestressing System	5.8-31
5.8.5.3.1	Tendons	5.8-31
5.8.5.3.2	Tendon Anchorage Zones	5.8-33
5.8.5.4	Liner Plate System	5.8-34
5.8.5.4.1	General	5.8-34
5.8.5.4.2	Liner Plate	5.8-35
5.8.5.4.3	Liner Plate Anchors	5.8-36
5.8.5.4.4	Brackets	5.8-38
5.8.5.5	Penetrations	5.8-38
5.8.6	PENETRATIONS	5.8-39
5.8.6.1	Design Basis	5.8-39
5.8.6.2	General Description	5.8-39
5.8.6.2.1	Personnel and Equipment Openings	5.8-40
5.8.6.2.2	Other Openings	5.8-41
5.8.6.3	Design Criteria	5.8-42
5.8.6.3.1	Concrete Openings	5.8-42
5.8.6.3.2	Steel Penetrations	5.8-42
5.8.6.4	Analysis and Design	5.8-45
5.8.6.4.1	Small Penetrations	5.8-46
5.8.6.4.2	Large Penetrations	5.8-48
5.8.6.4.3	Other Design Details	5.8-51

5.8.7	CONSTRUCTION	5.8-52
5.8.7.1	Materials	5.8-52
5.8.7.1.1	Concrete.....	5.8-52
5.8.7.1.2	Reinforcing Steel.....	5.8-53
5.8.7.1.3	Prestressing Tendons and Hardware	5.8-54
5.8.7.1.4	Liner Plate	5.8-54
5.8.7.1.5	Steel Penetrations	5.8-54
5.8.7.1.6	Sheathing Filler	5.8-55
5.8.7.2	Quality Control	5.8-55
5.8.7.2.1	Concrete Mix Design.....	5.8-55
5.8.7.2.2	Concrete Materials	5.8-56
5.8.7.2.3	Concrete.....	5.8-57
5.8.7.2.4	Reinforcing Steel and CADWELD Splices.....	5.8-57
5.8.7.2.5	Prestressing Tendons and Hardware	5.8-58
5.8.7.2.6	Liner Plate	5.8-59
5.8.7.2.7	Steel Penetrations	5.8-60
5.8.7.2.8	Sheathing Filler	5.8-60
5.8.7.3	Construction Methods	5.8-60
5.8.7.3.1	Governing Codes	5.8-60
5.8.7.3.2	Concrete.....	5.8-61
5.8.7.3.3	Reinforcing Steel and CADWELD Splices.....	5.8-61
5.8.7.3.4	Prestressing System.....	5.8-62
5.8.7.3.5	Liner Plate	5.8-63
5.8.7.4	Construction Problems	5.8-64
5.8.7.4.1	Cracking at Welds in Containment Liner Plate	5.8-64
5.8.8	CONTAINMENT STRUCTURE TESTING	5.8-68
5.8.8.1	Integrated Leak Rate Testing	5.8-68
5.8.8.1.1	Historical Summary.....	5.8-68
5.8.8.1.2	Regulatory Basis for Current Program.....	5.8-70
5.8.8.1.3	Type A Test Performance Under Option B	5.8-71
5.8.8.2	Local Leakage Rate Testing	5.8-71
5.8.8.2.1	Historical Summary.....	5.8-72
5.8.8.2.2	Regulatory Basis for Current Program.....	5.8-73
5.8.8.2.3	Scope of the Type B and C Testing Program.....	5.8-73
5.8.8.2.4	Performance Based Type B and C Program Overview.....	5.8-74
5.8.8.3	Prestressing System Surveillance	5.8-75
5.8.8.3.1	Basis for Program	5.8-75
5.8.8.3.2	Surveillance Period	5.8-76
5.8.8.3.3	Surveillance Guidelines	5.8-76
5.8.8.3.4	Acceptance Criteria.....	5.8-79
5.8.8.3.5	Historical Summary.....	5.8-80

5.8.8.4	Structural Integrity Test.....	5.8-84
5.8.8.4.1	Basis for Test.....	5.8-84
5.8.8.4.2	Test Guidelines.....	5.8-85
5.8.8.4.3	Objectives	5.8-85
5.8.8.4.4	Test Data and Results.....	5.8-86
5.8.8.4.5	Summary	5.8-88
5.8.8.5	Liner Plate and Penetration Surveillance Program	5.8-89
5.8.8.5.1	Basis for Program	5.8-89
5.8.8.5.2	Surveillance Period	5.8-89
5.8.8.5.3	Details of Program	5.8-90
5.8.8.5.4	Summary	5.8-90
5.8.8.6	End Anchorage Concrete Surveillance	5.8-91
5.8.8.6.1	Basis for Program	5.8-91
5.8.8.6.2	Surveillance Period	5.8-91
5.8.8.6.3	Surveillance Locations	5.8-92
5.8.8.6.4	Details and Results	5.8-92
5.8.8.6.5	Summary	5.8-93
5.8.9	STEAM GENERATOR REPLACEMENT CONSTRUCTION	
	OPENING	5.8-93
5.8.9.1	General Description	5.8-93
5.8.9.2	Containment Reevaluation	5.8-94
5.8.9.3	Materials	5.8-96
5.8.9.3.1	Concrete.....	5.8-96
5.8.9.3.2	Reinforcing Steel.....	5.8-97
5.8.9.3.3	Prestressing Tendons and Hardware	5.8-98
5.8.9.3.4	Liner Plate and Hardware	5.8-98
5.8.9.3.5	Sheathing Filler	5.8-98
5.8.9.4	Quality Control	5.8-98
5.8.9.4.1	Concrete Mix Design.....	5.8-98
5.8.9.4.2	Concrete Materials	5.8-99
5.8.9.4.3	Concrete.....	5.8-100
5.8.9.4.4	Reinforcing Steel and CADWELD Splices.....	5.8-100
5.8.9.4.5	Prestressing Tendons.....	5.8-101
5.8.9.4.6	Liner Plate	5.8-101
5.8.9.4.7	Sheathing Filler	5.8-102
5.8.9.5	Construction Methods	5.8-102
5.8.9.5.1	Governing Codes	5.8-102
5.8.9.5.2	Concrete.....	5.8-102
5.8.9.5.3	Reinforcing Steel and CADWELD Splices.....	5.8-102
5.8.9.5.4	Prestressing System	5.8-103
5.8.9.6	Containment Testing	5.8-103
5.8.9.6.1	Integrated Leak Rate Testing	5.8-103
5.8.9.6.2	Structural Integrity Test.....	5.8-103

5.8.10	CONTAINMENT STRUCTURAL INTEGRITY SURVEILLANCE PROGRAM.....	5.8-104
5.8.10.1	Requirement for Metal Containment Examinations.....	5.8-104
5.8.10.2	Requirements for Concrete Containment Examinations.....	5.8-104
5.8.10.2.1	Surveillance of Unbonded Post-Tensioning System	5.8-104
5.8.10.2.2	Surveillance of Containment Structural Concrete	5.8-104
	REFERENCES	5.8-105
5.9	OTHER STRUCTURES.....	5.9-1
5.9.1	DESIGN CRITERIA.....	5.9-1
5.9.1.1	CP Co Design Class 1 Structures	5.9-1
5.9.1.1.1	Design Methods.....	5.9-1
5.9.1.1.2	Loads and Load Combinations	5.9-2
5.9.1.2	CP Co Design Class 2 Structures	5.9-4
5.9.1.3	CP Co Design Class 3 Structures	5.9-4
5.9.1.4	Loads Common to All Structures	5.9-5
5.9.2	CONTAINMENT INTERIOR STRUCTURES	5.9-5
5.9.2.1	General Description.....	5.9-5
5.9.2.2	Loads	5.9-6
5.9.2.3	Analysis and Design	5.9-8
5.9.2.4	Materials of Construction.....	5.9-10
5.9.3	AUXILIARY BUILDING	5.9-10
5.9.3.1	General Description.....	5.9-10
5.9.3.2	Loads	5.9-11
5.9.3.3	Analysis and Design	5.9-12
5.9.3.4	Materials of Construction.....	5.9-13
5.9.4	TURBINE BUILDING AND INTAKE STRUCTURE	5.9-13
5.9.4.1	General.....	5.9-13
5.9.5	AUXILIARY BUILDING RADWASTE ADDITION	5.9-13
5.9.5.1	General Description.....	5.9-13
5.9.5.2	Analysis and Design	5.9-14
5.9.5.3	Materials of Construction.....	5.9-14
5.9.6	AUXILIARY BUILDING TSC/EER/HVAC ADDITION	5.9-14
5.9.6.1	General Description.....	5.9-14
5.9.6.2	Loads and Load Combinations.....	5.9-15
5.9.6.2.1	Loads.....	5.9-15
5.9.6.2.2	Load Combinations.....	5.9-16
5.9.6.3	Analysis and Design	5.9-17
5.9.6.4	Materials of Construction.....	5.9-18
	REFERENCES	5.9-19

5.10	SYSTEMS AND COMPONENTS	5.10-1
5.10.1	DESIGN CRITERIA FOR CP CO DESIGN CLASS 1 SYSTEMS AND COMPONENTS	5.10-1
5.10.1.1	CP Co Design Class 1 Piping.....	5.10-1
5.10.1.2	CP Co Design Class 1 Pipe Supports.....	5.10-3
5.10.1.3	Other CP Co Design Class 1 Systems and Components	5.10-5
5.10.1.4	Interim Operability Criteria.....	5.10-6
5.10.2	DESIGN CRITERIA FOR CP CO DESIGN CLASS 2 AND CLASS 3 SYSTEMS AND COMPONENTS	5.10-6
5.10.2.1	CP Co Design Class 2.....	5.10-6
5.10.2.2	CP Co Design Class 3.....	5.10-6
5.10.3	ANCHORAGE MODIFICATIONS FOR SAFETY-RELATED SYSTEMS AND COMPONENTS	5.10-7
5.10.3.1	Piping Systems	5.10-7
5.10.3.1.1	1974 Review	5.10-7
5.10.3.1.2	1979 Reanalysis.....	5.10-7
5.10.3.1.3	Revision of Seismic Piping Criteria - ASME Section III, Code Case N-411	5.10-8
5.10.3.1.4	Inspection and Enforcement Bulletins	5.10-9
5.10.3.2	Masonry Walls	5.10-11
5.10.3.2.1	History.....	5.10-11
5.10.3.2.2	Identification.....	5.10-11
5.10.3.2.3	Reevaluation	5.10-11
5.10.3.2.4	Modifications	5.10-11
5.10.3.3	Electrical Equipment.....	5.10-12
5.10.3.3.1	History.....	5.10-12
5.10.3.3.2	Identification.....	5.10-12
5.10.3.3.3	Evaluation and Modifications	5.10-13
5.10.4	QUALITY CONTROL	5.10-13
5.10.4.1	Shop Welding	5.10-13
5.10.4.2	Field Welding.....	5.10-14
5.10.4.3	Inspection of Piping.....	5.10-15
5.10.4.4	Field Inspection of Mechanical Components, Electrical Components and Instrumentation....	5.10-16
	REFERENCES	5.10-17

LIST OF TABLES

5.2-1	Palisades System of Classification for Structures/Systems/Components
5.2-2	Structures Classification
5.2-3	Mechanical System/Component Classification
5.2-4	Electrical Systems/Component Classification
5.2-5	Instrumentation and Control/Component Classification
5.3-1	Tornado Design Pressures
5.4-1	Safety-Related Equipment That Requires Protection From Flooding Due to Failures of Nonclass 1 Systems
5.5-1	Class 1 Structures Wall and Roof Thickness
5.5-2	Burst Probability for Each LP Rotor and Total Unit at 120% Rated Speed
5.6-1	High-Energy Pipe Failures Outside Containment - Summary of Operating Stresses - Main Steam
5.6-2	High-Energy Pipe Failures Outside Containment - Summary of Operating Stresses - Feedwater
5.6-3	High-Energy Pipe Failures Outside Containment - Summary of Operating Stresses - Main Steam Dump
5.6-4	Summary of Eliminated Hardware Resulting from Application of Generic Letter 87-11, "Relaxation of Arbitrary Pipe Rupture Requirements"
5.7-1	List of Computer Codes
5.7-2	Material Damping Values for Various Materials and Types of Construction
5.7-3	Material Damping Values for Various Class 1 Structures
5.7-4	Auxiliary Building TSC/EER Addition Summary of Modal Parameters Flexible Base Analysis
5.7-5	Comparison of Specifications for Seismic Requirements
5.7-6	Major Class 1 Components Seismic Loads
5.7-7	Class 1E Electrical Equipment and Instrumentation Seismic Loads
5.7-8	Class 1 Tanks Seismic Loads
5.7-9	Safety-Related Hydraulic Shock Suppressors (Snubbers)
5.7-10	Safety-Related Mechanical Shock Suppressors (Snubbers)
5.8-1	Containment Structure Summary of Concrete and Reinforcing Steel Stresses
5.8-2	Containment Structure Tendon Anchorage Zone Reinforcement Stresses
5.8-3	Containment Structure Liner Plate Anchor Analysis
5.8-4	Containment Penetrations and Appendix J Test Requirements
5.9-1	Major Equipment Supports, Materials of Construction
5.10-1	Class 1 Systems or Portions Thereof Included in the 1974 Review of As-Built Pipe Supports
5.10-2	Systems Containing Safety-Related Piping

LIST OF FIGURES

5.5-1	Deleted
5.5-2	Deleted
5.7-1	OBE Horizontal Design Ground Response Spectrum (Housner)
5.7-2	Taft Ground Response Spectrum Versus Housner Ground Response Spectrum (SSE), 4% Damping
5.7-3	Taft Ground Response Spectrum Versus Housner Ground Response Spectrum (SSE), 7-1/2% Damping
5.7-4	Containment Building Dynamic Model
5.7-5	Containment Shell Maximum Seismic Responses (OBE) Comparison of Responses for Fixed Base and Coupled Models
5.7-6	Auxiliary Building, N-S Mathematical Model
5.7-7	Auxiliary Building, E-W Mathematical Model
5.7-8	Electrical Penetration Enclosure, N-S and E-W Dynamic Models and Maximum Seismic Responses (OBE)
5.7-9	Turbine Building, E-W Dynamic Models
5.7-10	Turbine Building, E-W Fundamental Modeshapes, Outside Walls
5.7-11	Turbine Building, E-W Direction, Maximum Seismic Responses (SSE)
5.7-12	Auxiliary Building Radwaste Addition, Dynamic Models
5.7-13	Auxiliary Building TSC/EER Addition, Dynamic Model
5.7-14	Auxiliary Building TSC/EER Addition, Maximum Seismic Responses (OBE)
5.8-1 Sh 1	Containment Structure, Typical Cross Section
5.8-1 Sh 2	Containment Structure, Typical Cross Section
5.8-2	Containment Structure, Typical Piping Penetrations
5.8-3	Containment Structure, Typical Electrical Penetrations
5.8-4	Containment Structure, Reinforcing and Tendon Plan Adjacent to Equipment Hatch
5.8-5 Sh 1	Containment Structure, Tendon Hardware Assembly, Horizontal and Dome Tendons, Shop Buttonheaded End
5.8-5 Sh 2	Containment Structure, Tendon Hardware Assembly, Horizontal and Dome Tendons, Field Buttonheaded End
5.8-5 Sh 3	Containment Structure, Tendon Hardware Assembly, Vertical Tendons, Shop Buttonheaded End
5.8-5 Sh 4	Containment Structure, Tendon Hardware Assembly, Vertical Tendons, Field Buttonheaded End
5.8-6	Containment Structure, Personnel Air Lock
5.8-7	Containment Structure, Escape Air Lock
5.8-8	Containment Structure, Equipment Hatch Door
5.8-9	Containment Structure, Finite Element Mesh
5.8-10	Containment Structure, DBA Thermal Gradients Across Containment Wall, No Insulation

5.8-11 Sh 1	Containment Structure, Isostress Plot, Dome and Wall, $D + F_i$
5.8-11 Sh 2	Containment Structure, Isostress Plot, Dome and Wall, $D + F_f + 1.15P$
5.8-11 Sh 3	Containment Structure, Isostress Plot, Dome and Wall, $D + F_f + 1.5P + T_a$
5.8-11 Sh 4	Containment Structure, Isostress Plot, Dome and Wall, $D + F_f + T_a$
5.8-12 Sh 1	Containment Structure, Isostress Plot, Wall and Base Slab, $D + F_i$
5.8-12 Sh 2	Containment Structure, Isostress Plot, Wall and Base Slab, $D + F_f + 1.15P$
5.8-12 Sh 3	Containment Structure, Isostress Plot, Wall and Base Slab, $D + F_f + 1.5P + T_a$
5.8-12 Sh 4	Containment Structure, Isostress Plot, Wall and Base Slab, $D + F_f + T_a$
5.8-13 Sh 1	Containment Structure, Stress Resultants, Dead Load (D)
5.8-13 Sh 2	Containment Structure, Stress Resultants, Final Prestress (F_f)
5.8-13 Sh 3	Containment Structure, Stress Resultants, DBA Pressure (P)
5.8-13 Sh 4	Containment Structure, Stress Resultants, DBA Temperature (T_a)
5.8-14	Containment Structure, Finite Element Mesh for Buttress, Plane Strain Analysis
5.8-15 Sh 1	Containment Structure, Buttress Isostress Plot, Maximum Compressive Stresses
5.8-15 Sh 2	Containment Structure, Buttress Isostress Plot, Minimum Compressive or Maximum Tensile Stresses
5.8-16 Sh 1	Containment Structure, Model for Liner Plate Analysis
5.8-16 Sh 2	Containment Structure, Model for Liner Plate Analysis
5.8-17	Containment Structure, Results From Tests on Liner Plate Anchors
5.8-18	Containment Structure, Thermal Gradient at Main Steam Penetration
5.8-19	Containment Structure, Loads on Pipe Penetrations
5.8-20	Containment Structure, Stress Concentrations at Equipment Hatch Opening
5.8-21	Containment Structure, Liner Plate, Weld Cracking at Backing Strip Discontinuities
5.8-22 Sh 1	Containment Structure, Liner Plate Test Sample, Elevation 600'0", Azimuth 113°
5.8-22 Sh 2	Containment Structure, Liner Plate Test Sample, Elevation 600'0", Azimuth 275°
5.8-23 Sh 1	Containment Structure, Liner Plate, Inspection and Method of Repair, Elevation 583' 6"
5.8-23 Sh 2	Containment Structure, Liner Plate, Inspection and Method of Repair, Elevation 588' 6"
5.8-23 Sh 3	Containment Structure, Liner Plate, Inspection and Method of Repair, Elevation 590' 0"
5.8-24	Containment Structure, Location and Identification of Eleven Surveillance Tendons for One- and Three-Year Surveillances

5.8-25 Sh 1	Containment Structure, Structural Integrity Test Inside Hoop Strain Profiles, Typical Section
5.8-25 Sh 2	Containment Structure, Structural Integrity Test Outside Meridional Strain Profiles, Typical Section
5.8-26	Containment Structure, Pressure Test Displacement Profiles
5.8-27 Sh 1	Containment Structure, Pressure Test Tendon Load Change
5.8-27 Sh 2	Containment Structure, Pressure Test Tendon Load Change
5.8-28	Containment Structure, End Anchorage Surveillance Program, Crack Surveillance Locations
5.8-29	Construction Opening Plan, Elevations, and Sections
5.8-30	Construction Opening Tendon Detensioning and Post Tensioning Sequence
5.8-31	Miscellaneous Gas Supply Systems
5.9-1	Containment Structure, Interior Construction

SECTIONS

6.1	SAFETY INJECTION SYSTEM	6.1-1
6.1.1	DESIGN BASES	6.1-1
6.1.2	SYSTEM DESCRIPTION AND OPERATION	6.1-5
6.1.2.1	General Description	6.1-5
6.1.2.2	Component Design	6.1-8
6.1.2.3	Operation	6.1-16
6.1.3	TESTING	6.1-20
6.1.3.1	Operational Testing	6.1-20
6.1.3.2	Environmental Testing	6.1-21
6.1.4	DESIGN ANALYSIS	6.1-21
6.2	CONTAINMENT SPRAY SYSTEM	6.2-1
6.2.1	DESIGN BASIS	6.2-1
6.2.2	SYSTEM DESCRIPTION AND OPERATION	6.2-2
6.2.2.1	General Description	6.2-2
6.2.2.2	Component Description	6.2-2
6.2.2.3	System Operation	6.2-3
6.2.3	DESIGN ANALYSIS	6.2-4
6.2.3.1	Margins of Safety	6.2-4
6.2.3.2	Margins of Capacity	6.2-4
6.2.3.3	Testing	6.2-4
6.3	CONTAINMENT AIR COOLERS	6.3-1
6.3.1	DESIGN BASES	6.3-1
6.3.2	SYSTEM DESCRIPTION AND OPERATION	6.3-1
6.3.2.1	General Description	6.3-1
6.3.2.2	System Operation	6.3-3
6.3.3	DESIGN ANALYSIS	6.3-4
6.3.4	COMPONENT TESTING	6.3-5
6.3.4.1	Coils	6.3-5
6.3.4.2	Fans	6.3-6
6.3.4.3	Testing	6.3-6
6.4	CONTAINMENT SUMP pH CONTROL	6.4-1
6.4.1	DESIGN BASIS	6.4-1
6.4.2.1	General Description	6.4-1
6.4.2.2	Operation	6.4-1
6.4.2.3	Materials	6.4-2
6.4.2.4	Paint	6.4-3
6.5	CONTAINMENT VENTING CHARCOAL FILTER	6.5-1
6.5.1	GENERAL	6.5-1
6.6	DELETED	

6.7	CONTAINMENT ISOLATION SYSTEM.....	6.7-1
	6.7.1 DESIGN BASIS.....	6.7-1
	6.7.2 SYSTEM DESCRIPTION AND OPERATION	6.7-1
	6.7.2.1 System Description.....	6.7-1
	6.7.2.2 Component Description	6.7-4
	6.7.2.3 System Operation	6.7-4
	6.7.3 DESIGN ANALYSIS	6.7-6
	6.7.3.1 System Reliability - Margins of Safety	6.7-6
	6.7.3.2 Provisions for Testing and Inspection.....	6.7-6
6.8	REACTOR CAVITY FLOODING SYSTEM.....	6.8-1
	6.8.1 SYSTEM OPERATION	6.8-1
6.9	INSERVICE INSPECTION OF ASME CLASSES 1, 2 AND 3 SYSTEMS	
	AND COMPONENTS.....	6.9-1
	6.9.1 STRUCTURAL INTEGRITY EXAMINATION	6.9-2
	6.9.2 PUMP AND VALVE TESTING PROGRAM	6.9-3
	6.9.2.1 Pump Testing Program.....	6.9-3
	6.9.2.2 Valve Testing Program	6.9-3
6.10	CONTROL ROOM HABITABILITY	6.10-1
	6.10.1 DESIGN BASIS.....	6.10-1
	6.10.2 SYSTEM DESIGN	6.10-1
	6.10.3 DESIGN ANALYSIS.....	6.10-2
	REFERENCES.....	6-1

LIST OF TABLES

6-1	Safety Injection and Refueling Water Tank Design Parameters
6-2	Low Pressure Safety Injection Pump Data Summary
6-3	High Pressure Safety Injection Pump Data Summary
6-4	Shutdown Cooling Heat Exchanger Data Summary
6-5	Safety Injection Tank Design Parameters
6-6	Containment Spray System Component Description
6-7	Containment Air Cooler Component Description
6-8	Containment Air Coolers Performance Data for Normal Operation
6-9	Containment Air Coolers Performance Data for Post-DBA Conditions
6-10	ECCS Component Systems
6-11	Deleted
6-12	ISI Major Components and/or Systems List
6-13	Inservice Pump Test Program Summary
6-14	Technical Specification 3.6.3, "Containment Isolation Valves," Applicability

LIST OF FIGURES

6-1 Sh 1	Piping & Instrument Diagram, Safety Injection Containment Spray and Shutdown Cooling System
6-1 Sh 2	Piping & Instrument Diagram, Safety Injection Containment Spray and Shutdown Cooling System
6-2 Sh 1	Piping & Instrument Diagram, Safety Injection Containment Spray and Shutdown Cooling System
6-2 Sh 1A	Piping & Instrument Diagram, Safety Injection Containment Spray and Shutdown Cooling System
6-2 Sh 1B	Piping & Instrument Diagram, Safety Injection Containment Spray
6-3	Containment Air Coolers Relief Panel & Condensate Drain
6-4	Containment Vent Filter
6-5 Sh 1	Containment Penetrations
6-5 Sh 2	Containment Penetrations
6-5 Sh 2A	Containment Penetrations
6-5 Sh 3	Containment Penetrations
6-6	Reactor Cavity Flooding System
6-7	Capacity Curve 1713A Nozzle

SECTIONS

7.1	INTRODUCTION.....	7.1-1
7.2	REACTOR PROTECTIVE SYSTEM.....	7.2-1
7.2.1	GENERAL.....	7.2-1
7.2.2	DESIGN BASES.....	7.2-2
7.2.3	REACTOR PROTECTIVE SYSTEM ACTIONS.....	7.2-4
7.2.3.1	High Rate-of-Change of Power.....	7.2-4
7.2.3.2	Variable High Power.....	7.2-5
7.2.3.3	Low Primary Coolant Flow.....	7.2-6
7.2.3.4	High Pressurizer Pressure.....	7.2-7
7.2.3.5	Thermal Margin/Low Pressure.....	7.2-8
7.2.3.6	Loss of Load.....	7.2-9
7.2.3.7	Low Steam Generator Water Level.....	7.2-9
7.2.3.8	Low Steam Generator Pressure.....	7.2-9
7.2.3.9	Containment High Pressure.....	7.2-10
7.2.3.10	Manual Trip.....	7.2-10
7.2.4	SIGNAL GENERATION.....	7.2-11
7.2.5	LOGIC OPERATION.....	7.2-12
7.2.5.1	Trip Logic (See Figure 7-2).....	7.2-12
7.2.5.2	Trip Bypass Logic.....	7.2-12
7.2.5.3	CRDM Clutch Power Circuitry (See Figure 7-1).....	7.2-14
7.2.6	TESTING.....	7.2-15
7.2.7	EFFECTS OF FAILURES.....	7.2-16
7.2.8	POWER SOURCES.....	7.2-18
7.2.9	PHYSICAL SEPARATION AND ELECTRICAL ISOLATION.....	7.2-19
7.2.9.1	Physical Separation.....	7.2-19
7.2.9.2	Electrical Isolation.....	7.2-19
7.2.10	REACTOR TRIP AND PRETRIP SET POINTS.....	7.2-21
7.3	ENGINEERED SAFEGUARDS CONTROLS.....	7.3-1
7.3.1	INTRODUCTION.....	7.3-1
7.3.2	SAFETY INJECTION SYSTEM CONTROL CIRCUITS AND EQUIPMENT INITIATION.....	7.3-2
7.3.2.1	Design Basis.....	7.3-2
7.3.2.2	Description and Operation.....	7.3-2
7.3.2.3	Design Analysis.....	7.3-4
7.3.3	CONTAINMENT HIGH PRESSURE AND HIGH RADIATION.....	7.3-5
7.3.3.1	Design Basis.....	7.3-5
7.3.3.2	Description and Operation.....	7.3-5
7.3.3.3	Design Analysis.....	7.3-8

7.3.4	SAFETY INJECTION AND REFUELING WATER TANK	
	LOW LEVEL	7.3-9
7.3.4.1	Design Basis	7.3-9
7.3.4.2	Description and Operation	7.3-10
7.3.4.3	Design Analysis	7.3-11
7.3.5	ENGINEERED SAFEGUARDS TESTING	7.3-11
7.3.5.1	Design Bases	7.3-11
7.3.5.2	Testing Description	7.3-12
7.4	OTHER SAFETY RELATED PROTECTION, CONTROL AND DISPLAY SYSTEMS	7.4-1
7.4.1	REACTOR SHUTDOWN CONTROLS	7.4-1
7.4.2	PRIMARY COOLANT BOUNDARIES PROTECTION	7.4-1
7.4.2.1	Primary Coolant Overpressure Protection System	7.4-1
7.4.2.2	Other Primary Coolant Boundaries Protection.....	7.4-5
7.4.3	AUXILIARY FEEDWATER CONTROLS	7.4-6
7.4.3.1	Auxiliary Feedwater Initiation	7.4-6
7.4.3.2	Auxiliary Feedwater Flow Controls and Isolation.....	7.4-12
7.4.4	CONTAINMENT HYDROGEN CONTROLS	7.4-15
7.4.4.1	Design Basis	7.4-15
7.4.5	VENTILATION AND EFFLUENT RELEASES CONTROLS	7.4-16
7.4.5.1	Control Room	7.4-16
7.4.5.2	Engineered Safeguards Pump Rooms	7.4-16
7.4.5.3	Radwaste Area	7.4-16
7.4.5.4	Fuel Handling Areas	7.4-16
7.4.5.5	Waste Gas Decay Tank.....	7.4-16
7.4.6	OTHER SAFETY RELATED DISPLAY SYSTEMS	7.4-17
7.4.6.1	Subcooled Margin Monitor	7.4-17
7.4.6.2	Wide-Range Containment Pressure, Temperature and Water Level.....	7.4-18
7.4.6.3	Reactor Vessel Level Monitoring System	7.4-19
7.4.6.4	Core Exit Thermocouple (CET) System	7.4-21
7.5	NONSAFETY-RELATED REGULATING CONTROLS	7.5-1
7.5.1	DESIGN BASES	7.5-1
7.5.1.1	Reactor Regulating	7.5-1
7.5.1.2	Primary Pressure Regulating	7.5-2
7.5.1.3	Feedwater Regulating.....	7.5-2
7.5.1.4	Pressurizer Level Regulating	7.5-3
7.5.1.5	Steam Dump and Bypass	7.5-3
7.5.1.6	Turbine Runback.....	7.5-4
7.5.1.7	Turbine Generator Controls	7.5-4

7.5.2	SYSTEM DESIGN	7.5-4
7.5.2.1	Reactor Regulating	7.5-4
7.5.2.2	Primary Pressure Regulating	7.5-7
7.5.2.3	Feedwater Regulating.....	7.5-8
7.5.2.4	Pressurizer Level Regulating.....	7.5-9
7.5.2.5	Steam Dump and Bypass	7.5-9
7.5.2.6	Turbine Generator Controls	7.5-11
7.5.3	SYSTEM EVALUATION.....	7.5-12
7.5.3.1	Rod Drive Control System.....	7.5-12
7.5.3.2	Primary Pressure Regulating	7.5-13
7.5.3.3	Feedwater Regulating.....	7.5-13
7.5.3.4	Pressurizer Level Regulating.....	7.5-14
7.5.3.5	Steam Dump and Bypass	7.5-16
7.5.3.6	Turbine Generator Controls	7.5-17
7.6	NUCLEAR STEAM SUPPLY SYSTEM INSTRUMENTATION	7.6-1
7.6.1	DESIGN BASES.....	7.6-1
7.6.1.1	Process Instrumentation	7.6-1
7.6.1.2	Nuclear Instrumentation.....	7.6-2
7.6.1.3	Control Rod Position Instrumentation	7.6-2
7.6.1.4	Incore Instrumentation	7.6-3
7.6.1.5	Palisades Plant Computer (PPC)	7.6-4
7.6.2	SYSTEM DESCRIPTION	7.6-5
7.6.2.1	Process Instrumentation	7.6-5
7.6.2.2	Nuclear Instrumentation	7.6-11
7.6.2.3	Control Rod Position Instrumentation	7.6-15
7.6.2.4	Incore Instrumentation	7.6-17
7.6.2.5	Palisades Plant Computer.....	7.6-19
7.7	OPERATING CONTROL STATIONS	7.7-1
7.7.1	GENERAL LAYOUT	7.7-1
7.7.2	CONTROL ROOM	7.7-1
7.7.3	ENGINEERED SAFEGUARDS AUXILIARY PANEL (C-33)	7.7-4
7.7.4	AUXILIARY HOT SHUTDOWN CONTROL PANELS (C-150/C-150A).....	7.7-5
7.7.5	RADWASTE SYSTEM LOCAL CONTROL PANEL	7.7-7
7.7.6	MISCELLANEOUS LOCAL CONTROL STATIONS	7.7-7
7.7.7	FEATURES WHICH ENHANCE SAFE OPERATION	7.7-7
7.7.8	IN-PLANT COMMUNICATION SYSTEM	7.7-7
7.7.9	OUT-OF-PLANT COMMUNICATION SYSTEM.....	7.7-8

7.8	QUALITY CONTROL.....	7.8-1
	7.8.1 SPECIFICATIONS.....	7.8-1
	7.8.2 SUPPLIER'S QUALITY CONTROL.....	7.8-2
	7.8.3 REACTOR PROTECTIVE SYSTEM SHOP TEST.....	7.8-2
	7.8.4 SHIPPING AND STORAGE.....	7.8-3
	7.8.5 RELIABILITY.....	7.8-3
	7.8.6 RECORDS AND CERTIFICATION.....	7.8-4
	7.8.7 FIELD QUALITY CONTROL.....	7.8-4
	REFERENCES.....	7-1

APPENDICES

Appendix 7A, "Engineered Safeguard Testing
Appendix 7C, "Regulatory Guide 1.97 Rev 3, Parameter Summary Table"

LIST OF TABLES

7-1	Reactor Protective System Relays
7-2	Regulating Rods Withdrawal Interlocks
7-3	Source/Wide-Range Nuclear Instrument Channel Trip Unit Actions
7-4	Power-Range Safety Channel Trip Unit Actions
7-5	Control Rod Position Light Matrix

LIST OF FIGURES

7-1	Reactor Protective System Block Diagram
7-2	Reactor Protective System Functional Diagram
7-3	Typical Measurement Channel Functional Diagram
7-4	Schematic Diagram, Pressurizer Pressure ATWS
7-5	Schematic Diagram, Pressurizer Pressure ATWS
7-6	Low Flow Protective System Functional Diagram
7-7	Logic for Thermal Margin Monitor
7-8	Neutron Flux Monitoring System Start-Up and Logarithmic Range Channels
7-9	Neutron Flux Monitoring System Power Range Channels
7-10	Power Rate-of-Change Trip and Pretrip Interface With RPS
7-11	Zero Power Mode Bypass
7-12	Reactor Protective System Interfaces
7-13	Logic Diagram, Safety Injection Initiation
7-14 Sh 1	Logic Diagram, Main Generator Protection
7-14 Sh 2	Logic Diagram, Turbine-Generator Trips and Fast Transfer
7-14 Sh 3	Logic Diagram, 2400 Volt Load Shed
7-14 Sh 4	Logic Diagram, Diesel Start (CPCo)
7-14 Sh 5	Logic Diagram, Diesel Engine Control, Trips and Alarms
7-14 Sh 6	Logic Diagram, Diesel Generator Breakers
7-14 Sh 7	Logic Diagram, Bus 1C and 1D Incoming Breakers
7-14 Sh 8	Logic Diagram, Power to Bus 1E, 1F and 1G Incoming Breakers

7-14 Sh 9	Logic Diagram, Bus 1A & 1B Incoming Breakers
7-14 Sh 10	Logic Diagram, Generator Breaker and M.O.D. Control
7-14 Sh 11	Logic Diagram, Start-Up XFMR. Protection
7-14 Sh 12	Logic Diagram, Safeguard Transformer 1-1
7-14 Sh 13	Logic Diagram, Circuit Breaker Operation
7-15	Schematic Diagram, Safety Injection Signal Auxiliary Circuits
7-16	Schematic Diagram, Safety Injection Signal Auxiliary Circuits
7-17	Schematic Diagram, Safety Injection and Sequence Loading Circuits
7-18	Schematic Diagram, Safety Injection and Sequence Loading Circuits
7-19	Schematic Diagram, Safety Injection and Sequence Loading Circuits
7-20	Schematic Diagram, Safety Injection and Sequence Loading Circuits
7-21	Schematic Diagram, Safety Injection and Sequence Loading Test Circuit
7-22	Schematic Diagram, Safety Injection and Sequence Loading Test Circuit
7-23	Schematic Diagram, Safety Injection and Sequence Loading Test Circuit
7-24	Logic Diagram, Containment High Pressure Signal
7-25	Logic Diagram, Containment High Radiation
7-26	Schematic Diagram, Containment High Pressure, High Radiation and SIRW Tank Low Level
7-27	Schematic Diagram, Containment High Pressure, High Radiation and SIRW Tank Low Level
7-28	Schematic Diagram, Containment Isolation on High Pressure or High Radiation
7-29	Schematic Diagram, Containment Isolation on High Pressure or High Radiation
7-30	Logic Diagram, SIS Test and RAS
7-31	Schematic Diagram, SIRW Tank and Containment Sump Valves
7-32	Schematic Diagram, SIRW Tank and Containment Sump Valves
7-33	Logic Diagram, Legend and Notes
7-34	Logic Diagram, Legend and Notes
7-35	Logic Diagram, Legend and Notes
7-36	Schematic Diagram, Steam Generator Level Instrumentation
7-37	Logic Diagram, Auxiliary Feedwater Actuation System
7-38	Logic Diagram, Motor Driven Auxiliary Feedwater Pump P-8A
7-39	Logic Diagram, Motor Driven Auxiliary Feedwater Pump P-8C
7-40 Sh 1	Logic Diagram, Turbine Driven Auxiliary Feedwater Pump P-8B
7-40 Sh 2	Logic Diagram, Turbine Driven Auxiliary Feedwater Pump P-8B
7-41	Interface Loop Diagram, Pump Low Suction Pressure Trip
7-41 Sh 1	Logic Diagram Turbine Driven Auxiliary Feedwater Pump P-8B
7-41 Sh 2	Logic Diagram Turbine Driven Auxiliary Feedwater Pump P-8B
7-42	Logic Diagram, Auxiliary Feedwater Pumps Low Suction Pressure Trip
7-43	Interface Loop Diagram, Flow Control
7-44	Interface Loop Diagram, Flow Control
7-45	Interface Loop Diagram, Flow and Pressure Indication
7-46	Logic Diagram, Aux Feedwater Flow Control and Pump Test Logic
7-47	Logic Diagram, Auxiliary Feedwater Flow Control and Pump Test Logic
7-48	Logic Diagram, Auxiliary Feedwater Actuation System
7-49	Logic Diagram, Auxiliary Feedwater - Steam Generator Isolation Valves

7-50	Logic Diagram, Auxiliary Feedwater - Steam Generator Isolation Valves
7-51	Logic Diagram, AFAS-FOGG Remote Display and Annunciator Assignment
7-52	Logic Diagram, AFAS-FOGG Remote Display and Annunciator Assignment
7-53	Reactor Shutdown Controls
7-54	Reactor Regulating System Block Diagram
7-55	Rod Drive Control System Schematic Diagram
7-56	Rod Position Set Points
7-57	Pressure Control Program
7-58	Block Diagram, Steam Dump and Bypass System
7-59	Pressurizer Level Control System Failures Study - Mode "A" Failure
7-60	Piping Drawing, Nuclear Detector Wells
7-61	Block Diagram, Critical Functions Monitor System

SECTIONS

8.1	INTRODUCTION	8.1-1
	8.1.1 DESIGN BASIS	8.1-1
	8.1.2 DESCRIPTION AND OPERATION.....	8.1-3
	8.1.3 ENVIRONMENTAL QUALIFICATION OF ELECTRICAL EQUIPMENT.....	8.1-4
	8.1.4 SEISMIC QUALIFICATION OF ELECTRICAL EQUIPMENT	8.1-6
	8.1.5 STATION BLACKOUT	8.1-6
8.2	NETWORK INTERCONNECTION	8.2-1
	8.2.1 DESIGN BASIS	8.2-1
	8.2.2 DESCRIPTION AND OPERATION.....	8.2-1
	8.2.3 DESIGN ANALYSIS	8.2-3
	8.2.4 TRANSMISSION SYSTEM OWNERSHIP	8.2-5
8.3	STATION DISTRIBUTION	8.3-1
	8.3.1 4,160 VOLT SYSTEM	8.3-1
	8.3.1.1 Design Basis.....	8.3-1
	8.3.1.2 Description and Operation	8.3-1
	8.3.1.3 Design Analysis.....	8.3-3
	8.3.2 2,400 VOLT SYSTEM	8.3-3
	8.3.2.1 Design Basis.....	8.3-3
	8.3.2.2 Description and Operation	8.3-3
	8.3.2.3 Design Analysis.....	8.3-7
	8.3.3 480 VOLT SYSTEM	8.3-7
	8.3.3.1 Design Basis.....	8.3-7
	8.3.3.2 Description and Operation	8.3-8
	8.3.3.3 Design Analysis.....	8.3-10
	8.3.4 CONTROL ROD DRIVE POWER.....	8.3-10
	8.3.4.1 Design Basis.....	8.3-10
	8.3.4.2 Description and Operation	8.3-11
	8.3.4.3 Design Analysis.....	8.3-11

8.3.5	DC AND PREFERRED AC SYSTEMS	8.3-11
8.3.5.1	Design Basis	8.3-11
8.3.5.2	Description and Operation	8.3-11
8.3.5.3	Design Analysis	8.3-17
8.3.6	INSTRUMENT AC SYSTEM.....	8.3-18
8.3.6.1	Design Basis	8.3-18
8.3.6.2	Description and Operation	8.3-18
8.3.6.3	Design Analysis	8.3-18
8.4	EMERGENCY POWER SOURCES.....	8.4-1
8.4.1	EMERGENCY GENERATORS.....	8.4-1
8.4.1.1	Design Basis	8.4-1
8.4.1.2	Description and Operation	8.4-1
8.4.1.3	Design Analysis	8.4-4
8.4.2	STATION BATTERIES	8.4-7
8.4.2.1	Design Basis	8.4-7
8.4.2.2	Description and Operation	8.4-8
8.4.2.3	Design Analysis	8.4-9
8.4.3	TURBINE GENERATOR COASTDOWN	8.4-9
8.4.3.1	Design Basis	8.4-9
8.4.3.2	Description and Operation	8.4-10
8.4.4	EMERGENCY POWER SUPPLY FOR PRESSURIZER HEATERS	8.4-10
8.4.4.1	Design Basis	8.4-10
8.4.4.2	Description and Operation	8.4-10
8.4.5	SUPPLEMENTAL 2400 VOLT POWER SUPPLY	8.4-11
8.4.5.1	Design Basis	8.4-11
8.4.5.2	Description and Operation	8.4-11

8.5	RACEWAY AND CABLING SYSTEM.....	8.5-1
8.5.1	DESIGN BASIS	8.5-1
8.5.1.1	Fire Protection Features	8.5-1
8.5.1.2	Electrical Penetrations of Reactor Containment ..	8.5-1
8.5.2	DESIGN DESCRIPTION.....	8.5-1
8.5.3	DESIGN EVALUATION	8.5-3
8.5.3.1	Compliance With Regulatory Guide 1.75	8.5-3
8.5.3.2	Raceway and Cabling Separation Criteria	8.5-4
8.5.3.3	Raceway and Cabling Fire Barriers	8.5-7
8.5.3.4	Cable Spreading Room Protection Design	8.5-7
8.5.3.5	Cable Penetration Rooms Protection Design	8.5-8
8.5.3.6	Raceway Runs Protection Design	8.5-9
8.5.3.7	Safety-Related Cabling Routing Via Nonsafety-Related Areas	8.5-9
8.5.3.8	Containment Building Routing Protection	8.5-10
8.5.3.9	Other Areas Routing Protection.....	8.5-10
8.6	AUTOMATIC TRANSFER, VOLTAGE PROTECTION AND LOAD SHEDDING CONTROLS	8.6-1
8.6.1	DESIGN BASIS	8.6-1
8.6.2	DESCRIPTION AND OPERATION.....	8.6-2
8.6.3	DESIGN ANALYSIS	8.6-5
8.6.3.1	Automatic Transfer System.....	8.6-5
8.6.3.2	Voltage Protection and Load Shedding Systems.	8.6-6

8.7	PHYSICAL SEPARATION, ELECTRICAL ISOLATION AND SUPPORT SYSTEMS	8.7-1
8.7.1	ELECTRICAL ISOLATION (SEE FIGURE 8-1).....	8.7-1
8.7.2	PHYSICAL SEPARATION.....	8.7-2
8.7.2.1	General	8.7-2
8.7.2.2	Transformers	8.7-3
8.7.2.3	Protection Against Water Damage.....	8.7-3
8.7.2.4	Smoke Control.....	8.7-4
8.7.2.5	Switchgear Rooms Protection	8.7-4
8.7.2.6	Emergency Generators Rooms Protection	8.7-5
8.7.2.7	Battery Rooms Protection	8.7-6
8.7.3	SUPPORT SYSTEMS	8.7-7
8.7.3.1	Ventilation	8.7-7
8.8	MOTOR OPERATED VALVES	8.8-1
8.9	LIGHTING SYSTEMS	8.9-1
8.10	QUALITY CONTROL	8.10-1
	REFERENCES	8-1

LIST OF TABLES

8-1	Switchyard System Ratings and Construction of Components
8-2	4,160 Volt System Ratings and Construction of Components
8-3	2,400 Volt System Ratings and Construction of Components
8-4	480 Volt System Ratings and Construction of Components
8-5	DC and Preferred AC Systems Ratings and Construction of Components
8-6	Diesel 1-1 Sequence Start
8-7	Diesel 1-2 Sequence Start

LIST OF FIGURES

8-1 Sh 1	Single Line Meter & Relay Diagram, 480 Volt Motor Control Center - Warehouse
8-1 Sh 2	Plant Single Line Diagram
8-1 Sh 3	Plant Single Line Diagram
8-2	Substation
8-3 Sh 1	Single Line Meter & Relay Diagram, Generator & 4160 V System
8-3 Sh 2	Single Line Meter & Relay Diagram, Cooling Tower Systems
8-4	Single Line Meter & Relay Diagram, 2400 Volt System
8-5 Sh 1	Single Line Meter & Relay Diagram, 480 Volt Load Centers
8-5 Sh 2	Single Line Meter & Relay Diagram, 480 Volt Load Centers
8-5 Sh 3	Single Line Meter & Relay Diagram, Cooling Tower Systems
8-6 Sh 1	Single Line Meter & Relay Diagram, 480 Volt Motor Control Centers
8-6 Sh 2	Single Line Meter & Relay Diagram, 480 Volt Motor Control Centers
8-6 Sh 3	Single Line Meter & Relay Diagram, 480 Volt Motor Control Centers
8-6 Sh 4	Single Line Meter & Relay Diagram, Radwaste System
8-7 Sh 1	Single Line Meter & Relay Diagram, 125V DC, 120V Instrument & Preferred AC System
8-7 Sh 2	Single Line Meter & Relay Diagram, 125V DC, 120V Instrument & Preferred AC System
8-8	125V DC System, Auxiliary Shutdown Layout
8-9	Substation 120/240V AC & 125V DC Power Distribution Center
8-10	Voltage Protection Sensors Location
8-11	Piping & Instrument Diagram, Lube Oil, Fuel Oil and Diesel Generator Systems

SECTIONS

9.1	SERVICE WATER SYSTEM.....	9.1-1
9.1.1	DESIGN BASIS	9.1-1
9.1.2	SYSTEM DESCRIPTION AND OPERATION.....	9.1-1
9.1.2.1	System Description.....	9.1-1
9.1.2.2	Component Description	9.1-2
9.1.2.3	System Operation	9.1-3
9.1.3	DESIGN ANALYSIS	9.1-5
9.1.3.1	Margins of Safety	9.1-5
9.1.3.2	Provisions for Testing and Inspection.....	9.1-6
9.1.3.3	Discharge Line Rupture Analysis	9.1-6
9.1.3.4	Generic Letter 96-06 Waterhammer Analysis	9.1-8
9.2	REACTOR PRIMARY SHIELD COOLING SYSTEM.....	9.2-1
9.2.1	DESIGN BASIS	9.2-1
9.2.2	SYSTEM DESCRIPTION AND OPERATION.....	9.2-1
9.2.2.1	System Description.....	9.2-1
9.2.2.2	Component Description	9.2-1
9.2.2.3	System Operation	9.2-2
9.2.3	DESIGN ANALYSIS	9.2-3
9.2.3.1	Margins of Safety	9.2-3
9.3	COMPONENT COOLING SYSTEM.....	9.3-1
9.3.1	DESIGN BASIS	9.3-1
9.3.2	SYSTEM DESCRIPTION AND OPERATION.....	9.3-1
9.3.2.1	System Description.....	9.3-1
9.3.2.2	Component Description	9.3-2
9.3.2.3	System Operation	9.3-2
9.3.3	DESIGN ANALYSIS	9.3-6
9.3.3.1	Margins of Safety	9.3-6
9.3.3.2	Provisions for Testing and Inspection.....	9.3-7
9.4	SPENT FUEL POOL COOLING SYSTEM	9.4-1
9.4.1	DESIGN BASIS	9.4-1
9.4.2	SYSTEM DESCRIPTION AND OPERATION.....	9.4-1
9.4.2.1	System Description.....	9.4-1
9.4.2.2	Component Description	9.4-2
9.4.2.3	System Operation	9.4-2
9.4.3	DESIGN ANALYSIS	9.4-3
9.4.3.1	Margins of Safety	9.4-3
9.4.3.2	Provisions for Testing.....	9.4-4

9.5	COMPRESSED AIR SYSTEMS	9.5-1
9.5.1	INSTRUMENT AIR SYSTEM	9.5-1
9.5.1.1	Design Basis	9.5-1
9.5.1.2	System Description.....	9.5-1
9.5.1.3	Component Description	9.5-1
9.5.1.4	System Operation	9.5-2
9.5.1.5	Design Analysis	9.5-3
9.5.2	HIGH PRESSURE AIR SYSTEM	9.5-4
9.5.2.1	Design Basis	9.5-4
9.5.2.2	System Description.....	9.5-4
9.5.2.3	Component Description	9.5-4
9.5.2.4	System Operation	9.5-5
9.5.2.5	Design Analysis	9.5-5
9.5.3	BACKUP SYSTEMS	9.5-6
9.5.3.1	Design Basis	9.5-6
9.5.3.2	System Description.....	9.5-7
9.5.3.3	Component Description	9.5-7
9.5.3.4	System Operation	9.5-7
9.5.3.5	Design Analysis	9.5-8
9.5.4	FEEDWATER PURITY AIR SYSTEM	9.5-8
9.5.4.1	Design Basis	9.5-8
9.5.4.2	System Description.....	9.5-8
9.5.4.3	Component Description	9.5-8
9.5.4.4	System Operation	9.5-8
9.5.5	RADWASTE AREA COMPRESSOR	9.5-9
9.6	FIRE PROTECTION	9.6-1
9.6.1	DESIGN BASIS	9.6-1
9.6.2	SYSTEM DESCRIPTION AND OPERATION.....	9.6-2
9.6.2.1	System Description.....	9.6-2
9.6.2.2	Component Description	9.6-3
9.6.2.3	System Operation	9.6-4
9.6.3	DESIGN ANALYSIS.....	9.6-5
9.6.4	FIRE PROTECTION PROGRAM.....	9.6-5
9.7	AUXILIARY FEEDWATER SYSTEM.....	9.7-1
9.7.1	DESIGN BASIS	9.7-1
9.7.2	SYSTEM DESCRIPTION AND OPERATION.....	9.7-1
9.7.2.1	System Description.....	9.7-1
9.7.2.2	Component Description	9.7-2
9.7.2.3	System Operation	9.7-2
9.7.3	DESIGN ANALYSIS	9.7-4
9.7.4	SYSTEM RELIABILITY	9.7-5
9.7.5	TESTS AND INSPECTION	9.7-5

9.8	HEATING, VENTILATION AND AIR-CONDITIONING SYSTEM	9.8-1
9.8.1	DESIGN BASIS	9.8-1
9.8.2	SYSTEM DESCRIPTION AND OPERATION.....	9.8-2
9.8.2.1	System Description.....	9.8-2
9.8.2.2	Component Description	9.8-4
9.8.2.3	Codes	9.8-6
9.8.2.4	Operation	9.8-7
9.8.3	TESTS AND INSPECTIONS	9.8-22
9.8.4	LOSS OF INSTRUMENT AIR TO VENTILATION DAMPERS.....	9.8-23
9.8.5	SAFETY EVALUATION	9.8-24
9.8.5.1	Introduction	9.8-24
9.8.5.2	Evaluation.....	9.8-24
9.9	SAMPLING SYSTEM.....	9.9-1
9.9.1	DESIGN BASIS	9.9-1
9.9.2	SYSTEM DESCRIPTION AND OPERATION.....	9.9-1
9.9.3	SYSTEM EVALUATION.....	9.9-2
9.10	CHEMICAL AND VOLUME CONTROL SYSTEM	9.10-1
9.10.1	DESIGN BASIS	9.10-1
9.10.2	SYSTEM DESCRIPTION AND OPERATION.....	9.10-1
9.10.2.1	General.....	9.10-1
9.10.2.2	Volume Control	9.10-2
9.10.2.3	Chemical Control	9.10-3
9.10.2.4	Reactivity Control	9.10-4
9.10.2.5	Pressure-Leakage Test System	9.10-5
9.10.2.6	Component Functional Description	9.10-5
9.10.3	OPERATIONS.....	9.10-8
9.10.3.1	Start-Up.....	9.10-8
9.10.3.2	Normal Operations.....	9.10-9
9.10.3.3	Shutdown.....	9.10-10
9.10.3.4	Emergency Operations.....	9.10-11
9.10.4	DESIGN ANALYSIS	9.10-11
9.10.5	TESTING AND INSPECTION	9.10-12
9.10.6	REGENERATIVE HEAT EXCHANGER.....	9.10-12
9.11	FUEL HANDLING AND STORAGE SYSTEMS.....	9.11-1
9.11.1	INTRODUCTION.....	9.11-1
9.11.2	NEW FUEL STORAGE	9.11-1
9.11.3	SPENT FUEL STORAGE	9.11-2
9.11.3.1	Original Design	9.11-2
9.11.3.2	Modified Spent Fuel Storage	9.11-3
9.11.3.3	Structural Analysis.....	9.11-5

9.11.3.4	Prevention of Criticality During Transfer and Storage	9.11-6
9.11.3.5	Radiological Considerations	9.11-10
9.11.3.5.1	Radiation Shielding.....	9.11-10
9.11.3.5.2	Pool Surface Dose.....	9.11-10
9.11.3.5.3	Airborne Doses.....	9.11-11
9.11.3.5.4	General Area Doses	9.11-12
9.11.3.5.5	Protection Against Radioactivity Release.....	9.11-12
9.11.4	FUEL HANDLING SYSTEM.....	9.11-13
9.11.4.1	General.....	9.11-14
9.11.4.2	Fuel Handling Structures	9.11-15
9.11.4.3	Major Fuel Handling Equipment	9.11-15
9.11.4.4	System Evaluation	9.11-28
9.11.4.5	Test Program.....	9.11-29
9.11.5	SPENT FUEL STORAGE AT AN INDEPENDENT SPENT FUEL STORAGE INSTALLATION	9.11-30
9.11.5.1	Description Of 10CFR72 License Items Which Interface With The 10CFR50 License.....	9.11-31
9.11.5.1.1	Multi-Assembly Sealed Basket And Transfer Cask.....	9.11-31
9.11.5.1.2	Transnuclear 32PT-S125 DSC, 24 PTH-S125 DSC and OS-197 Transfer Cask.....	9.11-32
9.11.5.1.3	Impact Limiting Pads	9.11-32
9.11.5.1.4	Security For The Independent Spent Fuel Storage Installation.....	9.11-33
9.11.5.1.5	Lifting Equipment.....	9.11-33
9.11.5.1.6	Spent Fuel Pool Boron And Temperature Limits	9.11-33
9.12	ULTIMATE HEAT SINK.....	9.12-1
9.12.1	DESIGN BASIS	9.12-1
9.12.2	SYSTEM DESCRIPTION AND OPERATION.....	9.12-1
9.12.2.1	System Description.....	9.12-1
9.12.2.2	System Operation	9.12-3
9.12.3	DESIGN ANALYSIS	9.12-3
9.12.3.1	Margin of Safety	9.12-3
9.12.3.2	Provisions for Testing and Inspection.....	9.12-4
9.12.3.3	Heat Sink At Hot Shutdown Conditions	9.12-4
	REFERENCES.....	9-1

LIST OF TABLES

9-1	Service Water System Flow Requirements
9-2	Service Water System Design Ratings and Construction of Components
9-3	Reactor Primary Shield Cooling System Design Ratings and Construction of Components
9-4	Component Cooling System Heat Loads
9-5	Component Cooling Water System Design Ratings and Construction of Components
9-6	Component Cooling System Required Flow Rates
9-7	Spent Fuel Pool Cooling System Design Ratings and Construction of Components
9-8	Instrument Air System Design Ratings and Construction of Components
9-9	Effect of Loss of Air to Air-Operated Valves
9-10	Fire Detection Instrumentation
9-11	Fire Protection System Design Ratings and Construction of Components
9-12	Auxiliary Feedwater System Design Ratings and Construction of Components
9-13	Design Basis Ambient Conditions
9-14	Control Room HVAC System Major Component Design Data
9-15	Ventilation Dampers: Functions and Positions for Various Modes of Plant Operation
9-16	Sampling Stations
9-17	Sample Point Summary
9-18	Chemical and Volume Control System Design Parameters
9-19	Fuel Handling Data
9-20	Fuel Building Crane

LIST OF FIGURES

9-1 Sh 1	System Diagram, Service Water System
9-1 Sh 1A	P&ID, Service Water System
9-1 Sh 1B	P&ID, Service Water System
9-1 Sh 2	P&ID, Service Water Screen Structure, and Chlorinator
9-2	P&ID, Shield Cooling System
9-3	Nominal Operating Conditions Cooling Coil Centerline
9-4	Nominal Operating Conditions Mid-Span of Two Cooling Coils
9-5	Bounding Design Cooling Coil Centerline
9-6	Bounding Design Conditions and Mid-Span of Two Cooling Coils
9-7 Sh 1	P&ID, Component Cooling System
9-7 Sh 2	P&ID, Component Cooling System
9-7 Sh 3	P&ID, Component Cooling System
9-8	P&ID, Spent Fuel Pool Cooling System
9-9 Sh 1	P&ID, Service and Instrument Air Systems
9-9 Sh 2	P&ID, Miscellaneous Gas Supply Systems
9-10 Sh 1	P&ID, High Pressure Air Operated Valves
9-10 Sh 1A	P&ID High Pressure Air Operated Valves
9-10 Sh 2	P&ID, High Pressure Air Operated Valves
9-11 Sh 1	P&ID, Fire Protection System
9-11 Sh 2	P&ID, Fire Protection System
9-11 Sh 3	P&ID, Fire Protection System
9-12	P&ID, Auxiliary Feedwater System
9-13	P&ID, Auxiliary Feedwater Steam Supply
9-14 Sh 1	P&ID, Heating, Ventilation and Air Conditioning, Switchgear and Cable Spreading Rooms
9-14 Sh 2	P&ID, Heating, Ventilation and Air Conditioning, Containment Building
9-14 Sh 3	P&ID, Heating, Ventilation and Air Conditioning, Radwaste Area
9-14 Sh 4	P&ID, Heating, Ventilation and Air Conditioning, Miscellaneous Buildings
9-14 Sh 5	P&ID, Heating, Ventilation and Air Conditioning, Control Room
9-14 Sh 6	P&ID, Heating, Ventilation and Air Conditioning, Control Room
9-14 Sh 7	P&ID, Heating, Ventilation and Air Conditioning, Control Room
9-14 Sh 8	Heating and Ventilation Air Flow Diagram
9-14 Sh 9	P&ID, Heating, Ventilating and Cooling Auxiliary Building Addition
9-15	P&ID, Fluid System Diagram Post Accident Sample Monitor System
9-16	P&ID, Gas Analyzing Systems (Containment Hydrogen)
9-17	Monitoring and Sampling Systems (Radwaste Addition)
9-18 Sh 1	P&ID, Chemical and Volume Control System
9-18 Sh 1A	P&ID, Chemical and Volume Control System
9-18 Sh 1B	P&ID, Chemical and Volume Control System
9-19	Boron Concentration vs Core Lifetime
9-20	Palisades Plant Spent Fuel Storage Rack Arrangement

SECTIONS

10.1 DESIGN BASIS..... 10.1-1

10.2 SYSTEM DESCRIPTION AND OPERATION 10.2-1

10.2.1 SYSTEM GENERAL DESCRIPTION..... 10.2-1

10.2.2 SYSTEM TURBINE..... 10.2-5

10.2.2.1 High-Pressure Turbine 10.2-5

10.2.2.2 Low-Pressure Turbine 10.2-6

10.2.2.3 Electrical Generator..... 10.2-8

10.2.2.4 Exciter..... 10.2-8

10.2.3 CONDENSATE AND FEEDWATER..... 10.2-9

10.2.3.1 Condensate System..... 10.2-9

10.2.3.2 Condensate Demineralizer System..... 10.2-10

10.2.3.3 Feedwater Regulating System..... 10.2-11

10.2.4 CIRCULATING WATER SYSTEM..... 10.2-13

10.2.4.1 Cooling Towers..... 10.2-13

10.2.4.2 Makeup and Blowdown..... 10.2-14

10.2.4.3 Dilution..... 10.2-14

10.2.5 CODES AND STANDARDS..... 10.2-14

10.3 SYSTEM ANALYSIS..... 10.3-1

10.3.1 REACTOR AND/OR TURBINE TRIP..... 10.3-1

10.4 TESTS AND INSPECTIONS..... 10.4-1

10.4.1 PIPE WALL THINNING INSPECTION PROGRAM..... 10.4-1

REFERENCES.....None

LIST OF TABLES

10-1 Turbine Casing Properties

10-2 Stud Mechanical Properties

10-3 Signal System Operating Conditions

10-4 Cooling Tower Design Summary

10-5 Cooling Tower Pumps

LIST OF FIGURES

10-1 System Diagram, Main Steam, Main and Auxiliary Turbine Systems

10-2 System Diagram, Extractions, Heaters Vents and Drain Systems

10-3 Sh 1 Piping and Instrument Diagram, Steam Generator Blowdown Modification

10-3 Sh 2 Piping and Instrument Diagram, Steam Generator Blowdown Modification

10-3 Sh 3 Piping and Instrument Diagram, Steam Generator Blowdown Modification

10-4 System Diagram, Feedwater and Condensate System

10-5 General Assembly Electrical Generator

10-6 System Diagram, Cooling Tower System

TABLE OF CONTENTS

SECTIONS

11.1	SOURCE TERMS	11.1-1
11.2	LIQUID RADIOACTIVE WASTE SYSTEM	11.2-1
	11.2.1 DESIGN BASES.....	11.2-1
	11.2.1.1 Design Objective.....	11.2-1
	11.2.1.2 Design Criteria	11.2-1
	11.2.1.3 Codes	11.2-1
	11.2.2 SYSTEM DESCRIPTION	11.2-2
	11.2.2.1 Clean Waste Section.....	11.2-2
	11.2.2.2 Dirty Waste Section	11.2-4
	11.2.2.3 Laundry Waste Section	11.2-4
	11.2.3 RADIOACTIVE RELEASES.....	11.2-5
	11.2.3.1 Clean Waste Section.....	11.2-5
	11.2.3.2 Dirty Waste Section	11.2-8
	11.2.3.3 Laundry Waste Section	11.2-8
	11.2.4 BALANCE OF PLANT (BOP) INTERFACE.....	11.2-8
	11.2.4.1 Clean Waste Section.....	11.2-8
	11.2.4.2 Dirty Waste Section	11.2-8
	11.2.4.3 Laundry Waste Section	11.2-9
	11.2.4.4 Alternate Radwaste Processing System.....	11.2-9
11.2.5	SYSTEM EVALUATION	11.2-9
11.3	GASEOUS RADIOACTIVE WASTE SYSTEM	11.3-1
	11.3.1 DESIGN BASIS	11.3-1
	11.3.2 SYSTEM DESCRIPTION	11.3-1
	11.3.2.1 Gas Collection Header.....	11.3-1
	11.3.2.2 Waste Gas Processing System.....	11.3-2
	11.3.3 RADIOACTIVE RELEASES.....	11.3-2
	11.3.4 BOP INTERFACE	11.3-3
	11.3.5 SYSTEM EVALUATION.....	11.3-3
11.4	SOLID WASTE MANAGEMENT SYSTEM.....	11.4-1
	11.4.1 DESIGN BASIS	11.4-1
	11.4.2 SYSTEM DESCRIPTION	11.4-2
	11.4.2.1 System Modifications	11.4-2
	11.4.2.2 Radioactive Waste Storage Facilities	11.4-3
	11.4.2.3 Alternate Radwaste Processing Standard Dewatering System	11.4-8
	11.4.3 RADIOACTIVE RELEASES.....	11.4-8
	11.4.4 BOP INTERFACE	11.4-9
	11.4.5 SYSTEM EVALUATION.....	11.4-9
	11.4.6 REQUEST TO RETAIN SOIL IN ACCORDANCE WITH 10CFR20.302.....	11.4-9

TABLE OF CONTENTS

11.5	PROCESS AND EFFLUENT RADIOLOGICAL MONITORING AND SAMPLING SYSTEM.....	11.5-1
	11.5.1 DESIGN BASIS	11.5-1
	11.5.2 SYSTEM DESCRIPTION	11.5-1
	11.5.3 EFFLUENT MONITORING AND SAMPLING	11.5-2
	11.5.4 SYSTEM EVALUATION.....	11.5-3
11.6	RADIATION PROTECTION.....	11.6-1
	11.6.1 GENERAL	11.6-1
	11.6.1.1 Radiation Exposure of Personnel.....	11.6-1
	11.6.1.2 Radiation Exposure of Materials and Components.....	11.6-1
	11.6.2 RADIATION ZONING AND ACCESS CONTROL.....	11.6-2
	11.6.3 GENERAL DESIGN CONSIDERATIONS	11.6-3
	11.6.3.1 Specific Design Values.....	11.6-3
	11.6.3.2 Reactor Core Data.....	11.6-3
	11.6.4 SHIELDING DESIGN	11.6-4
	11.6.4.1 Containment Building Shell	11.6-4
	11.6.4.2 Containment Building Interior.....	11.6-4
	11.6.4.3 Auxiliary Building (Including Radwaste Building Addition).....	11.6-5
	11.6.4.4 Turbine Building	11.6-7
	11.6.4.5 General Plant Yard Areas	11.6-7
	11.6.4.6 Other Buildings	11.6-7
	11.6.5 AREA RADIATION MONITORING SYSTEMS.....	11.6-8
	11.6.5.1 Design Basis	11.6-8
	11.6.5.2 System Description.....	11.6-8
	11.6.5.3 Testing and Maintenance	11.6-9
	11.6.6 HEALTH PHYSICS	11.6-9
	11.6.6.1 Facilities	11.6-9
	11.6.6.2 Tool and Equipment Decontamination Facility	11.6-10
	11.6.6.3 Calibration Facility.....	11.6-11
	11.6.6.4 Radiation Control.....	11.6-11
	11.6.6.5 Shielding.....	11.6-11
	11.6.6.6 Access Control.....	11.6-11
	11.6.6.7 Facility Contamination Control.....	11.6-13
	11.6.6.8 Personnel Contamination Control	11.6-14
	11.6.6.9 Airborne Contamination Control	11.6-15
	11.6.6.9.1 Respiratory Protection Program.....	11.6-15
	11.6.6.10 External Radiation Dose Determination.....	11.6-17
	11.6.6.11 Internal Radiation Dose Determination.....	11.6-17

TABLE OF CONTENTS

11.6.7 RADIATION PROTECTION INSTRUMENTATION..... 11.6-18
 11.6.7.1 Counting Room Instrumentation 11.6-18
 11.6.7.2 Portable Radiation Detecting Instrumentation . 11.6-18
 11.6.7.3 Air Sampling Instrumentation 11.6-18
 11.6.7.4 Personal Monitoring Instrumentation..... 11.6-19
 11.6.7.5 Emergency Instrumentation 11.6-19
11.6.8 TESTS AND INSPECTIONS 11.6-19
 11.6.8.1 Shielding 11.6-19
 11.6.8.2 Area and Process Radiation Monitors 11.6-20
 11.6.8.3 Continuous Air Monitors 11.6-20
 11.6.8.4 Radiation Protection Instrumentation 11.6-20
**11.6.9 CONTROL OF BYPRODUCT, SOURCE OR SPECIAL NUCLEAR
MATERIAL (SNM) SOURCES 11.6-21**
11.6.10 RADIOACTIVE MATERIAL STORAGE FACILITIES 11.6-22

REFERENCES..... 11-1

LIST OF TABLES

11-1 Primary Coolant Fission and Corrosion Product Activities
11-2 Radioactive Waste Quantities of Significant Activity
11-3 Equipment Ratings and Construction Codes - Original Equipment
11-4 Equipment Ratings and Construction Codes - Additional Equipment Installed
1971-1973
11-5 Primary System Drain Tank
11-6 Equipment Drain Tank
11-7 Dirty Waste Drain Tank
11-8 Liquid Radwaste
11-9 Maximum Calculated Tritium Release Due to Evaporation From Refueling
Cavity and Spent Fuel Pool
11-10 LADTAP Input Data and Results Maximum Individual Dose Calculations
11-11 Activity in Coolant and Gaseous Waste
11-12 Special Location GASPAP Input Data
11-13 Dose Results for Special Locations, Maximum Individual Doses by Age
Group and Organ
11-14 Deleted
11-15 Process Radiation Service and Equipment
11-16 Area Radiation Detectors
11-17 Primary Coolant Fission and Corrosion Product Activities for AST Dose
Analyses

TABLE OF CONTENTS

LIST OF FIGURES

11-1 Sh 1	P&ID Radioactive Waste Treatment System Clean
11-1 Sh 1A	P&ID Radioactive Waste Treatment System Clean
11-1 Sh 1B	P&ID Radioactive Waste Treatment System Clean
11-1 Sh 1C	P&ID Radioactive Waste Treatment System Clean
11-1 Sh 2	P&ID Radioactive Waste Treatment System Clean
11-1 Sh 3	P&ID Radwaste Evaporator System Clean Wastes
11-2 Sh 1	P&ID Dirty Waste & Gaseous Waste
11-2 Sh 2	P&ID Radwaste Evaporator System Miscellaneous Waste
11-2 Sh 2A	P&ID Radwaste Evaporator System Miscellaneous Waste
11-2 Sh 2B	P&ID Radwaste Evaporator System Miscellaneous Waste
11-3 Sh 1	P&ID Radioactive Waste Treatment System Gaseous Waste
11-3 Sh 2	P&ID Radioactive Waste Treatment System Gaseous Waste
11-4 Sh 1	Spent Resin Storage and Radwaste Packaging System
11-4 Sh 2	P&ID Radwaste Solidification System
11-4 Sh 3	P&ID Liquid Volume Reduction System
11-5 Sh 1	P&ID Radiation Monitoring and Sampling Systems
11-5 Sh 1A	P&ID Radiation Monitoring and Sampling Systems
11-5 Sh 1B	P&ID Radiation Monitoring and Sampling Systems
11-5 Sh 2	P&ID Radiation Monitoring and Sampling Systems
11-6	Gaseous Effluent Monitoring System
11-7	Architectural Access Control and Radiation Zoning (Plant in Operation)
11-8	Architectural Access Control and Radiation Zoning (Plant in Operation)
11-9	Architectural Access Control and Radiation Zoning (Plant in Operation)

SECTIONS

12.1 ORGANIZATION AND RESPONSIBILITY 12.1-1
 12.1.1 MANAGEMENT AND TECHICAL SUPPORT ORGANIZATIONS 12.1-1

12.2 TRAINING 12.2-1
 12.2.1 PLANT STAFF TRAINING PROGRAM..... 12.2-1
 12.2.1.1 Plant Access Training..... 12.2-1
 12.2.1.2 Radiation Worker Training (RWT)..... 12.2-1
 12.2.1.3 Licensed and Nonlicensed Operator Training Program 12.2-2
 12.2.1.4 Instrumentation and Controls (I&C) Technician Training Programs 12.2-2
 12.2.1.5 Mechanical and Electrical Maintenance Personnel Training Program 12.2-3
 12.2.1.6 Radiological Protection Technician Training Program 12.2-3
 12.2.1.7 Chemistry Technician Training Program 12.2-3
 12.2.1.8 Engineering Support Personnel Training Program 12.2-3
 12.2.1.9 Fire Protection Training..... 12.2-4
 12.2.2 TRAINING EFFECTIVENESS EVALUATION 12.2-4

12.3 PLANT PROCEDURES 12.3-1
 12.3.1 PROCEDURE CONTROL REQUIREMENTS..... 12.3-1
 12.3.2 UPGRADE AND MAINTENANCE OF EMERGENCY OPERATING PROCEDURES 12.3-2
 12.3.3 OPERATING REQUIREMENTS MANUAL (ORM)..... 12.3-2

12.4 REVIEW AND ASSESMENT 12.4-1

12.5 EMERGENCY PLANNING 12.5-1

12.6 INDUSTRIAL SECURITY 12.6-1

REFERENCES.....None

TABLES.....None

LIST OF FIGURES

12-1 Entergy Nuclear Site Leadership
 12-2 Plant Specific Titles for Generic Titles Located in the Technical Specifications
 12-3 Deleted

SECTIONS

13.1	TESTS PRIOR TO REACTOR FUELING	13.1-1
13.2	REACTOR FUELING AND PHYSICS TESTS.....	13.2-1
	13.2.1 CORE LOADING	13.2-1
	13.2.2 POST-LOADING TESTS	13.2-2
	13.2.3 INITIAL CRITICALITY.....	13.2-2
13.3	POST CRITICALITY AND POWER ESCALATION.....	13.3-1
	13.3.1 ZERO POWER TESTING.....	13.3-1
	13.3.2 POWER ESCALATION.....	13.3-1
	13.3.3 ESCALATION TO 2,650 MWt.....	13.3-2
13.4	OPERATION RESTRICTIONS.....	13.4-1
	13.4.1 SAFETY PRECAUTIONS.....	13.4-1
	13.4.2 SUMMARY.....	13.4-1
	REFERENCES.....	None
	TABLES.....	None
	FIGURES.....	None

SECTIONS

14.1	INTRODUCTION.....	14.1-1
14.1.1	BACKGROUND	14.1-1
14.1.2	ANALYSES AT NOMINAL POWER LEVEL OF 2,650 MWt..	14.1-5
14.1.3	ANALYSES PERFORMED AT 2,580.6 MWt INCLUDING UNCERTAINTY	14.1-5
14.2	UNCONTROLLED CONTROL ROD WITHDRAWAL	14.2-1
14.2.1	UNCONTROLLED CONTROL ROD BANK WITHDRAWAL FROM A SUBCRITICAL OR LOW POWER START-UP CONDITION	14.2-1
14.2.1.1	Event Description.....	14.2-1
14.2.1.2	Thermal-Hydraulic Analysis	14.2-2
14.2.1.2.1	Analysis Method	14.2-2
14.2.1.2.2	Bounding Event Input	14.2-2
14.2.1.2.3	Analysis of Results	14.2-3
14.2.1.3	Radiological Consequences	14.2-3
14.2.1.4	Conclusions	14.2-3
14.2.2	UNCONTROLLED CONTROL ROD BANK WITHDRAWAL AT POWER.....	14.2-4
14.2.2.1	Event Description.....	14.2-4
14.2.2.2	Thermal-Hydraulic Analysis	14.2-4
14.2.2.2.1	Analysis Method	14.2-4
14.2.2.2.2	Bounding Event Input	14.2-5
14.2.2.2.3	Analysis of Results	14.2-5
14.2.2.3	Radiological Consequences	14.2-6
14.2.2.4	Conclusions	14.2-6
14.2.3	SINGLE CONTROL ROD WITHDRAWAL	14.2-6
14.2.3.1	Event Description.....	14.2-6
14.2.3.2	Thermal-Hydraulics Analysis	14.2-7
14.2.3.2.1	Analysis Method	14.2-7
14.2.3.2.2	Bounding Event Input	14.2-7
14.2.3.2.3	Analysis of Results	14.2-8
14.2.3.3	Radiological Consequences	14.2-8
14.2.3.4	Conclusions	14.2-8

14.3	BORON DILUTION.....	14.3-1
14.3.1	EVENT DESCRIPTION.....	14.3-1
14.3.2	THERMAL-HYDRAULIC ANALYSIS.....	14.3-2
14.3.2.1	Analysis Method.....	14.3-2
14.3.2.2	Bounding Event Input.....	14.3-3
14.3.2.3	Analysis of Results.....	14.3-3
14.3.2.3.1	Dilution During Refueling (Mode 6)	14.3-3
14.3.2.3.2	Dilution During Cold Shutdown (Mode 5)	14.3-4
14.3.2.3.3	Dilution During Hot Shutdown (Mode 4) ..	14.3-6
14.3.2.3.4	Dilution During Hot Standby (Mode 3).....	14.3-7
14.3.2.3.5	Dilution During Power Operation and Startup (Modes 1 and 2).....	14.3-8
14.3.2.3.6	Failure to Add Boron to Compensate for Reactivity Changes After Shutdown.....	14.3-8
14.3.3	RADIOLOGICAL CONSEQUENCES	14.3-9
14.3.4	CONCLUSIONS.....	14.3-9
14.4	CONTROL ROD DROP	14.4-1
14.4.1	DROPPED ROD EVENT.....	14.4-1
14.4.1.1	Event Description.....	14.4-1
14.4.1.2	Thermal-Hydraulic Analysis	14.4-2
14.4.1.2.1	Analysis Methods.....	14.4-2
14.4.1.2.2	Bounding Event Input	14.4-2
14.4.1.2.3	Analysis of Results	14.4-2
14.4.1.3	Radiological Consequences	14.4-3
14.4.1.4	Conclusions	14.4-3
14.4.2	DROPPED BANK EVENT	14.4-3
14.4.2.1	Event Description.....	14.4-3
14.4.2.2	Thermal-Hydraulic Analysis	14.4-3
14.4.2.2.1	Analysis Methods.....	14.4-3
14.4.2.2.2	Bounding Event Input	14.4-4
14.4.2.2.3	Analysis of Results	14.4-4
14.4.2.3	Radiological Consequences	14.4-4
14.4.2.4	Conclusions	14.4-5
14.5	CORE BARREL FAILURE.....	14.5-1
14.5.1	EVENT DESCRIPTION.....	14.5-1
14.5.2	THERMAL-HYDRAULIC ANALYSIS.....	14.5-1
14.5.3	RADIOLOGICAL CONSEQUENCES	14.5-1
14.5.4	CONCLUSIONS.....	14.5-1

14.6	CONTROL ROD MISOPERATION.....	14.6-1
14.6.1	MALPOSITION OF THE PART-LENGTH CONTROL ROD GROUP.....	14.6-1
14.6.1.1	Event Description.....	14.6-1
14.6.1.2	Thermal-Hydraulic Analysis.....	14.6-1
14.6.1.3	Radiological Consequences.....	14.6-1
14.6.1.4	Conclusions.....	14.6-1
14.6.2	STATICALLY MISALIGNED CONTROL ROD/BANK.....	14.6-1
14.6.2.1	Event Description.....	14.6-1
14.6.2.2	Thermal-Hydraulics Analysis.....	14.6-2
14.6.2.2.1	Analysis Method.....	14.6-2
14.6.2.2.2	Bounding Event Input.....	14.6-2
14.6.2.2.3	Analysis of Results.....	14.6-3
14.6.2.3	Radiological Consequences.....	14.6-3
14.6.2.4	Conclusion.....	14.6-3
14.7	DECREASED REACTOR COOLANT FLOW.....	14.7-1
14.7.1	LOSS OF FORCED REACTOR COOLANT FLOW.....	14.7-1
14.7.1.1	Event Description.....	14.7-1
14.7.1.2	Thermal-Hydraulic Analysis.....	14.7-2
14.7.1.2.1	Analysis Method.....	14.7-2
14.7.1.2.2	Bounding Event Input.....	14.7-2
14.7.1.2.3	Analysis of Results.....	14.7-2
14.7.1.3	Radiological Consequences.....	14.7-3
14.7.1.4	Conclusions.....	14.7-3
14.7.2	REACTOR COOLANT PUMP ROTOR SEIZURE.....	14.7-3
14.7.2.1	Event Description.....	14.7-3
14.7.2.2	Thermal-Hydraulic Analysis.....	14.7-4
14.7.2.2.1	Analysis Method.....	14.7-4
14.7.2.3	Bounding Event Input.....	14.7-4
14.7.2.4	Analysis of Results.....	14.7-4
14.7.2.5	Radiological Consequences.....	14.7-4
14.7.2.6	Conclusions.....	14.7-5
14.8	START-UP OF AN INACTIVE LOOP.....	14.8-1
14.8.1	EVENT DESCRIPTION.....	14.8-1
14.9	EXCESSIVE FEEDWATER INCIDENT.....	14.9-1
14.10	INCREASE IN STEAM FLOW (EXCESS LOAD).....	14.10-1
14.10.1	EVENT DESCRIPTION.....	14.10-1
14.10.2	THERMAL-HYDRAULIC ANALYSIS.....	14.10-2
14.10.2.1	Analysis Method.....	14.10-2
14.10.2.2	Bounding Event Input.....	14.10-2
14.10.2.3	Analysis of Results.....	14.10-3
14.10.3	RADIOLOGICAL CONSEQUENCES.....	14.10-3
14.10.4	CONCLUSIONS.....	14.10-4

14.11	POSTULATED CASK DROP ACCIDENTS.....	14.11-1
14.11.1	EVENT DESCRIPTION.....	14.11-1
14.11.2	STRUCTURAL ANALYSIS.....	14.11-2
14.11.2.1	Analysis Method.....	14.11-3
14.11.2.1.1	Analysis of Cask Drop Scenarios	14.11-3
14.11.2.1.2	Cask Overturn Due to Seismic Event	14.11-3
14.11.2.2	Bounding Event Input.....	14.11-4
14.11.2.2.1	Analysis of Cask Drop Scenarios	14.11-4
14.11.2.2.2	Cask Overturn Due to Seismic Event.....	14.11-4
14.11.2.3	Analysis Results	14.11-5
14.11.2.3.1	Analysis of Cask Drop Scenarios	14.11-5
14.11.2.3.2	Cask Overturn Due to Seismic Event.....	14.11-6
14.11.3	RADIOLOGICAL CONSEQUENCES	14.11-6
14.11.3.1	Analysis Method.....	14.11-6
14.11.3.1.1	Radiological Consequences of a Cask Drop in the Spent Fuel Pool....	14.11-6
14.11.3.1.2	Impact on MTC/MSB Due to Postulated Drop on the VCC in the Track Alley.	14.11-7
14.11.3.2	Bounding Event Input.....	14.11-8
14.11.3.2.1	Radiological Consequences of a Cask Drop in the Spent Fuel Pool....	14.11-8
14.11.3.3	Analysis Results	14.11-8
14.11.3.3.1	Radiological Consequences of a Cask Drop in the Spent Fuel Pool....	14.11-8
14.11.3.3.2	Drop of the Loaded MTC on to the VCC in the Track Alley	14.11-8
14.11.4	CONCLUSIONS.....	14.11-8
14.12	LOSS OF EXTERNAL LOAD	14.12-1
14.12.1	EVENT DESCRIPTION.....	14.12-1
14.12.2	THERMAL-HYDRAULIC ANALYSIS.....	14.12-1
14.12.2.1	Analysis Method.....	14.12-1
14.12.2.2	Bounding Event Input.....	14.12-2
14.12.2.3	Analysis of Results	14.12-3
14.12.3	RADIOLOGICAL CONSEQUENCES	14.12-3
14.12.4	CONCLUSIONS.....	14.12-4

14.13	LOSS OF NORMAL FEEDWATER	14.13-1
14.13.1	EVENT DESCRIPTION.....	14.13-1
14.13.2	THERMAL-HYDRAULIC ANALYSIS.....	14.13-3
14.13.2.1	Analysis Method.....	14.13-3
14.13.2.2	Bounding Event Input.....	14.13-3
14.13.2.3	Analysis of Results	14.13-5
14.13.3	RADIOLOGICAL CONSEQUENCES	14.13-10
14.13.4	CONCLUSIONS.....	14.13-10
14.14	STEAM LINE RUPTURE INCIDENT	14.14-1
14.14.1	EVENT DESCRIPTION.....	14.14-1
14.14.2	THERMAL-HYDRAULIC ANALYSIS.....	14.14-2
14.14.2.1	Analysis Method.....	14.14-2
14.14.2.2	Bounding Event Input.....	14.14-3
14.14.2.3	Analysis of Results	14.14-4
14.14.3	RADIOLOGICAL CONSEQUENCES	14.14-7
14.14.3.1	Analysis Method.....	14.14-7
14.14.3.2	Bounding Event Input.....	14.14-7
14.14.3.3	Analysis of Results	14.14-8
14.14.4	CONCLUSIONS.....	14.14-9
14.15	STEAM GENERATOR TUBE RUPTURE WITH A LOSS OF OFFSITE POWER	14.15-1
14.15.1	EVENT DESCRIPTION.....	14.15-1
14.15.2	THERMAL-HYDRAULIC ANALYSIS.....	14.15-2
14.15.2.1	Analysis Method.....	14.15-2
14.15.2.2	Bounding Event Input.....	14.15-2
14.15.2.3	Analysis of Results	14.15-4
14.15.3	RADIOLOGICAL ANALYSIS.....	14.15-6
14.15.3.1	Analysis Method.....	14.15-6
14.15.3.2	Bounding Event Input.....	14.15-7
14.15.3.3	Analysis of Results	14.15-8
14.15.4	CONCLUSIONS.....	14.15-9

14.16	CONTROL ROD EJECTION	14.16-1
14.16.1	EVENT DESCRIPTION.....	14.16-1
14.16.2	THERMAL-HYDRAULIC ANALYSIS.....	14.16-1
14.16.2.1	Analysis Method.....	14.16-1
14.16.2.2	Bounding Event Input.....	14.16-2
14.16.2.3	Analysis of Results.....	14.16-2
14.16.3	RADIOLOGICAL CONSEQUENCES	14.16-3
14.16.3.1	Induced LOCA	14.16-3
14.16.3.1.1	Analysis Method.....	14.16-3
14.16.3.1.2	Bounding Event Input.....	14.16-4
14.16.3.1.3	Analysis of Results	14.16-4
14.16.3.2	Steam Generator Release.....	14.16-4
14.16.3.2.1	Analysis Method.....	14.16-4
14.16.3.2.2	Bounding Event Input.....	14.16-5
14.16.3.2.3	Analysis of Results	14.16-5
14.16.4	CONCLUSION.....	14.16-5
14.17	LOSS OF COOLANT ACCIDENT	14.17-1
14.17.1	LARGE BREAK LOCA (LBLOCA).....	14.17-1
14.17.1.1	Event Description.....	14.17-1
14.17.1.2	Thermal Hydraulics Analysis	14.17-3
14.17.1.2.1	Analysis Method.....	14.17-3
14.17.1.2.2	Bounding Event Input.....	14.17-5
14.17.1.2.3	Analysis of Results	14.17-6
14.17.1.3	Radiological Consequences	14.17-7
14.17.1.4	Conclusions	14.17-7
14.17.2	SMALL BREAK LOCA.....	14.17-8
14.17.2.1	Event Description.....	14.17-8
14.17.2.2	Thermal-Hydraulic Analysis	14.17-8
14.17.2.2.1	Analysis Models	14.17-8
14.17.2.2.2	Plant Description and Summary of Analysis Parameters	14.17-9
14.17.2.2.3	Analytical Results	14.17-10
14.17.2.3	Radiological Consequences	14.17-12
14.17.2.4	Conclusion	14.17-12
14.17.3	REACTOR INTERNALS STRUCTURAL BEHAVIOR FOLLOWING A LOCA	14.17-13
14.17.3.1	Event Description.....	14.17-13
14.17.3.2	Thermal-Hydraulic Analysis	14.17-14
14.17.3.2.1	Analysis Method.....	14.17-14
14.17.3.2.2	Bounding Event Input.....	14.17-14
14.17.3.2.3	Analysis of Results	14.17-14
14.17.3.3	Radiological Consequences	14.17-14
14.17.3.4	Conclusions	14.17-14

14.18	CONTAINMENT PRESSURE AND TEMPERATURE ANALYSIS.....	14.18-1
14.18.1	LOCA ANALYSIS	14.18-1
14.18.1.1	Event Description.....	14.18-1
14.18.1.2	Description of GOTHIC.....	14.18-1
14.18.1.3	Thermal-Hydraulic Analysis	14.18-3
14.18.1.3.1	Analysis Method.....	14.18-3
14.18.1.3.2	Bounding Event Input	14.18-6
14.18.1.3.3	Analysis of Results	14.18-7
14.18.1.4	Radiological Consequences	14.18-7
14.18.1.5	Conclusion	14.18-8
14.18.2	MSLB INSIDE CONTAINMENT	14.18-8
14.18.2.1	Event Description.....	14.18-8
14.18.2.2	Thermal-Hydraulic Analysis	14.18-9
14.18.2.2.1	Analysis Method.....	14.18-9
14.18.2.2.2	Bounding Event Input	14.18-12
14.18.2.2.3	Analysis of Results	14.18-13
14.18.2.3	Radiological Consequences	14.18-14
14.18.2.4	Conclusion	14.18-14
14.18.3	CONTAINMENT INTERNAL STRUCTURE EVALUATION	14.18-14
14.18.3.1	Event Description.....	14.18-14
14.18.3.2	Thermal Hydraulic Analysis	14.18-14
14.18.3.2.1	Analysis Method.....	14.18-14
14.18.3.2.2	Bounding Event Input	14.18-15
14.18.3.2.3	Analysis of Results	14.18-17
14.18.3.3	Radiological Consequences	14.18-18
14.18.3.4	Conclusion	14.18-18
14.19	FUEL HANDLING INCIDENT	14.19-1
14.19.1	EVENT DESCRIPTION.....	14.19-1
14.19.2	THERMAL-HYDRAULIC ANALYSIS.....	14.19-3
14.19.3	RADIOLOGICAL CONSEQUENCES	14.19-3
14.19.3.1	Analysis Method.....	14.19-3
14.19.3.2	Bounding Event Input	14.19-4
14.19.3.3	Analysis of Results	14.19-4
14.19.4	CONCLUSIONS.....	14.19-5
14.20	LIQUID WASTE INCIDENT	14.20-1
14.20.1	EVENT DESCRIPTION.....	14.20-1
14.20.2	THERMAL-HYDRAULIC ANALYSIS.....	14.20-1
14.20.3	RADIOLOGICAL CONSEQUENCES	14.20-1
14.20.3.1	Analysis Method.....	14.20-1
14.20.3.2	Bounding Event Input	14.20-2
14.20.3.3	Analysis of Results	14.20-2
14.20.4	CONCLUSIONS.....	14.20-3

14.21	WASTE GAS INCIDENT.....	14.21-1
14.21.1	GAS DECAY TANK RUPTURE.....	14.21-1
14.21.1.1	Event Description.....	14.21-1
14.21.1.2	Thermal-Hydraulic Analysis.....	14.21-1
14.21.1.3	Radiological Consequences.....	14.21-1
14.21.1.3.1	Analysis Method.....	14.21-1
14.21.1.3.2	Bounding Event Input.....	14.21-2
14.21.1.3.3	Analysis of Results.....	14.21-2
14.21.2	VOLUME CONTROL TANK RUPTURE.....	14.21-2
14.21.2.1	Event Description.....	14.21-2
14.21.2.2	Thermal-Hydraulic Analysis.....	14.21-3
14.21.2.3	Radiological Consequences.....	14.21-3
14.21.2.3.1	Analysis Method.....	14.21-3
14.21.2.3.2	Bounding Event Input.....	14.21-4
14.21.2.3.3	Analysis of Results.....	14.21-4
14.21.3	CONCLUSIONS.....	14.21-4
14.22	MAXIMUM HYPOTHETICAL ACCIDENT.....	14.22-1
14.22.1	EVENT DESCRIPTION.....	14.22-1
14.22.2	RADIOLOGICAL CONSEQUENCES.....	14.22-1
14.22.2.1	Analysis Method.....	14.22-1
14.22.2.2	Bounding Event Input.....	14.22-2
14.22.2.3	Analysis of Results.....	14.22-2
14.22.3	CONCLUSION.....	14.22-2
14.23	RADIOLOGICAL CONSEQUENCES OF FAILURE OF SMALL LINES CARRYING PRIMARY COOLANT OUTSIDE CONTAINMENT.....	14.23-1
14.23.1	EVENT DESCRIPTION.....	14.23-1
14.23.2	THERMAL-HYDRAULIC ANALYSIS.....	14.23-1
14.23.3	RADIOLOGICAL CONSEQUENCES.....	14.23-1
14.23.3.1	Analysis Method.....	14.23-1
14.23.3.2	Bounding Event Input.....	14.23-1
14.23.3.3	Analysis of Results.....	14.23-2
14.23.4	CONCLUSIONS.....	14.23-2
14.24	CONTROL ROOM RADIOLOGICAL HABITABILITY.....	14.24-1
14.24.1	EVENT DESCRIPTION.....	14.24-1
14.24.2	THERMAL-HYDRAULIC ANALYSIS.....	14.24-1
14.24.3	RADIOLOGICAL CONSEQUENCES.....	14.24-1
14.24.3.1	Analysis Method.....	14.24-1
14.24.3.2	Bounding Event Input.....	14.24-3
14.24.3.3	Analysis of Results.....	14.24-3
14.24.4	CONCLUSION.....	14.24-3

LIST OF TABLES

14.1-1	Specified Acceptable Fuel Design Limits
14.1-3	Trip Setpoints for Analysis of Palisades Reactor at 2,530 MWt
14.1-4	Disposition of Events Summary for Palisades Cycle 21
14.1-5	Cycle 21 Summary of Results for Standard Review Plan Chapter 15 Events
14.1-6	Summary of Radiological Consequences of the Chapter 14 Events
14.2.1-1	Event Summary For The Uncontrolled Bank Withdrawal From A Low Power Event
14.2.2-1	Event Summary For The Uncontrolled Rod Bank Withdrawal Event From Power
14.7.1-1	Event Summary For The Loss of Forced Reactor Coolant Flow
14.7.2-1	Event Summary For The Reactor Coolant Pump Rotor Seizure
14.10-1	Sequence of Events for Excess Load Limiting MDNBR Case
14.11-1	Postulated Cask Drop Accidents
14.11-2	Spent Fuel Cask Drop Radiological Analysis – Source Terms
14.11-3	Spent Fuel Cask Drop Radiological Analysis – Inputs and Assumptions
14.12-1	Event Summary For Loss of Load
14.13-1	Initial Conditions for the Loss of Normal Feedwater Analysis
14.13-2	Sequence of Events for Loss of Normal Feedwater Flow Analysis with Offsite Power Available and Steam Dump System Disabled
14.13-3	Sequence of Events for Loss of Normal Feedwater Flow Analysis with Offsite Power Available and Steam Dump System Available
14.13-4	Sequence of Events for Loss of Normal Feedwater Flow Analysis without Offsite Power Available and Steam Dump System Disabled
14.13-5	Results Summary for Loss of Normal Feedwater
14.14-1	Main Steam Line Break Input Parameters and Assumptions
14.14-2	Steam Line Break Sequence of Events During LHR-Limiting Transient (HZP, Offsite Power Available)
14.14-3	Overall Core Conditions at Time of Peak LHR
14.14-4	Steam Line Break Sequence of Events During DNBR-Limiting Transient (HZP, Loss of Offsite Power)
14.14-5	Overall Core Conditions at Time of MDNBR
14.14-6	Main Steam Line Break (MSLB) Radiological Analysis – Inputs and Assumptions
14.14-7	Main Steam Line Break (MSLB) Radiological Analysis – Intact SG Steam Release Rate
14.15-1	Initial Conditions For The Steam Generator Tube Rupture With A Loss Of Offsite Power
14.15-2	Setpoints For The Steam Generator Tube Rupture With A Loss Of Offsite Power
14.15-3	Sequence Of Events For The Steam Generator Tube Rupture With A Loss Of Offsite Power
14.15-4	Integrated Parameters For The Steam Generator Tube Rupture With A Loss Of Offsite Power

14.15-5	Steam Generator Tube Rupture (SGTR) Radiological Analysis – Inputs and Assumptions
14.15-6	SGTR Radiological Analysis – Integrated Mass Releases
14.15-7	SGTR Radiological Analysis – Flashing Fraction for Flow From Broken Tube
14.18-8	SGTR Radiological Analysis – 40 $\mu\text{Ci/gm}$ D.E. I-131 Activities
14.15.9	SGTR Radiological Analysis – Iodine Equilibrium Appearance Assumptions
14.15-10	SGTR Radiological Analysis – Concurrent (335 x) Iodine Spike Appearance Rate
14.15-11	SGTR Radiological Analysis – Affected Steam Generator Water Level and Decontamination Factors for Flashed Flow
14.16-1	Event Summary For The EOC HZP Control Rod Ejection
14.16-2	Control Rod Ejection Radiological Analysis – Inputs and Assumptions
14.16-3	Control Rod Ejection Radiological Analysis – Steam Release
14.17.1-1	Sampled LBLOCA Parameters
14.17.1-2	Plant Operating Range Supported by the LOCA Analysis
14.17.1-3	Statistical Distributions Used for Process Parameters
14.17.1-4	Summary of Major Parameters for the Limiting PCT Case
14.17.1-5	Summary of Hot Rod Limiting PCT Results
14.17.1-6	Calculated Event Times for the Limiting PCT Case
14.17.1-7	Containment Heat Sink Data
14.17.1-8	Containment Initial and Boundary Conditions
14.17.2-1	System Parameters and Initial Conditions Used in the Palisades SBLOCA Analysis
14.17.2-2	PCT Results of the Palisades SBLOCA Analysis
14.17.2-3	Sequence of Events for the Palisades SBLOCA Event
14.17.2-4	SBLOCA Analysis Calculation Results
14.17.3-1	Maximum Stresses, Pressures and Deflections in Critical Reactor Internals Following a Major Loss of Coolant Accident
14.17.3-2	Asymmetric Loads Analysis - Reactor Vessel Internal Component Stress Margins
14.18.1-1	LOCA Analysis Containment Building Heat Sinks/Sources
14.18.1-2	LOCA Analysis Engineered Safeguards Equipment Alignment
14.18.1-3	LOCA Initial Conditions
14.18.1-4	Containment Building Response to LOCA Double Ended Guillotine Break in a Hot Leg
14.18.1-5	LOCA Analysis Parameter Assumptions
14.18.2-1	Initial Conditions For The MSLB Containment Analysis
14.18.2-2	Initial Conditions For The MSLB Containment Analysis
14.18.2-3	MSLB Containment Analysis Results
14.18.2-4	MSLB Analysis Containment Building Heat Sinks/Sources
14.18.3-1	Reactor Cavity Geometric Factors
14.18.3-2	Geometry and Peak Pressures in Steam Generator Compartments
14.18.3-3	Differential Pressures at Various Locations
14.19-1	Fuel Handling Accident (FHA) Radiological Analysis – Inputs and Assumptions

14.19-2	Fuel Handling Accident Radiological Analysis – Source Term
14.22-1	MHA Sequence of Events for the Dose Consequence Analysis
14.22-2	Maximum Hypothetical Accident / Loss of Coolant Accident (MHA/LOCA) Radiological Analysis – Inputs and Assumptions
14.22-3	MHA/LOCA Source Term
14.22-4	MHA/LOCA Release Phases
14.22-5	MHA/LOCA Time Dependent SIRWT pH
14.22-6	MHA/LOCA Time Dependent SIRWT Total Iodine Concentration
14.22-7	MHA/LOCA Time Dependent SIRWT Liquid Temperature
14.22-8	MHA/LOCA Time Dependent SIRWT Elemental Iodine Fraction
14.22-9	MHA/LOCA Time Dependent SIRWT Partition Coefficient
14.22-10	MHA/LOCA Adjusted Release Rate from SIRWT
14.23-1	Small Line Break Outside of Containment Radiological Analysis – Inputs and Assumptions
14.23-2	Small Line Break Outside of Containment Radiological Analysis – Concurrent (500 x) Iodine Spike Appearance Rate
14.24-1	Time Dependent Control Room Parameters
14.24-2	Control Room Atmospheric Dispersion (X/Q) Factors for AST Analysis Events
14.24-3	Release-Receptor Point Pairs Assumed for AST Analysis Events

LIST OF FIGURES

14.1-3	Palisades Scram Curve
14.2.1-1	Control Rod Withdrawal Incident HZP Reactivity Insertion Curve
14.2.1-2	Control Rod Withdrawal Incident HZP Reactivity Feedbacks
14.2.1-3	Control Rod Withdrawal Incident HZP Total Reactivity
14.2.1-4	Control Rod Withdrawal Incident HZP Power and Heat Flux
14.2.1-5	Control Rod Withdrawal Incident HZP System Pressure
14.2.1-6	Control Rod Withdrawal Incident HZP Inlet Enthalpy
14.2.2-1	Reactivities For Uncontrolled bank Withdrawal At Full Power
14.2.2-2	Reactor Power Level For Uncontrolled Bank Withdrawal Full Power
14.2.2-3	Core Average Heat Flux For Uncontrolled Bank Withdrawal At Full Power
14.2.2-4	Pressurizer Pressure For Uncontrolled Bank Withdrawal At Full Power
14.2.2-5	Pressurizer Liquid Level For Uncontrolled Bank Withdrawal At Full Power
14.2.2-6	PCS Mass Flow Rate For Uncontrolled Bank Withdrawal At Full Power
14.2.2-7	PCS Temperatures For Uncontrolled Bank Withdrawal At Full Power
14.2.2-8	Secondary Pressure For Uncontrolled Bank Withdrawal At Full Power
14.2.2-9	S/G Liquid Level For Uncontrolled Bank Withdrawal At Full Power
14.7.1-1	Primary Coolant System Mass Flow Rate For Loss Of Forced Flow
14.7.1-2	Reactor Power Level For Loss Of Forced Flow
14.7.1-3	Core Average Heat Flux For Loss Of Forced Flow
14.7.1-4	Pressurizer Pressure For Loss Of Forced Flow
14.7.1-5	Primary Coolant System Temperatures For Loss Of Forced Flow
14.7.2-1	Primary Coolant System Mass Flow Rate For Reactor Coolant Pump Rotor Seizure
14.7.2-2	Reactor Power Level For Reactor Coolant Pump Rotor Seizure

14.7.2-3	Core Average Heat Flux For Reactor Coolant Pump Rotor Seizure
14.7.2-4	Pressurizer Pressure For Reactor Coolant Pump Rotor Seizure
14.7.2-5	Primary Coolant System Temperatures For Reactor Coolant Pump Rotor Seizure
14.10-1	Power Comparisons – Excess Load
14.10-2	Primary Coolant System Temperatures - Excess Load
14.10-3	Pressurizer Pressure - Excess Load
14.10-4	Pressurizer Collapsed Liquid Level - Excess Load
14.10-5	Components of Reactivity – Excess Load
14.11-1	Partial Operating Floor Plan EL 649'-0"
14.12-1	Reactor Power Level For Loss Of External Load Event
14.12-2	Primary Pressures For Loss Of External Load Event
14.12-3	Pressurizer Liquid Volume For Loss Of External Load Event
14.12-4	Primary Coolant System Temperatures For Loss Of External Load Event
14.12-5	Secondary Pressures For Loss Of External Load Event
14.13-1	Reactor Power, LNFF with Offsite Power Available and Steam Dump System Disabled
14.13-2	Primary Coolant System Loop Temperatures, LNFF with Offsite Power Available and Steam Dump System Disabled
14.13-3	Primary Coolant System Loop Flow, LNFF with Offsite Power Available and Steam Dump System Disabled
14.13-4	Pressurizer Pressure, LNFF with Offsite Power Available and Steam Dump System Disabled
14.13-5	Pressurizer Spray Flow, LNFF with Offsite Power Available and Steam Dump System Disabled
14.13-6	Pressurizer SRV Flow, LNFF with Offsite Power Available and Steam Dump System Disabled
14.13-7	Pressurizer Level, LNFF with Offsite Power Available and Steam Dump System Disabled
14.13-8	SG Auxiliary Feedwater Flow, LNFF Analysis with Off-Site Power Available and Steam Dump System Disabled
14.13-9	SG Dome Pressure, LNFF Analysis with Off-Site Power Available and Steam Dump System Disabled
14.13-10	SG Liquid Mass Inventory, LNFF Analysis with Off-Site Power Available and Steam Dump System Disabled
14.13-11	Reactor Power, LNFF Analysis with Off-Site Power Available and Steam Dump System Available
14.13-12	Primary Coolant System Loop Temperatures, LNFF Analysis with Off-Site Power Available and Steam Dump System Available
14.13-13	Primary Coolant System Loop Flow, LNFF Analysis with Off-Site Power Available and Steam Dump System Available
14.13-14	Pressurizer Pressure, LNFF Analysis with Off-Site Power Available and Steam Dump System Available
14.13-15	Pressurizer Spray Flow, LNFF Analysis with Off-Site Power Available and Steam Dump System Available
14.13-16	Pressurizer SRV Flow, LNFF Analysis with Off-Site Power Available and Steam Dump System Available

14.13-17	Pressurizer Level, LNFF Analysis with Off-Site Power Available and Steam Dump System Available
14.13-18	SG Auxiliary Feedwater Flow, LNFF Analysis with Off-Site Power Available and Steam Dump System Available
14.13-19	SG Dome Pressure, LNFF Analysis with Off-Site Power Available and Steam Dump System Available
14.13-20	SG Liquid Mass Inventory, LNFF Analysis with Off-Site Power Available and Steam Dump System Available
14.13-21	Reactor Power, LNFF Analysis without Off-Site Power Available and Steam Dump Systems Disabled
14.13-22	Primary Coolant System Loop Temperatures, LNFF Analysis without Off-Site Power Available and Steam Dump Systems Disabled
14.13-23	Primary Coolant System Loop Flow, LNFF Analysis without Off-Site Power Available and Steam Dump Systems Disabled
14.13-24	Pressurizer Pressure, LNFF Analysis without Off-Site Power Available and Steam Dump Systems Disabled
14.13-25	Pressurizer Level, LNFF Analysis without Off-Site Power Available and Steam Dump Systems Disabled
14.13-26	SG Auxiliary Feedwater Flow, LNFF Analysis without Off-Site Power Available and Steam Dump Systems Disabled
14.13-27	SG Dome Pressure, LNFF Analysis without Off-Site Power Available and Steam Dump Systems Disabled
14.13-28	SG Liquid Mass Inventory, LNFF Analysis without Off-Site Power Available and Steam Dump Systems Disabled
14.14-1	Break Flow Rates During LHR-Limiting Transient
14.14-2	Steam Generator Pressures During LHR-Limiting Transient
14.14-3	Steam Generator Heat Transfer Rates During LHR-Limiting Transient
14.14-4	Steam Generator Secondary-Side Total Fluid Inventories During LHR-Limiting Transient
14.14-5	Core Inlet Temperatures During LHR-Limiting Transient
14.14-6	Core Inlet Flow Rates During LHR-Limiting Transient
14.14-7	Pressurizer Pressure During LHR-Limiting Transient
14.14-8	Pressurizer Liquid Level During LHR-Limiting Transient
14.14-9	Total HPSI Flow Rate During LHR-Limiting Transient
14.14-10	Reactivity During LHR-Limiting Transient
14.14-11	Reactor Power During LHR-Limiting Transient
14.14-12	Break Flow Rates During DNBR-Limiting Transient
14.14-13	Steam Generator Pressures During DNBR-Limiting Transient
14.14-14	Steam Generator Heat Transfer Rates During DNBR-Limiting Transient
14.14-15	Steam Generator Secondary-Side Total Fluid Inventories During DNBR-Limiting Transient
14.14-16	Core Inlet Temperatures During DNBR-Limiting Transient
14.14-17	Core Inlet Flow Rates During DNBR-Limiting Transient
14.14-18	Pressurizer Pressure During DNBR-Limiting Transient
14.14-19	Pressurizer Liquid Level During DNBR-Limiting Transient
14.14-20	Total HPSI Flow Rate During DNBR-Limiting Transient
14.14-21	Reactivity During DNBR-Limiting Transient

14.14-22	Reactor Power During DNBR-Limiting Transient
14.15-1	SGTR With LOAC: Core Power vs Time
14.15-2	SGTR With LOAC: Core Coolant Temperatures vs Time
14.15-3	SGTR With LOAC: Primary Coolant System Pressure vs Time
14.15-4	SGTR With LOAC: Steam Generator Pressure vs Time
14.15-5	SGTR With LOAC: Tube Leak Flow Rate vs Time
14.15-6	SGTR With LOAC: Integrated Tube Leak Flow vs Time
14.15-7	SGTR With LOAC: Pressurizer Liquid Volume vs Time
14.15-8	SGTR With LOAC: Affected Steam Generator Safety Valve (MSSV) Flow Rate vs Time
14.15-9	SGTR With LOAC: Affected Steam Generator Safety Valve (MSSV) Integrated Flow vs Time
14.15-10	SGTR With LOAC: Steam Generators Liquid Mass vs Time
14.15-11	SGTR With LOAC: Core Power vs Time
14.15-12	SGTR With LOAC: Core Coolant Temperatures vs Time
14.15-13	SGTR With LOAC: Primary Coolant System Pressure vs Time
14.15-14	SGTR With LOAC: Steam Generators Pressure vs Time
14.15-15	SGTR With LOAC: Pressurizer Liquid Volume vs Time
14.15-16	SGTR With LOAC: Tube Leak Flow Rate vs Time
14.15-17	SGTR Integrated Leak Flow vs Time
14.15-18	SGTR ADV Flow Rate vs Time
14.15-19	SGTR Integrated ADV Flow vs Time
14.15-20	SGTR PCS Subcooling vs Time
14.15-21	SGTR HPSI Flow Rate vs Time
14.16-1	Control Rod Ejection, EOC HZP Case: Core Power
14.16-2	Control Rod Ejection, EOC HZP Case: Core Average Heat-Flux-Based LHR
14.16-3	Control Rod Ejection, EOC HZP Case: Total Core Reactivity
14.17.1-1	Scatter Plot of Operational Parameters
14.17.1-2	PCT Versus PCT Time Scatter Plot From Transient Calculations
14.17.1-3	PCT Versus Break Size Scatter Plot From Transient Calculations
14.17.1-4	Total Oxidation Vs. PCT Scatter Plot from Transient Calculations
14.17.1-5	Maximum Oxidation Versus PCT Scatter Plot from Transient Calculations
14.17.1-6	Peak Cladding Temperature for the Limiting Case
14.17.1-7	Break Flow for the Limiting Case
14.17.1-8	Core Inlet Mass Flux for the Limiting Case
14.17.1-9	Core Outlet Mass Flux for the Limiting Case
14.17.1-10	Void Fraction at PCS Pumps for the Limiting Case
14.17.1-11	ECCS Flows (Includes SIT, HPSI, and LPSI) for the Limiting Case
14.17.1-12	Upper Plenum Pressure for the Limiting Case
14.17.1-13	Collapsed Liquid Level in the Downcomer for the Limiting Case
14.17.1-14	Collapsed Liquid Level in the Lower Plenum for the Limiting Case
14.17.1-15	Collapsed Liquid Level in the Core for the Limiting Case
14.17.1-16	Containment and Loop Pressures for the Limiting Case
14.17.1-17	Deleted
14.17.1-18	Deleted
14.17.1-19	Deleted

14.17.1-20	Deleted
14.17.1-21	Deleted
14.17.2-1	Break Mass Flow Rate (Limiting Case)
14.17.2-2	Primary and Secondary Pressures (Limiting Case)
14.17.2-3	Normalized Reactor Power (Limiting Case)
14.17.2-4	Total HPSI Mass Flow Rate (Limiting Case)
14.17.2-5	Total SIT Mass Flow Rate (Limiting Case)
14.17.2-6	Loop Seal Void Fractions (Limiting Case)
14.17.2-7	Break Void Fraction (Limiting Case)
14.17.2-8	Reactor Vessel and PCS Mass Inventories (Limiting Case)
14.17.2-9	Hot Channel Collapsed Level (Limiting Case)
14.17.2-10	Fluid and Cladding Temperatures (Limiting Case)
14.17.2-11	SG Narrow Range Liquid Levels (Limiting Case)
14.17.2-12	AFW Flow Rates (Limiting Case)
14.17.2-13	Total MSSV Flow (Limiting Case)
14.18.1-1	LOCA Containment Pressure Profile
14.18.1-2	LOCA Containment Temperature Profile
14.18.2-1	MSLB Containment Response Maximum Pressure Profile
14.18.2-2	MSLB Containment Response Environmental Qualification Profile
14.22-1	Deleted
14.22-2	Deleted

SECTIONS

15.1	<u>QUALITY ASSURANCE DURING THE OPERATIONAL PHASE</u>	15.1-1
	15.1.1 <u>QUALITY ASSURANCE PROGRAM MANUAL</u>	15.1-1
	15.1.2 <u>GENERIC QUALITY ASSURANCE REQUIREMENTS FOR AGING MANAGEMENT PROGRAMS</u>	15.1-2
15.2	<u>QUALITY ASSURANCE DURING ORIGINAL PLANT DESIGN AND CONSTRUCTION</u>	15.2-1
	15.2.1 <u>BECHTEL CORPORATION</u>	15.2-1
	15.2.1.1 <u>General</u>	15.2-1
	15.2.1.2 <u>Organization</u>	15.2-1
	15.2.2 <u>COMBUSTION ENGINEERING, INC</u>	15.2-2
	15.2.2.1 <u>General</u>	15.2-2
	15.2.2.2 <u>Organization</u>	15.2-3
	15.2.2.3 <u>Responsibilities</u>	15.2-4
	15.2.3 <u>CONSUMERS POWER COMPANY</u>	15.2-5
	15.2.3.1 <u>General</u>	15.2-5
	15.2.3.2 <u>Vendor Shops</u>	15.2-5
	15.2.3.3 <u>Nuclear Fuel</u>	15.2-7
	15.2.3.4 <u>Construction Activities</u>	15.2-8

REFERENCES..... None

TABLES..... None

LIST OF FIGURES

- 15-1 Quality Assurance Organization**
- 15-2 Combustion Engineering Incorporated Quality Assurance Organization**