Tennessee Valley Authority, 1101 Market Street, LP 5A, Chattanooga, Tennessee 37402-2801

November 10, 2011

10 CFR Part 50

ATTN: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Project Number 785

**SUBJECT: TENNESSEE VALLEY AUTHORITY (TVA)
CLINCH RIVER CONSTRUCTION PERMIT (CRCP) PROJECT
THIRD REGULATORY FRAMEWORK WORKSHOP**

References:
1) TVA letter to NRC dated August 24, 2011, "Clinch River Construction Permit (CRCP) Project, First Regulatory Framework Workshop"

2) TVA letter to NRC dated October 14, 2011, "Second Regulatory Framework Workshop

Please find attached the Regulatory Framework Documents and Section Outlines for the following sections to be presented at the public meeting:

PSAR Chapters 4, 5 (excluding 5.3), 6, Sections 9.4, 9.5.1, and Chapters 10, 15, and 16

TVA and Generation mPower have worked closely together to develop these Regulatory Framework Documents and Section Outlines, and look forward to receiving the NRC Staff's feedback at the November 30, 2011 public meeting. Please contact Thomas Spink at (423) 751-7062 if you have questions.

Sincerely,

Gordon Arent
General Manager, New Generation Licensing
Nuclear Generation Development and Construction

Attachment
cc: See Page 2

D104
NRO

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U.S Nuclear Regulatory Commission
November 10, 2011

Attachment

Regulatory Framework Documents and Section Outlines
Chapter 4
Chapter 5 (excluding 5.3)
Chapter 6
Section 9.4
Section 9.5.1
Chapter 10
Chapter 15
Chapter 16

Clinch River Regulatory Framework Document
NRC Version

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
4.1 Summary Description	PSAR	None	None	RG 1.70	None	None	None	No	No	3.9, 4.2, 4.3, 4.4, 4.5, 4.6	None
	DCD	None	None	RG 1.206	None	None	None	N/A	N/A	3.9, 4.2, 4.3, 4.4, 4.5, 4.6	None
	FSAR	None	None	RG 1.206	None	None	None	N/A	No	3.9, 4.2, 4.3, 4.4, 4.5, 4.6	None
4.2 Fuel System Design	PSAR	10 CFR 50.34, 10 CFR 50.46, 10 CFR 50, App. A GDCs 2, 10, 27, and 35; 10 CFR 50, App. K; 10 CFR 100,	None	RG 1.70	4.2	RGs 1.4, 1.25, 1.60, 1.77, 1.126, 1.157, 1.183, 1.195, 1.196; NUREG-0085, NUREG-0303, NUREG-0308, S2, NUREG-0401, NUREG-0418, NUREG-0609, NUREG-0630, NUREG/CR-1018, NUREG/CR-1019, NUREG/CR-1020, NUREG/CR-1380, NUREG/CR-1883 NUREG/CR-6534, NUREG-75/077 Revised SER on Effects of Fuel Rod Bowing, 1977 "Burst Criterion of Zircaloy Fuel Cladding in a LOCA", 1980; WASH-1236, 1972 SE of WCAP-8720, 1979 Evaluation of WCAP-8377, 1975, Letter to DeYoung, "CEPAN", 1976 Memo, Request for Revised Rod Bowing Topical Reports, 1978	ASME, Section III 2007 w/ 2008 addenda; ASTM Standard C776-89, Part 45 1989; ANL-6548, 1962; ANS 5.4, 1982; Publication on NSRR/RIA Experiments with High Burnup PWR Fuels, 1967, BAW-10087A, Rev. 1, CENPD-139-A, 1974, AEC Staff Report on GE Reactor Fuels, 1973, AEC Staff Report on Exxon PWR Fuels, 1975, Letter on SE of WCAP-8720, 1979; Nuclear Science Eng. 20, 1, 1964 Trans. Am. Nucl Soc. 15, 186, 1972 "Burst Criterion of Zircaloy Fuel Claddings in a LOCA", 1980 Nuclear Technology Vol. 38, pp 246-259, 2002 "The Role of Grain Boundary Fission Gases in High Burn-Up Fuel Under Reactivity Initiated Accident Conditions", 2000	No	No	3.9, 4.3, 4 4, 6.3, 15	NRC communications and draft regulatory guidelines need to be tracked for applicability
	DCD	10 CFR 50.34 10 CFR 50.46, 10 CFR 50, App. A GDCs 2, 10, 27, and 35; 10 CFR 50, App. K; 10 CFR 52.47(b)(1), 10 CFR 100	None	RG 1.206	4.2	RGs 1.4, 1.25, 1.60, 1.77, 1.126, 1.157, 1.183, 1.195, 1.196; NUREG-0085, NUREG-0303, NUREG-0308, S2, NUREG-0401, NUREG-0418, NUREG-0609, NUREG-0630, NUREG/CR-1018, NUREG/CR-1019, NUREG/CR-1020, NUREG/CR-1380, NUREG/CR-1883 NUREG/CR-6534, NUREG-75/077 Revised SER on Effects of Fuel Rod Bowing, 1977 "Burst Criterion of Zircaloy Fuel Cladding in a LOCA", 1980; WASH-1236, 1972 SE of WCAP-8720, 1979 Evaluation of WCAP-8377, 1975, Letter to DeYoung, "CEPAN", 1976 Memo, Request for Revised Rod Bowing Topical Reports, 1978	ASME, Section III 2007 w/ 2008 addenda; ASTM Standard C776-89, Part 45 1989; ANL-6548, 1962; ANS 5.4, 1982; Publication on NSRR/RIA Experiments with High Burnup PWR Fuels, 1967, BAW-10087A, Rev. 1, CENPD-139-A, 1974, AEC Staff Report on GE Reactor Fuels, 1973, AEC Staff Report on Exxon PWR Fuels, 1975, Letter on SE of WCAP-8720, 1979; Nuclear Science Eng. 20, 1, 1964 Trans. Am. Nucl Soc. 15, 186, 1972 "Burst Criterion of Zircaloy Fuel Claddings in a LOCA", 1980 Nuclear Technology Vol. 38, pp 246-259, 2002 "The Role of Grain Boundary Fission Gases in High Burn-Up Fuel Under Reactivity Initiated Accident Conditions", 2000	N/A	N/A	3.9, 4.3, 4.4, 6.3, 15	NRC communications and draft regulatory guidelines need to be tracked for applicability
	FSAR	10 CFR 50.34 10 CFR 50.46, 10 CFR 50, App. A GDCs 2, 10, 27, and 35; 10 CFR 50, App. K 10 CFR 100	None	RG 1.206	4.2	RGs 1.4, 1.25, 1.60, 1.77, 1.126, 1.157, 1.183, 1.195, 1.196; NUREG-0085, NUREG-0303, NUREG-0308, S2, NUREG-0401, NUREG-0418, NUREG-0609, NUREG-0630, NUREG/CR-1018, NUREG/CR-1019, NUREG/CR-1020, NUREG/CR-1380, NUREG/CR-1883 NUREG/CR-6534, NUREG-75/077 Revised SER on Effects of Fuel Rod Bowing, 1977 "Burst Criterion of Zircaloy Fuel Cladding in a LOCA", 1980; WASH-1236, 1972 SE of WCAP-8720, 1979 Evaluation of WCAP-8377, 1975, Letter to DeYoung, "CEPAN", 1976 Memo, Request for Revised Rod Bowing Topical Reports, 1978	ASME, Section III 2007 w/ 2008 addenda; ASTM Standard C776-89, Part 45 1989; ANL-6548, 1962; ANS 5.4, 1982; Publication on NSRR/RIA Experiments with High Burnup PWR Fuels, 1967, BAW-10087A, Rev. 1, CENPD-139-A, 1974, AEC Staff Report on GE Reactor Fuels, 1973, AEC Staff Report on Exxon PWR Fuels, 1975, Letter on SE of WCAP-8720, 1979; Nuclear Science Eng. 20, 1, 1964 Trans. Am. Nucl Soc. 15, 186, 1972 "Burst Criterion of Zircaloy Fuel Claddings in a LOCA", 1980 Nuclear Technology Vol. 38, pp 246-259, 2002 "The Role of Grain Boundary Fission Gases in High Burn-Up Fuel Under Reactivity Initiated Accident Conditions", 2000	N/A	No	3.9, 4.3, 4.4, 6.3, 15	NRC communications and draft regulatory guidelines need to be tracked for applicability

Note:
RG revisions are not identified as these will be consistent with the version in effect 6 months prior to the PSAR submittal.

Clinch River Regulatory Framework Document
NRC Version

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
4.3 Nuclear Design	PSAR	10 CFR 50, App. A, GDC 10, 11, 12, 13, 20, 25, 26, 27, and 28	None	RG 1.70	4.3	RGs 1.77, 1.126 NUREG-0085 BTP 4-1	None	No	No	4.2, 4.4, 4.6, 5.3, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 9.1, 9.3, 15, 15.4, 15.8	NRC communications and draft regulatory guidelines need to be tracked for applicability
	DCD	10 CFR 50, App. A, GDC 10, 11, 12, 13, 20, 25, 26, 27, and 28 10 CFR 52.47(b)(1)	None	RG 1.206	4.3	RGs 1.77, 1.126 NUREG-0085 BTP 4-1	None	N/A	N/A	4.2, 4.4, 4.6, 5.3, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 9.1, 9.3, 15, 15.4, 15.8	NRC communications and draft regulatory guidelines need to be tracked for applicability
	FSAR	10 CFR 50, App. A, GDC 10, 11, 12, 13, 20, 25, 26, 27, and 28	None	RG 1.206	4.3	RGs 1.77, 1.126 NUREG-0085 BTP 4-1	None	N/A	No	4.2, 4.4, 4.6, 5.3, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 9.1, 9.3, 15, 15.4, 15.8	NRC communications and draft regulatory guidelines need to be tracked for applicability
4.4 Thermal and Hydraulic Design	PSAR	10 CFR 50 App. A, GDC 10, 12 10CFR50.34(f)(2)(xviii)	None	RG 1.70	4.4	RGs 1.68, 1.133 NUREG-1449 GL 82-28 GL 86-09 GL 88-17 RS-001	BAW-10037, 1968; WCAP-11397-P-A, 1975; BAW-10021, 1970; WCAP-7956, 1973 (also, WCAP-7359-L, WCAP-7838)	No	No	3.9, 4.3, 7.2, 7.5, 13.2, 13.3, 15.8, 18, 19	NRC communications and draft regulatory guidelines need to be tracked for applicability
	DCD	10 CFR 50 App. A, GDC 10, 12 10CFR50.34(f)(2)(xviii) 10 CFR 52.47(b)(1)	None	RG 1.206	4.4	RGs 1.68, 1.133 NUREG-1449 GL 82-28 GL 86-09 GL 88-17 RS-001	BAW-10037, 1968; WCAP-11397-P-A, 1975; BAW-10021, 1970; WCAP-7956, 1973 (also, WCAP-7359-L, WCAP-7838)	N/A	N/A	3.9, 4.3, 7.2, 7.5, 13.2, 13.3, 15.8, 18, 19	NRC communications and draft regulatory guidelines need to be tracked for applicability
	FSAR	10 CFR 50 App. A, GDC 10, 12 10CFR50.34(f)(2)(xviii)	None	RG 1.206	4.4	RGs 1.68, 1.133 NUREG-1449 GL 82-28 GL 86-09 GL 88-17 RS-001	BAW-10037, 1968; WCAP-11397-P-A, 1975; BAW-10021, 1970; WCAP-7956, 1973 (also, WCAP-7359-L, WCAP-7838)	N/A	No	3.9, 4.3, 7.2, 7.5, 13.2, 13.3, 15.8, 18, 19	NRC communications and draft regulatory guidelines need to be tracked for applicability
4.5 Reactor Materials	PSAR	10 CFR 50, App. A, GDCs 1, 14, 26, 10 CFR 55a	None	RG 1.70	4.5.1 4.5.2	RGs 1.31, 1.44, 1.84 NUREG-1823, GL 97-01	ASME Code, Section III, 2007 w/ 2008 addenda ASME Code, Section II, 2007 w/ 2008 addenda ASME Code, Section IX, 2007 w/ 2008 addenda ASME NQA-1-1994, ASTM A-262 2010, ASTM A-708-1974	No	No	3.9, 3.13, 4.2, 5.2, 5.3, 9.3, 12.1	NRC communications and draft regulatory guidelines need to be tracked for applicability
	DCD	10 CFR 50, App. A, GDCs 1, 14, 26 10 CFR 55a, 10 CFR 52.47(b)(1),	None	RG 1.206	4.5.1 4.5.2	RGs 1.31, 1.44, 1.84 NUREG-1823, GL 97-01	ASME Code, Section III, 2007 w/ 2008 addenda ASME Code, Section II, 2007 w/ 2008 addenda ASME Code, Section IX, 2007 w/ 2008 addenda ASME NQA-1-1994, ASTM A-262 2010, ASTM A-708-1974	N/A	N/A	3.9, 3.13, 4.2, 5.2, 5.3, 9.3, 12.1	NRC communications and draft regulatory guidelines need to be tracked for applicability
	FSAR	10 CFR 50, App. A, GDCs 1, 14, 26 10 CFR 55a	None	RG 1.206	4.5.1 4.5.2	RGs 1.31, 1.44, 1.84 NUREG-1823, GL 97-01	ASME Code, Section III, 2007 w/ 2008 addenda ASME Code, Section II, 2007 w/ 2008 addenda ASME Code, Section IX, 2007 w/ 2008 addenda ASME NQA-1-1994, ASTM A-262 2010, ASTM A-708-1974	N/A	No	3.9, 3.13, 4.2, 5.2, 5.3, 9.3, 12.1	NRC communications and draft regulatory guidelines need to be tracked for applicability

Note:
RG revisions are not identified as these will be consistent with the version in effect 6 months prior to the PSAR submittal.

Clinch River Regulatory Framework Document
NRC Version

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
4.6 Functional Design of Control Rod Drive System	PSAR	10 CFR 50, App. A GDC 4, 23, 25, 26, 27, 28, 29 10CFR50.62	None	RG 1.70	4.6	NUREG-0460 NUEREG-1000	mPower Technical Report: Control Rod Drive Mechanism (CRDM) Design Details and Development Plan (Rev. 0)	No	No	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 4.3, 6.3, 7.1, 7.2, 7.7, Appendix 7-A, 8.3, 9.3, 9.5, 15, 15.4	NRC communications and draft regulatory guidelines need to be tracked for applicability
	DCD	10 CFR 50, App. A GDC 4, 23, 25, 26, 27, 28, 29 10 CFR 52.47(b)(1) 10CFR50.62	None	RG 1.206	4.6	NUREG-0460 NUEREG-1000	mPower Technical Report: Control Rod Drive Mechanism (CRDM) Design Details and Development Plan (Rev. 0)	N/A	N/A	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 4.3, 6.3, 7.1, 7.2, 7.7, Appendix 7-A, 8.3, 9.3, 9.5, 15, 15.4	NRC communications and draft regulatory guidelines need to be tracked for applicability
	FSAR	10 CFR 50, App. A GDC 4, 23, 25, 26, 27, 28, 29 10CFR50.62	None	RG 1.206	4.6	NUREG-0460 NUEREG-1000	mPower Technical Report: Control Rod Drive Mechanism (CRDM) Design Details and Development Plan (Rev. 0)	N/A	No	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 4.3, 6.3, 7.1, 7.2, 7.7, Appendix 7-A, 8.3, 9.3, 9.5, 15, 15.4	NRC communications and draft regulatory guidelines need to be tracked for applicability

Note:
RG revisions are not identified as these will be consistent with the version in effect 6 months prior to the PSAR submittal.

CLINCH RIVER
REGULATORY FRAMEWORK DOCUMENTS
Chapter 4 Outline

4.0 Reactor

4.1 Summary Description

PSAR PSAR Section 4.1 provides the following information related to a summary description of the mechanical, nuclear, and thermal and hydraulic designs of the various reactor components, including the fuel, reactor vessel internals, and reactivity control systems as follows:

- states the independent and interrelated performance and safety functions of each component
- refers to PSAR Sections 3.9.4 and 3.9.5 for information on control rod drive systems and reactor vessel internals
- includes a summary table of the important design and performance characteristics of the various reactor components
- provides a tabulation of analysis techniques used and load conditions considered, including computer code names

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DCD DCD Section 4.1 provides a summary description of the mechanical, nuclear, and thermal and hydraulic designs of the various reactor components, including the fuel, reactor vessel internals, and reactivity control systems as follows:

- states the independent and interrelated performance and safety functions of each component
- refers to DCD Sections 3.9.4 and 3.9.5 for information on control rod drive systems and reactor vessel internals
- includes a summary table of the important design and performance characteristics of the various reactor components
- provides a tabulation of analysis techniques used and load conditions considered, including computer code names

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FSAR Same contents as mPower standard plant DCD Section 4.1

4.2 Fuel System Design

PSAR PSAR Section 4.2.1 provides information on the fuel system design bases as follows:

- explains and substantiates selection of the design bases from the viewpoint of safety considerations
- describes functional characteristics in terms of desired performance under stated conditions
- relates systems, components, and materials performance under normal operating, anticipated transient, and accident conditions
- discusses the following with respect to performance:
  - cladding
  - fuel material
  - fuel rod performance
  - spacer grid and channel boxes
  - fuel assembly
  - reactivity control assembly and burnable poison rods
  - surveillance program

PSAR Section 4.2.2 provides the following information:

- description of and preliminary design drawings of the fuel rod components, burnable poison rods, fuel assemblies, and reactivity control assemblies showing arrangement, dimensions, critical tolerances, sealing and handling features, methods of support, internal pressurization, fission gas spaces, burnable poison content, and internals
- discussion of design features that prevent improper orientation or placement of fuel rods or assemblies within the core

PSAR Section 4.2.3 provides an evaluation of the fuel system design for the physically feasible combinations of chemical, thermal, irradiation, mechanical, and hydraulic interaction. This section includes the effects of normal reactor operations, anticipated operational occurrences (AOO), anticipated transients without scram (ATWS), and postulated accidents for the following components:

- cladding
- fuel
- fuel rod performance
- spacer grid and channel boxes
- fuel assembly
- reactivity control assembly and burnable poison rods

4.2 Fuel System Design (cont.)

PSAR (cont.)

PSAR Section 4.2.4 provides the testing and inspection plan as follows:

- describes the testing and inspections to be performed to verify the design characteristics of the fuel system components, including clad integrity, dimensions, fuel enrichment, burnable poison concentration, absorber composition, and characteristics of the fuel, absorber, and poison pellets
- describes radiographic inspections, destructive tests, fuel assembly dimensional checks, and the program for inspection of new fuel assemblies and new control rods to ensure mechanical integrity after shipment

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DCD

DCD Section 4.2.1 provides the following information on the fuel system design bases:

- explains and substantiates selection of the design bases from the viewpoint of safety considerations
- describes functional characteristics in terms of desired performance under stated conditions
- relates systems, components, and materials performance under normal operating, anticipated transient, and accident conditions
- discusses the following with respect to performance:
  - cladding
  - fuel material
  - fuel rod performance
  - spacer grid and channel boxes
  - fuel assembly
  - reactivity control assembly and burnable poison rods
  - surveillance program

DCD Section 4.2.2 provides the following information:

- description and advanced design drawings of the fuel rod components, burnable poison rods, fuel assemblies, and reactivity control assemblies showing arrangement, dimensions, critical tolerances, sealing and handling features, methods of support, internal pressurization, fission gas spaces, burnable poison content, and internals
- discussion of design features that prevent improper orientation or placement of fuel rods or assemblies within the core

The DCD contains the following fuel system information and the associated tolerances:

- cladding information including its type and metallurgical state, inside and outside diameters, and inside roughness
- pellet information including the outside diameter, roughness, density, re-sintering data, length, and dish dimensions
- burnable poison content
- fuel column length, overall rod length and rod internal void volume

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4.2 Fuel System Design (cont.)

DCD (cont.)

- fill gas type and pressure
- sorbed gas composition and content
- spring and plug dimensions
- fissile enrichment
- equivalent hydraulic diameter
- coolant pressure
- design-specific burnup limit

In addition, the DCD contains the following design drawings:

- fuel assembly cross-section and outline
- fuel rod schematic
- spacer grid cross-section
- guide tube and nozzle joint
- control rod assembly cross-section and outline
- control rod schematic
- burnable poison rod assembly cross-section and outline
- burnable poison rod schematic
- orifice and source assembly outline

DCD Section 4.2.3 provides an evaluation of the fuel system design for the physically feasible combinations of chemical, thermal, irradiation, mechanical, and hydraulic interaction. This section includes the effects of normal reactor operations, AOO, ATWS, and postulated accidents for the following components:

- cladding
- fuel and fuel rod performance
- spacer grid and channel boxes
- fuel assembly
- reactivity control assembly and burnable poison rods

Additionally, this section describes any prototype testing associated with the fuel design, as well a discussion of fuel/cladding phenomenological models, fuel system damage criteria, fuel rod failure and a fuel coolability evaluation.

DCD Section 4.2.4 provides the testing and inspection plan as follows:

- describes testing and inspections to be performed to verify the design characteristics of the fuel system components, including clad integrity, dimensions, fuel enrichment, burnable poison concentration, absorber composition, and characteristics of the fuel, absorber, and poison pellets
- describes radiographic inspections, destructive tests, fuel assembly dimensional checks, and the program for inspection of new fuel assemblies and new control rods to ensure mechanical integrity after shipment
- describes the online fuel rod failure monitoring methods and post-irradiation surveillance package as well as surveillance of control rods containing boron carbide (B_4C)

4.2 Fuel System Design (cont.)

FSAR Same contents as mPower standard plant DCD Section 4.2

4.3 Nuclear Design

PSAR PSAR Section 4.3.1 describes the design bases for the nuclear design of the fuel and reactivity control systems, including nuclear and reactivity control limits.

PSAR Section 4.3.2 provides a description and discussion of the following topics:

- nuclear design
- power distribution
- reactivity coefficients
- control requirements
- Control rod patterns and reactivity worths
- criticality of reactor during refueling
- stability
- vessel irradiation

PSAR Section 4.3.3 describes nuclear design analytical methods as follows:

- analytical methods used in the nuclear design, including those for predicting criticality, reactivity coefficients, and burnup effects
- computer codes used, including the name and type of code, how it is used, and its validity based on critical experiments or confirmed predictions of operating plants
- methods of obtaining parameters such as cross sections
- estimates of the accuracy of the analytical methods

PSAR Section 4.3.4 describes nuclear design changes as follows:

- lists any changes in reactor core design features, calculational methods, data, or information relevant to determining important nuclear design parameters that depart from prior practice of the reactor designs along with affected parameters
- discusses details of the nature and effects of the changes in appropriate subsections

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DCD DCD Section 4.3.1 describes the design bases for the nuclear design of the fuel and reactivity control systems, including nuclear and reactivity control limits.

4.3 Nuclear Design (cont.)

DCD (cont.)

DCD Section 4.3.2 provides a detailed description and discussion of the following topics:

- nuclear design
- power distribution
- reactivity coefficients
- control requirements
- Control Rod patterns and reactivity worths
- criticality of reactor during refueling
- stability
- vessel irradiation

DCD Section 4.3.3 describes nuclear design analytical methods as follows:

- describes the analytical methods used in the nuclear design, including those for predicting criticality, reactivity coefficients, and burnup effects
- describes computer codes used, including the name and type of code, how it is used, and its validity based on critical experiments or confirmed predictions of operating plants
- describes methods of obtaining parameters such as cross sections
- estimates of the accuracy of the analytical methods

DCD Section 4.3.4 describes nuclear design changes as follows:

- lists any changes in reactor core design features, calculational methods, data, or information relevant to determining important nuclear design parameters that depart from prior practice of the reactor designs along with affected parameters.
- discusses details of the nature and effects of the changes in appropriate subsections

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FSAR Same contents as mPower standard plant DCD Section 4.3

4.4 Thermal and Hydraulic Design

PSAR PSAR Section 4.4.1 provides the design bases for the thermal and hydraulic design of the reactor, including such items as:

- maximum fuel and clad temperatures and cladding-to-fuel gap characteristics as a function of burnup (at rated power, at design overpower, and during transients)
- critical heat flux ratio (at rated power, at design overpower, and during transients)
- flow velocities and distribution control
- coolant and moderator voids
- hydraulic stability
- transient limits
- fuel cladding integrity criteria
- fuel assembly integrity criteria

PSAR Section 4.4.2 provides a description of the thermal and hydraulic characteristics of the reactor design and includes information in the following topics:

- summary comparison of thermal hydraulic design parameters with those of previous designs
- critical heat flux ratios
- linear heat generation rate
- void fraction distribution
- core coolant flow distribution
- core pressure drops and hydraulic loads
- correlation and physical data
- thermal effects of operational transients
- uncertainties in estimates
- flux tilt considerations

PSAR Section 4.4.3 describes the thermal and hydraulic design of the reactor coolant system and includes information regarding the following:

- plant configuration data
- operating restrictions on pumps
- temperature-power operating map
- load-following characteristics
- thermal and hydraulic characteristics summary table

PSAR Section 4.4.4 provides an evaluation of the thermal and hydraulic design of the reactor and the reactor coolant system and includes information regarding the following:

- critical heat flux
- core hydraulics
- influence of power distribution
- core thermal response
- analytical methods

4.4 Thermal and Hydraulic Design (cont.)

PSAR (cont.)

PSAR Section 4.4.5 provides the thermal and hydraulic design testing and verification information as follows:

- discusses the testing and verification techniques to be used to ensure that the planned thermal and hydraulic design characteristics of the core and the reactor coolant system have been provided and will remain within required limits throughout core lifetime
- addresses applicable portions of RG 1.68, "Initial Test Program for Water-Cooled Reactor Power Plants"

PSAR Section 4.4.6 provides the thermal and hydraulic design instrumentation requirements as follows:

- discusses the functional requirements for the instrumentation to be employed in monitoring and measuring those thermal-hydraulic parameters important to safety
- includes the requirements for in-core instrumentation to confirm predicted power density distribution and moderator temperature distributions
- describes vibration and loose-parts monitoring equipment to be provided in the plant
- discusses procedures to be used to detect excessive vibration and the occurrence of loose parts

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DCD

DCD Section 4.4.1 provides the design bases for the thermal and hydraulic design of the reactor, including such items as:

- maximum fuel and clad temperatures and cladding-to-fuel gap characteristics as a function of burnup (at rated power, at design overpower, and during transients)
- critical heat flux ratio (at rated power, at design overpower, and during transients)
- flow velocities and distribution control
- coolant and moderator voids
- hydraulic stability
- transient limits
- fuel cladding integrity criteria
- fuel assembly integrity criteria.

DCD Section 4.4.2 provides a description of the thermal and hydraulic characteristics of the reactor design, including detailed information on the following topics:

- summary comparison of thermal-hydraulic design parameters with those of previous designs
- critical heat flux ratios
- linear heat generation rate
- void fraction distribution

4.4 Thermal and Hydraulic Design (cont.)

DCD (cont.)

- core coolant flow distribution
- core pressure drops and hydraulic loads
- correlation and physical data
- thermal effects of operational transients
- uncertainties in estimates
- flux tilt considerations

DCD Section 4.4.3 describes the thermal and hydraulic design of the reactor coolant system including detailed information regarding the following:

- plant configuration data
- operating restrictions on pumps
- temperature-power operating map
- load-following characteristics
- thermal and hydraulic characteristics summary table

DCD Section 4.4.4 provides an evaluation of the thermal and hydraulic design of the reactor and the reactor coolant system and includes detailed information regarding the following:

- critical heat flux
- core hydraulics
- influence of power distribution
- core thermal response
- analytical methods

DCD Section 4.4.5 provides the thermal and hydraulic design testing and verification information as follows:

- discusses testing and verification techniques to be used to ensure that the planned thermal and hydraulic design characteristics of the core and the reactor coolant system have been provided and will remain within required limits throughout core lifetime
- addresses applicable portions of RG 1.68, "Initial Test Program for Water-Cooled Reactor Power Plants"

DCD Section 4.4.6 provides the thermal and hydraulic design instrumentation requirements as follows:

- discusses the functional requirements for the instrumentation to be employed in monitoring and measuring those thermal-hydraulic parameters important to safety
- includes the requirements for in-core instrumentation to confirm predicted power density distribution and moderator temperature distributions

4.4 Thermal and Hydraulic Design (cont.)

DCD (cont.)	- describes the vibration and loose-parts monitoring equipment to be provided in the plant - discusses procedures to be used to detect excessive vibration and the occurrence of loose parts
FSAR	Same contents as mPower standard plant DCD Section 4.4 supplemented by information on the design limit departure from nuclear boiling ratio (DNBR) value calculation using the Revised Thermal Design Procedure

4.5 Reactor Materials

PSAR PSAR Section 4.5.1 provides information related to the control rod drive system (CRDS) structural materials. The CRDS includes the control rod drive mechanism (CRDM) and extends to the coupling interface with the reactivity control (poison) elements in the reactor vessel. It does not include electrical and hydraulic systems used for actuating the CRDMs.

PSAR Section 4.5.1 provides CRDM information for the topics below:
- materials specifications
- austenitic stainless steel components
- other materials
- cleaning and cleanliness control

PSAR Section 4.5.2 provides information related to materials used for reactor internals and core support materials and includes information regarding the topics below:
- materials specifications
- controls on welding
- nondestructive examination of tubular products and fittings
- fabrication and processing of austenitic stainless steel components
- other materials

DCD DCD Section 4.5.1 provides information related to the CRDS structural materials. The CRDS includes the CRDM and extends to the coupling interface with the reactivity control elements in the reactor vessel. It does not include electrical and hydraulic systems used for actuating the CRDMs.

DCD Section 4.5.1 provides the detailed information the topics below:
- materials specifications
- austenitic stainless steel components
- other materials
- cleaning and cleanliness control

DCD Section 4.5.2 provides information related to materials used for reactor internals and core support materials and includes detailed information regarding the topics below:
- materials specifications
- controls on welding
- nondestructive examination of tubular products and fittings
- fabrication and processing of austenitic stainless steel components
- other materials

FSAR Same contents as mPower standard plant DCD Section 4.5

4.6 Functional Design of Reactivity Control Systems

PSAR PSAR Section 4.6.1 provides, directly or through references to other chapters, information related to the CRDS, including the following drawings and descriptions:

- the rod drive mechanism drawing
- layout drawings of the control rod drive system
- process flow diagrams
- piping and instrumentation diagrams
- component descriptions and characteristics
- description of the functions of all related ancillary equipment and hydraulic systems

PSAR Section 4.6.2 provides, directly or through references to other chapters, an evaluation of the CRDS as follows:

- presents a failure mode and effects analyses (FMEA) of the CRDS in tabular form with supporting discussion to delineate the logic employed
- the FMEA demonstrates that the CRDS, which for purposes of these evaluations includes all essential ancillary equipment and hydraulic systems, can perform the intended safety functions with the loss of any single active component
- establishes that all essential elements of the CRDS are identified and provisions made for isolation from nonessential CRDS elements
- establishes that all essential equipment is amply protected from common mode failures such as failure of moderate- and high-energy lines

PSAR Section 4.6.3 provides, directly or through references to other chapters, testing and verification of the CRDS as follows:

- presents a functional testing program that includes:
  - rod insertion and withdrawal tests
  - thermal and fluid dynamic tests simulating postulated operating and accident conditions
  - test verification of the CRDS with imposed single failures, as appropriate
- presents preoperational and initial startup test programs and includes the objectives, test methods, and acceptance criteria

PSAR Section 4.6.4 provides, directly or through references to other chapters, the following combined performance information of the reactivity system:

- figures of plan and elevation layout drawings to provide bases for establishing that the reactivity control systems when used in single or multiple redundant modes are not vulnerable to common mode failures
- listing of all the postulated accidents evaluated in Chapter 15 that take credit for two or more reactivity control systems for preventing or mitigating each accident
- tabulation of the related reactivity systems

4.6 Functional Design of Reactivity Control Systems (cont.)

PSAR (cont.) PSAR Section 4.6.5 provides, directly or through references to other chapters, an evaluation of combined performance as follows:

- presents evaluations of the combined functional performance for accidents where two or more reactivity systems are used
- failure analyses to demonstrate that the reactivity control systems used redundantly are not susceptible to common mode failures
- considers failures originating within each reactivity control system and from plant equipment other than reactivity systems and presents in tabular form with supporting discussion and logic

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DCD DCD Section 4.6.1 provides information related to the CRDS including the following drawings and descriptions:

- the rod drive mechanism drawing
- layout drawings of the control rod drive system
- process flow diagrams
- piping and instrumentation diagrams
- component descriptions and characteristics
- description of the functions of all related ancillary equipment and hydraulic systems

DCD Section 4.6.2 provides the evaluation of the CRDS as follows:

- presents an FMEA of the CRDS in tabular form with supporting discussion to delineate the logic employed
- the FMEA demonstrates that the CRDS, which for purposes of these evaluations includes all essential ancillary equipment and hydraulic systems, can perform the intended safety functions with the loss of any single active component
- establishes that all essential elements of the CRDS are identified and provisions made for isolation from nonessential CRDS elements
- establishes that all essential equipment is amply protected from common mode failures such as failure of moderate- and high-energy lines

DCD Section 4.6.3 provides testing and verification of the CRDS as follows:

- presents a functional testing program that includes:
  - rod insertion and withdrawal tests
  - thermal and fluid dynamic tests simulating postulated operating and accident conditions
  - test verification of the CRDS with imposed single failures, as appropriate
- presents preoperational and initial startup test programs and includes the objectives, test methods, and acceptance criteria

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4.6 Functional Design of Reactivity Control Systems (cont.)

DCD (cont.)

DCD Section 4.6.4 provides the following combined performance information of the reactivity system:

- figures of plan and elevation layout drawings to provide bases for establishing that the reactivity control systems, when used in single or multiple redundant modes, are not vulnerable to common mode failures
- listing of all the postulated accidents evaluated in Chapter 15 that take credit for two or more reactivity control systems for preventing or mitigating each accident
- tabulation of the related reactivity systems

DCD Section 4.6.5 provides the evaluation of combined performance as follows:

- presents evaluations of the combined functional performance for accidents where two or more reactivity systems are used
- failure analyses to demonstrate that the reactivity control systems used redundantly are not susceptible to common mode failures
- considers failures originating within each reactivity control system and from plant equipment other than reactivity systems and present in tabular form with supporting discussion and logic

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FSAR Same contents as mPower standard plant DCD Section 4.6

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5.0 Reactor Coolant System and Connected Systems	PSAR	10 CFR 50.2(v)	No	RG 1.70	None	N/A	N/A	N/A	No	N/A	None
	DCD	10 CFR 50.2(v)	No	RG 1.206	None	N/A	N/A	N/A	N/A	N/A	None
	FSAR	10 CFR 50.2(v)	No	RG 1.206	None	N/A	N/A	N/A	No	N/A	None
5.1 Summary Description	PSAR	None	No	RG 1.70	None	N/A	N/A	N/A	No	N/A	None
	DCD	None	No	RG 1.206	None	N/A	N/A	N/A	N/A	N/A	None
	FSAR	None	No	RG 1.206	None	N/A	N/A	N/A	No	N/A	None
5.2 Integrity of the Reactor Coolant Pressure Boundary	PSAR	See individual subsections for specific Regulatory Requirements.	No	RG 1.70	None	See individual subsections for specific Regulatory Guidance.	See individual subsections for specific Industry Guidance.	N/A	No	N/A	None
	DCD	See individual subsections for specific Regulatory Requirements.	No	RG 1.206	None	See individual subsections for specific Regulatory Guidance.	See individual subsections for specific Industry Guidance.	N/A	N/A	N/A	None
	FSAR	See individual subsections for specific Regulatory Requirements.	No	RG 1.206	None	See individual subsections for specific Regulatory Guidance.	See individual subsections for specific Industry Guidance.	N/A	No	N/A	None
5.2.1 Compliance with Codes and Code Cases	PSAR	10 CFR 50 App A, GDC 1 10 CFR 50.55a	No	RG 1.70	5.2.1.1 5.2.1.2	RGs 1.26, 1.84, 1.147, 1.192 Note: RG 1.85 referenced in RG 1.70 was incorporated into RG 1.84 and withdrawn in June 2003. Note: RG 1.193 Rev 3 dated 10/2010 is not referenced in the SRP. RG 1.193 lists "ASME Code Cases Not Approved for Use."	ASME Section III, 2007 w/ 2008 addenda ASME B31.1, 2007	Per RG 1.26, Table showing compliance with regulations of 10CFR 50.55a to include identification of storage tanks that were not addressed in RG 1.70. RG 1.206 includes the storage tanks.	No	3.2, 3.8, 3.9, 3.12, 3.13	None
	DCD	10 CFR 50 App A, GDC 1 10 CFR 50.55a 10 CFR52.47(b)(1)	No	RG 1.206	5.2.1.1 5.2.1.2	RGs 1.26, 1.84, 1.147, 1.192	ASME Section III, 2007 w/ 2008 addenda ASME B31.1, 2007	N/A	N/A	3.2, 3.8, 3.9, 3.12, 3.13, 14.3	None
	FSAR	10 CFR 50 App A, GDC 1 10 CFR 50.55a	No	RG 1.206	5.2.1.1 5.2.1.2	RGs 1.26, 1.84, 1.147, 1.192	ASME Section III, 2007 w/ 2008 addenda ASME B31.1, 2007	N/A	No	3.2, 3.8, 3.9, 3.12, 3.13	None

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior to the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
5.2.2 Overpressure Protection	PSAR	10 CFR 50 App A, GDC 1, 15, 30, and 31 10 CFR 50 App G 10 CFR 50.34(f)(2)(x), and (xi). 10 CFR 50.55a	No	RG 1.70	5.2.2 BTP 5-2	RG 1.26, RG 1.29, RG 1.84. GL 82-16, 83-02, 96-03, 90-06. TMI AP II.D.1, and II.D.33. NUREG 0737, 1430 thru 1434 as applicable RIS 2004-04	ASME Section II, III, and XI, 2007 w/ 2008 addenda. ASME Section III § NB-7000, 2007 w/ 2008 addenda ANSI/ANS 51.1	RG 1.206, Section 5.2.2.1, requests a description of compliance with GDC 15 as it relates to not exceeding the RCPB design conditions during any condition of normal operation or AOO, as well as GDC 31 as it relates to designing the RCPB with sufficient margin to ensure that it behaves in a nonbrittle manner and minimizes the probability of rapidly propagating fracture. RG 1.206, Section 2.2.2 includes: "Applicants should describe the design of overpressure protection during low-temperature operations, including the capability to relieve pressure during all overpressure events during startup and shutdown conditions at low temperatures. Applicants should provide the analysis, identify events that can be prevented by interlocks or locking-out power, and describe how the system is enabled (with alarms, indications, and power sources) to demonstrate how overpressure protection is achieved. Discuss whether any credit is taken for active components to mitigate an overpressure event. RG 1.206, section 5.2.2.10 includes: "Applicants should describe specific testing of the low-temperature overpressure protection system	No	3.2, 3.9, 3.10, 3.11, 3.12, 5.2, 5.3, 5.4, 6.3, 7.6, 14.2, 16.0, 17.5	None
	DCD	10 CFR 50 App A, GDC 1, 15, 30, and 31 10 CFR 50 App G 10 CFR 50.34(f)(2)(x), and (xi). 10 CFR 50.55a 10 CFR52.47(b)(1)	No	1.206	5.2.2 BTP 5-2	RG 1.26, RG 1.29, RG 1.84. GL 82-16, 83-02, 96-03, 90-06. TMI AP II.D.1, and II.D.33. NUREG 0737, 1430 thru 1434 as applicable RIS 2004-04	ASME Section II, III, and XI, 2007 w/ 2008 addenda. ASME Section III § NB-7000, 2007 w/ 2008 addenda ANSI/ANS 51.1	N/A	N/A	3.2, 3.9, 3.10, 3.11, 3.12, 5.2, 5.3, 5.4, 6.3, 7.6, 14.2, 14.3, 16.0, 17.5	None
	FSAR	10 CFR 50 App A, GDC 1, 15, 30, and 31 10 CFR 50 App G 10 CFR 50.34(f)(2)(x), and (xi). 10 CFR50.55a	No	1.206	5.2.2 BTP 5-2	RG 1.26, RG 1.29, RG 1.84. GL 82-16, 83-02, 96-03, 90-06. TMI AP II.D.1, and II.D.33. NUREG 0737, 1430 thru 1434 as applicable RIS 2004-04	ASME Section II, III, and XI, 2007 w/ 2008 addenda. ASME Section III § NB-7000, 2007 w/ 2008 addenda ANSI/ANS 51.1	N/A	No	3.2, 3.9, 3.10, 3.11, 3.12, 5.2, 5.3, 5.4, 6.3, 7.6, 14.2, 16.0, 17.5	None

Note:
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5.2.3 Reactor Coolant Pressure Boundary Materials	PSAR	CFR 50 App A, GDC 1, 4, 14, 30, 31 10 CFR 50 App B Criteria XIII 10 CFR 50 App G 10 CFR 50.55a,	No	RG 1.70	5.2.3	RGs 1.31, 1.34, 1.36, 1.37, 1.43, 1.44, 1.50, 1.71, 1.84 GL 97-01 NUREG 1823 NRC Order EA-03-009	ASME Section II, III NB-2000, and IX, 2007 w/ 2008 addenda ASME Section III Appendix G - 2007 w/ 2008 addenda ASTM A262, 2010 EPRI Reports, PWR Primary and Secondary Water Chemistry Guidelines	Yes, RG 1.206 places emphasis on the austenitic stainless steel with sensitized microstructure being susceptible to (Intergranular stress corrosion cracking (IGSCC). For compatibility with Reactor Coolant, RG 1.206 requires discussion of methods to control water chemistry to inidcate whether the coolant chemistry will be maintained at a level comparable to the guidlines in the latest version of the EPRI report "PWR Water Chemistry Guidelines." Under the control of welding of ferritic materials, RG 1.206 has added requirement for applicants to describe controls to limit the occurrance of underclad cracking in lowalloy steel components clad with stainless steel. RG 1.206 provides additional guidance in Section 5.2.3.5 "Prevention of Primary Water Stress-Corrosion Cracking for Nickel-Base Alloys" and Section 5.2.3.6 "Threaded Fasteners" The authors of the PSAR sections should consider addressing additional guidance contained in RG	No	3.9, 3.13, 5.2, 5.3, 5.4, 9.3, 17	Compatibility of materials with reactor coolant. General corrosion and stress corrosion cracking (SCC) induced by impurities in the reactor coolant can cause failures of the reactor coolant pressure boundary. The use of nickel-chromium-iron alloys in the RCPB of PWR requires attention due to SCC of certain nickel-chromium-iron alloys.
	DCD	CFR 50 App A, GDC 1, 4, 14, 30, 31 10 CFR 50 App B Criteria XIII 10 CFR 50 App G 10 CFR 50.55a, 10 CFR 52.47(b)(1)	No	RG 1.206	5.2.3	RGs 1.31, 1.34, 1.36, 1.37, 1.43, 1.44, 1.50, 1.71, 1.84 GL 97-01 NUREG 1823 NRC Order EA-03-009 IMC-2504	ASME Section II, III NB-2000, and IX, 2007 w/ 2008 addenda ASME Section III Appendix G - 2007 w/ 2008 addenda ASTM A262, 2010 EPRI Reports, PWR Primary and Secondary Water Chemistry Guidelines	N/A	N/A	3.9, 3.13, 5.2, 5.3, 5.4, 9.3, 13.4, 14.3, 17	Compatibility of materials with reactor coolant. General corrosion and stress corrosion cracking (SCC) induced by impurities in the reactor coolant can cause failures of the reactor coolant pressure boundary.
	FSAR	CFR 50 App A, GDC 1, 4, 14, 30, 31 10 CFR 50 App B Criteria XIII 10 CFR 50 App G 10 CFR 50.55a,	No	RG 1.206	5.2.3	RGs 1.31, 1.34, 1.36, 1.37, 1.43, 1.44, 1.50, 1.71, 1.84 GL 97-01 NUREG 1823 NRC Order EA--03-009	ASME Section II, III NB-2000, and IX, 2007 w/ 2008 addenda ASME Section III Appendix G - 2007 w/ 2008 addenda ASTM A262, 2010 EPRI Reports, PWR Primary and Secondary Water Chemistry Guidelines	N/A	No	3.9, 3.13, 5.2, 5.3, 5.4, 9.3, 13.4, 17	The use of nickel-chromium-iron alloys in the RCPB of PWR requires attention due to SCC of certain nickel-chromium-iron alloys.

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior to the PSAR submittal.

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5.2.4 Inservice Inspection and Testing of the Reactor Coolant Pressure Boundary	PSAR	CFR 50 App A, GDC 32 10 CFR 50.55a,	No	RG 1.70	5.2.4	RGs 1.147 and 1.150 GL 88-05	ASME Section III, and XI - IWA- 1000, 4000; IWA & IWB - 2000, 3000, 5000; Appendix VII and VIII to Division 1, 2007 w/ 2008 addenda	RG 1.206 contains a complete re-write and updating of section 5.2.4, "Inservice Inspection and Testing Program."	No	3.2, 3.13, 5.2, 5.3, 5.4, 6.6	RG 1.206 contains a complete re-write and updating of section 5.2.4, "Inservice Inspection and Testing Program." The authors of the PSAR sections consider addressing additional guidance contained in RG 1.206
	DCD	10 CFR 50 App A, GDC 32, 10 CFR 50.55a, 10 CFR 52.47(b)(1)	No	RG 1.206	5.2.4	RGs 1.147 and 1.150 GL 88-05 IMC-2504 SECY-05-0197	ASME Section III, and XI - IWA- 1000, 4000; IWA & IWB - 2000, 3000, 5000; Appendix VII and VIII to Division 1, 2007 w/ 2008 addenda	N/A	N/A	3.2, 3.13, 5.2, 5.3, 5.4, 6.6, 13.4, 14.3	N/A
	FSAR	10 CFR 50 App A, GDC 32, 10 CFR 50.55a,	No	RG 1.206	5.2.4	RGs 1.147 and 1.150 GL 88-05	ASME Section III, and XI - IWA- 1000, 4000; IWA & IWB - 2000, 3000, 5000; Appendix VII and VIII to Division 1, 2007 w/ 2008 addenda	N/A	No	3.2, 3.13, 5.2, 5.3, 5.4, 6.6, 13.4	N/A

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior to the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
5.2.5 Reactor Coolant Pressure Boundary Leakage Detection	PSAR	10 CFR 50 App A, GDC 2, 30	No	RG 1.70	5.2.5	RGs 1.29 and 1.45	None	RG 1.206, section 5.2.5, requests information beyond that requested in RG 1.70, including compliance with RG 1.29, "Seismic Design Classification," and GDC 2 for RCPB leakage detection and responses after an earthquake; describing floor drain system to demonstrate the leakage will be collected in sump or tank; and describing primary coolant radioactivity concentration assumption utilized to analyze the sensitivity of the leak detection systems.	No	3.2, 3.9, 3.10, 3.11, 6.2, 6.6, 7.5, 8.3, 16, 17	The authors of the PSAR sections should consider addressing additional guidance contained in RG 1.206
	DCD	10 CFR 50 App A, GDC 2, 30 10 CFR 52.47(b)(1)	No	RG 1.206	5.2.5	RGs 1.29 and 1.45	None	N/A	N/A	3.2, 3.9, 3.10, 3.11, 6.2, 6.6, 7.5, 8.3, 14.3, 16, 17	N/A
	FSAR	10 CFR 50 App A, GDC 2, 30	No	RG 1.206	5.2.5	RGs 1.29 and 1.45	None	N/A	No	3.2, 3.9, 3.10, 3.11, 6.2, 6.6, 7.5, 8.3, 16, 17	N/A
5.4 Reactor Coolant System Component and Subsystem Design	PSAR	See individual subsections for specific Regulatory Requirements.	No	RG 1.70	5.4	See individual subsections for specific Regulatory Guidance.	See individual subsections for specific Industry Guidance.	None	No	3.5, 3.7, 3.9, 3.10, 3.12, 5.2, 5.4, 6.1, 6.3, 6.6, 7.2, 7.3, 7.4, 7.5, 9.2, 10.3, 10.4, 14.3, 15.0, 15.1, 15.2, 15.3, 15.6	None
	DCD	See individual subsections for specific Regulatory Requirements.	No	RG 1.206	5.4	See individual subsections for specific Regulatory requirements.	See individual subsections for specific Industry Guidance.	N/A	N/A	3.5, 3.7, 3.9, 3.10, 3.12, 5.2, 5.4, 6.1, 6.3, 6.6, 7.2, 7.3, 7.4, 7.5, 9.2, 10.3, 10.4, 14.3, 15.0, 15.1, 15.2, 15.3, 15.6	None
	FSAR	See individual subsections for specific Regulatory Requirements.	No	RG 1.206	5.4	See individual subsections for specific Regulatory Guidance.	See individual subsections for specific Industry Guidance.	N/A	No	3.5, 3.7, 3.9, 3.10, 3.12, 5.2, 5.4, 6.1, 6.3, 6.6, 7.2, 7.3, 7.4, 7.5, 9.2, 10.3, 10.4, 14.3, 15.0, 15.1, 15.2, 15.3, 15.6	None

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior to the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
5.4.1 Reactor Coolant Pumps	PSAR	10 CFR 50 App A, GDC 1, 4 10 CFR 50, 50.55a Note: SRP does not have separate Section 5.4.1 but it is included within SRP Section 5.4 as item 1	No	RG 1.70	5.4	RG 1.14	ASME Section III, and XI, 2007 w/ 2008 addenda.	None Note: Section 5.4.1.1 regarding RCP Flywheel Integrity does not apply for mPower Reactor.	No	3.5, 3.9, 3.10, 5.2, 7.2, 7.3, 7.4, 7.5, 9.2, 15.3	Note: B&W mPower reactor does not have RCP flywheel therefore this section should address why section 5.4.1.1 "Pump Flywheel Integrity" is not applicable. Resolution to AP 1000 open item OI-SRP4.5.1-CIB1-01 states that Section 4.5.1 will include more information about the specific use of RG 1.44 for the AP1000 CRDMs.
	DCD	10 CFR 50 App A, GDC 1, 4 10 CFR 50, 50.55a 10 CFR 52.47(b)(1) Note: SRP does not have separate Section 5.4.1 but it is included within SRP Section 5.4 as item 1	No	RG 1.206	5.4	RG 1.14 IMC-2504	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	N/A	3.5, 3.9, 3.10, 5.2, 7.2, 7.3, 7.4, 7.5, 9.2, 14.3, 15.3	Note: B&W mPower reactor does not have RCP flywheel therefore this section should address why section 5.4.1.1 "Pump Flywheel Integrity" is not applicable. Resolution to AP 1000 open item OI-SRP4.5.1-CIB1-01 states that Section 4.5.1 will include more information about the specific use of RG 1.44 for the AP1000 CRDMs.
	FSAR	10 CFR 50 App A, GDC 1, 4 10 CFR 50, 50.55a Note: SRP does not have separate Section 5.4.1 but it is included within SRP Section 5.4 as item 1	No	RG 1.206	5.4	RG 1.14	ASME Section III, and XI, 2007 w/ 2008 addenda.		No	3.5, 3.9, 3.10, 5.2, 7.2, 7.3, 7.4, 7.5, 9.2, 15.3	Note: B&W mower reactor does not have RCP flywheel therefore section 5.4.1.1 "Pump Flywheel Integrity" should not be discussed. Response to AP 1000 open item OI-SRP4.5.1-CIB1-01 agrees to provide more information in Section states that Section 4.5.1 will include more information about the specific use of RG 1.44 for the AP1000 CRDMs.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
5.4.2 Steam Generators	PSAR	CFR 50 App A, GDC 1, 4, 14, 15, 30, 31, 32 10 CFR 50 App B 10 CFR 50 App G 10 CFR 50.36 10 CFR 50.55a 10 CFR 50.65	No	RG 1.70	5.4 5.4.2.1 5.4.2.2 BTP 5-1, 5.3	RGs 1.31, 1.34, 1.36, 1.37, 1.43, 1.44, 1.50, 1.65, 1.71, 1.84, 1.121 NUREGs 0313, 1430, 1431, 1432	NEI 97-06 ASME Section II, III, IX, 2007 w/ 2008 addenda	RG 1.206 Section 5.4.2.2. require Steam Generator Program to describe provisions in the design of the primary and secondary side of SG that permit implementation of a steam generator tube integrity program. It includes the content specified under section 5.4.2.2 Steam Generator Inservice Inspection and adds "the reporting to be adopted into the TS (including the limiting conditions for operation (LCO), surveillance requirements, and primary-to-secondary leakage limits). They should discuss the extent to which any potential conflicts (i.e. differences) exist between the TS and Article IWB-2000 of section XI of the ASME Code (refer to 10 CFR 50.55a(b)(2)(iii)." The authors of the PSAR sections should consider addressing additional guidance contained in RG 1.206	No	3.2, 3.9, 3.13, 5.2, 5.4, 6.6, 9.3, 10.3, 10.4, 13.4, 15.0, 15.1, 16, 17.5	None
	DCD	CFR 50 App A, GDC 1, 4, 14, 15, 30, 31 10 CFR 50 App B 10 CFR 50 App G 10 CFR 50.36 10 CFR 50.55a 10 CFR 50.65 10 CFR 52.47(b)(1)	No	RG 1.206	5.4 5.4.2.1 5.4.2.2 BTP 5-1, 5.3	RGs 1.31, 1.34, 1.36, 1.37, 1.43, 1.44, 1.50, 1.65, 1.71, 1.84, 1.121 NUREGs 0313, 1430, 1431, 1432 IMC-2504 SECY-05-0197	NEI 97-06 ASME Section II, III, IX, 2007 w/ 2008 addenda	N/A	N/A	3.2, 3.9, 3.13, 5.2, 5.4, 6.6, 9.3, 10.3, 10.4, 13.4, 14.3, 15.0, 15.1, 16, 17.5	None
	FSAR	CFR 50 App A, GDC 1, 4, 14, 15, 30, 31 10 CFR 50 App B 10 CFR 50 App G 10 CFR 50.36 10 CFR 50.55a 10 CFR 50.65	No	RG 1.206	5.4 5.4.2.1 5.4.2.2 BTP 5-1, 5.3	RGs 1.31, 1.34, 1.36, 1.37, 1.43, 1.44, 1.50, 1.65, 1.71, 1.84, 1.121 NUREGs 0313, 1430, 1431, 1432	NEI 97-06 ASME Section II, III, IX, 2007 w/ 2008 addenda	N/A	No	3.2, 3.9, 3.13, 5.2, 5.4, 6.6, 9.3, 10.3, 10.4, 13.4, 15.0, 15.1, 16, 17.5	None
5.4.3 Reactor Coolant System Piping and Valves	PSAR	10 CFR 50 App A, GDC 1, 2, 4, 10, 14, 15, 30, and 31 10 CFR 50.2 10 CFR 50.55a(c)(1) 10 CFR 50.55a(c)(2)	No	RG 1.70	5.4	RGs 1.26 GL 89-10	ASME Section II, III, IX, and XI, 2007 w/ 2008 addenda.	None	No	3.9, 3.10, 3.12, 5.2, 5.4, 6.1, 6.3, 6.6, 10.3	None
	DCD	10 CFR 50 App A, GDC 1, 2, 4, 10, 14, 15, 30, and 31 10 CFR 50.2 10 CFR 50.55a(c)(1) 10 CFR 50.55a(c)(2) 10 CFR 52.47(b)(1)	No	RG 1.206	5.4	RGs 1.26 GL 89-10	ASME Section II, III, IX, and XI, 2007 w/ 2008 addenda.	N/A	N/A	3.9, 3.10, 3.12, 5.2, 5.4, 6.1, 6.3, 6.6, 10.3, 14.3	None
	FSAR	10 CFR 50 App A, GDC 1, 2, 4, 10, 14, 15, 30, and 31 10 CFR 50.2 10 CFR 50.55a(c)(1) 10 CFR 50.55a(c)(2)	No	RG 1.206	5.4	RGs 1.26 GL 89-10	ASME Section II, III, IX, and XI, 2007 w/ 2008 addenda.	N/A	No	3.9, 3.10, 3.12, 5.2, 5.4, 6.1, 6.3, 6.6, 10.3	None

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior to the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
5.4.4 Main Steam Line Flow Restrictions (Not Applicable for mPower Reactor)	PSAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	DCD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	FSAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None
5.4.5 Pressurizer	PSAR	10 CFR 50.36 10 CFR 50.46 10 CFR 50.34 (f)(2)(xiii)	No	RG 1.70	5.4	NUREG 0737	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	No	3.9, 5.2, 15.6	Pressurizer needs to be addressed in Section 5.4.5
	DCD	10 CFR 50.36 10 CFR 50.46 10 CFR 50.34 (f)(2)(xiii) 10 CFR 52.47(b)(1)	No	RG 1.206	5.4	NUREG 0737	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	N/A	3.9, 5.2, 14.3, 15.6	Pressurizer needs to be addressed in Section 5.4.5
	FSAR	10 CFR 50.36 10 CFR 50.46 10 CFR 50.34 (f)(2)(xiii)	No	RG 1.206	5.4	NUREG 0737	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	No	3.9, 5.2, 15.6	Pressurizer needs to be addressed in Section 5.4.5
5.4.6 Automatic Depressurization System Valves	PSAR	10CFR50.46	No	None Note: Automatic Depressurization System (ADS) Valves added by Engineering. It is not addressed in RG 1.206 as such	Note: ADS Valves is added by Engineering. It is not addressed in SRP as such	None	ASME Section III, and XI, 2007 w/ 2008 addenda.	None	N/A	3.2, 3.9, 3.10, 5.2, 5.4, 6.1, 6.3, 6.6, 7.3, 10.3, 14.2, 15.6	N/A
	DCD	10CFR50.46 10 CFR 52.47(b)(1)	No	None Note: Automatic Depressurization System (ADS) Valves added by Engineering. It is not addressed in RG 1.206 as such	Note: ADS Valves is added by Engineering. It is not addressed in SRP as such	None	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	N/A	3.2, 3.9, 3.10, 5.2, 5.4, 6.1, 6.3, 6.6, 7.3, 10.3, 14.2, 14.3, 15.6	N/A
	FSAR	10CFR50.46	No	None Note: Automatic Depressurization System (ADS) Valves added by Engineering. It is not addressed in RG 1.206 as such	Note: ADS Valves is added by Engineering. It is not addressed in SRP as such	None	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	N/A	3.2, 3.9, 3.10, 5.2, 5.4, 6.1, 6.3, 6.6, 7.3, 10.3, 14.2, 15.6	N/A

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior to the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
5.4.7 Reactor Coolant Inventory and Purification System (RCIPS)	PSAR	10 CFR 50 App A, GDC 1, 2, 4, 5, 14, 19, 29, 33, 34, 35, 60, 61 10 CFR 50.34(f)(2)(xxvi) 10 CFR 50.63	No	RG 1.70	5.4.7 BTP 5-4	RGs 1.26, 1.29, 1.55, & 1.82 NUREG 0737 Task Action Plan Item III.D.1.1. NUREG 927, GLs 88-17 and 89-04 Bulletins 80-05, 86-01 and 88-04 ISG-019 (post GL 2008-01) SECY-77-439	ASME Section III, and XI, 2007 w/ 2008 addenda.	RG 1.206 requires applicants to discuss design bases with respect to GDC 2,4,5,19, and 34 whereas RG 1.70 specifies only GDC 5. RG 1.206 requires design bases discussion of RHR system for shutdown and midloop operations, prevention of an interfacing system LOCA, RHR system relief valves for low-temperature overpressure protection, and an evaluation in accordance with the process of RTNSS to determine necessary regulatory oversight.	No	3.2, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 4.3, 5.2, 6.1, 6.2, 6.3, 6.6, 6.8, 7.1, 7.4, 7.6, 8.1, 8.2, 9.2, 11.2, 11.3, 11.4, 12.1, 12.2, 12.3, 12.4, 12.5, 15.6, 16, 17	The functions performed under RHR and CVCS are addressed under RCIP system unique to mPower reactor design.
	DCD	10 CFR 50 App A, GDC 1, 2, 4, 5, 14, 19, 29, 33, 34, 35, 60, 61 10 CFR 50.34(f)(2)(xxvi) 10 CFR 50.63 10 CFR 52.47(b)(1)	No	RG 1.206	5.4.7 BTP 5-4	RGs 1.26, 1.29, 1.55, & 1.82 NUREG 0737 Task Action Plan Item III.D.1.1. NUREG 927, GLs 88-17 and 89-04 Bulletins 80-05, 86-01 and 88-04 ISG-019 (post GL 2008-01) SECY-77-439	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	N/A	3.2, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 4.3, 5.2, 6.1, 6.2, 6.3, 6.6, 6.8, 7.1, 7.4, 7.6, 8.1, 8.2, 9.2, 11.2, 11.3, 11.4, 12.1, 12.2, 12.3, 12.4, 12.5, 14.3, 15.6, 16, 17	The functions performed under RHR and CVCS are addressed under RCIP system unique to mPower reactor design.
	FSAR	10 CFR 50 App A, GDC 1, 2, 4, 5, 14, 19, 29, 33, 34, 35, 60, 61 10 CFR 50.34(f)(2)(xxvi) 10 CFR 50.63	No	RG 1.206	5.4.7 BTP 5-4	RGs 1.26, 1.29, 1.55, & 1.82 NUREG 0737 Task Action Plan Item III.D.1.1. NUREG 927, GLs 88-17 and 89-04 Bulletins 80-05, 86-01 and 88-04 ISG-019 (post GL 2008-01) SECY-77-439	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	No	3.2, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 4.3, 5.2, 6.1, 6.2, 6.3, 6.6, 6.8, 7.1, 7.4, 7.6, 8.1, 8.2, 9.2, 11.2, 11.3, 11.4, 12.1, 12.2, 12.3, 12.4, 12.5, 15.6, 16, 17	The functions performed under RHR and CVCS are addressed under RCIP system unique to mPower reactor design.
5.4.8 Reactor Water Cleanup System (Not Applicable for mPower Reactor)	PSAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	DCD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	FSAR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior to the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
5.4.9 Reactor Coolant System Pressure Relief Devices	PSAR	10 CFR 50 App A, GDC 15 10 CFR 50.34(f)(2)(xi), 10 CFR 50.34(f)(2)(x) 10 CFR 52.47(b)(1)	No	RG 1.70	5.4 BTP-5.2	None.	ASME Section III, and XI, Appendix G, 2007 w/ 2008 addenda. Appendix I of OM Code, 2004 w/ 2005 addenda	There is no discussion of RCS Pressure Relief Devices in RG 1.70	N/A	3.9, 3.10, 5.2, 6.1, 6.6, 10.3, 15.6	N/A
	DCD	10 CFR 50 App A, GDC 15 10 CFR 50.34(f)(2)(xi), 10 CFR 50.34(f)(2)(x)	No	RG 1.206	5.4 BTP-5.2	None.	ASME Section III, and XI, Appendix G, 2007 w/ 2008 addenda. Appendix I of OM Code, 2004 w/ 2005 addenda	N/A	N/A	3.9, 3.10, 5.2, 6.1, 6.6, 10.3, 14.3, 15.6	N/A
	FSAR	10 CFR 50 App A, GDC 15 10 CFR 50.34(f)(2)(xi), 10 CFR 50.34(f)(2)(x)	No	RG 1.206	5.4 BTP-5.2	None.	ASME Section III, and XI, Appendix G, 2007 w/ 2008 addenda. Appendix I of OM Code, 2004 w/ 2005 addenda	N/A	N/A	3.9, 3.10, 5.2, 6.1, 6.6, 10.3, 15.6	None
5.4.10 Reactor Coolant System Component Supports	PSAR	10 CFR 50 App A, GDC 1, 2, 4 10 CFR 50.55a	No	RG 1.70	5.4	RGs 1.124 and 1.130	ASME Section III Subsection NF, 2007 w/ 2008 addenda. AISC N690-06 ACI 349-06/349R	Yes	N/A	3.9	N/A
	DCD	10 CFR 50 App A, GDC 1,2, 4 10 CFR 50.55a 10 CFR 52.47(b)(1)	No	RG 1.206	5.4	RGs 1.124 and 1.130	ASME Section III Subsection NF, 2007 w/ 2008 addenda. AISC N690-06 ACI 349-06/349R	N/A	N/A	3.9, 14.3	N/A
	FSAR	10 CFR 50 App A, GDC 1, 2, 4 10 CFR 50.55a	No	RG 1.206	5.4	RGs 1.124 and 1.130	ASME Section III Subsection NF, 2007 w/ 2008 addenda. AISC N690-06 ACI 349-06/349R	N/A	N/A	3.9	None
5.4.11 Pressurizer Relief Discharge System	PSAR	10 CFR 50 App A, GDC 2, 4	No	RG 1.70	5.4.11	RG 1.29	ASME Section III Subsection NF, 2007 w/ 2008 addenda	No	No	3.2, 3.9, 5.2, 6.6, 9.5, 16, 17	None
	DCD	10 CFR 50 App A, GDC 2, 4 10 CFR 52.47(b)(1)	No	RG 1.206	5.4.11	RG 1.29	ASME Section III Subsection NF, 2007 w/ 2008 addenda	N/A	N/A	3.2, 3.9, 5.2, 6.6, 9.5, 14.3, 16, 17	None
	FSAR	10 CFR 50 App A, GDC 2, 4	No	RG 1.206	5.4.11	RG 1.29	ASME Section III Subsection NF, 2007 w/ 2008 addenda	N/A	No	3.2, 3.9, 5.2, 6.6, 9.5, 16, 17	None

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior to the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
5.4.12 Reactor Coolant System High Point Vents	PSAR	10 CFR 50 App A, GDC 1, 14, 17, 19, 30, 32,34, 36. 10 CFR 50.34, 10 CFR 50.44, 10 CFR 50.46a, 10 CFR 50.46b, 10 CFR 50.49, 10 CFR 50.55a	No	RG 1.206	5.4.12	RGs 1.92, 1.100 NUREG 0737	IEEE 323-2003 (R2008), 344 - 2004 (R2009), 382-2006 ASME Section III, XI Subsection IWV, 2007 w/ 2008 addenda	Reactor Coolant System High Point Vent is not addressed under Section 5.4 of RG 1.70	No	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 3.11, 6.2, 6.6, 7.1, 8.1, 14.2, 16, 17, 18, 19	Need to address RCS High Vent per RG 1.206
	DCD	10 CFR 50 App A, GDC 1, 14, 17, 19, 30, 32, 34, 36. 10 CFR 50.34, 10 CFR 50.44, 10 CFR 50.46a, 10 CFR 50.46b, 10 CFR 50.49, 10 CFR 50.55a, 10 CFR 52.47(b)(1)	No	RG 1.206	5.4.12	RGs 1.92, 1.100 NUREG 0737	IEEE 323-2003 (R2008), 344 - 2004 (R2009), 382-2006 ASME Section III, XI Subsection IWV, 2007 w/ 2008 addenda	N/A	N/A	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 3.11, 6.2, 6.6, 7.1, 8.1, 14.2, 14.3, 16, 17, 18, 19	Need to address RCS High Vent per RG 1.206
	FSAR	10 CFR 50 App A, GDC 1, 14, 17, 19, 30, 32, 34, 36. 10 CFR 50.34, 10 CFR 50.44, 10 CFR 50.46a, 10 CFR 50.46b, 10 CFR 50.49, 10 CFR 50.55a	No	RG 1.206	5.4.12	RGs 1.92, 1.100 NUREG 0737	IEEE 323-2003 (R2008), 344 - 2004 (R2009), 382-2006 ASME Section III, XI Subsection IWV, 2007 w/ 2008 addenda	N/A	No	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 3.11, 6.2, 6.6, 7.1, 8.1, 14.2, 16, 17, 18, 19	Need to address RCS High Vent per RG 1.206
5.4.13 Emergency Boration Tank	PSAR	10 CFR 50 App A, GDC 26, 36, 37 10 CFR 50.55a 10 CFR 50.62	No	None Note: Emergency Boration Tank is added by Engineering. It is not addressed in RG 1.70 as such	None Note: Emergency Boration Tank is added by Engineering. It is not addressed in SRP as such	RGs 1.26 and 1.29	ASME Section III, and XI, 2007 w/ 2008 addenda.	Yes	No	3.9, 5.2, 6.3, 15.0	None
	DCD	10 CFR 50 App A, GDC 26, 36, 37 10 CFR 50.55a 10 CFR 50.62 10 CFR 52.47(b)(1)	No	None Note: Emergency Boration Tank is added by Engineering. It is not addressed in RG 1.206 as such	Note: Emergency Boration Tank is added by Engineering. It is not addressed in SRP as such	RGs 1.26 and 1.29	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	N/A	3.9, 5.2, 6.3, 14.3, 15.0	None
	FSAR	10 CFR 50 App A, GDC 26, 36, 37 10 CFR 50.55a 10 CFR 50.62	No	None Note: Emergency Boration Tank is added by Engineering. It is not addressed in RG 1.206 as such	Note: Emergency Boration Tank is added by Engineering. It is not addressed in SRP as such	RGs 1.26 and 1.29	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	No	3.9, 5.2, 6.3, 15.0	None

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior to the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Related Sections	Key Issues
5.4.14 Emergency Condensers	PSAR	10 CFR 50 App A, GDC 36, 37 10 CFR 50.55a	No	None Note: Emergency Condensers are added by Engineering. They are not addressed in RG 1.70 as such	None Note: Emergency Condensers are added by Engineering. They are not addressed in SRP as such	RGs 1.26 and 1.29	ASME Section III, and XI, 2007 w/ 2008 addenda.	Yes	No	3.9, 5.2, 6.3	None
	DCD	10 CFR 50 App A, GDC 36, 37 10 CFR 50.55a 10 CFR 52.47(b)(1)	No	None Note: Emergency Condensers are added by Engineering. They are not addressed in RG 1.206 as such	None Note: Emergency Condensers are added by Engineering. They are not addressed in SRP as such	RGs 1.26 and 1.29	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	N/A	3.9, 5.2, 6.3, 14.3	None
	FSAR	10 CFR 50 App A, GDC 36, 37 10 CFR 50.55a	No	None Note: Emergency Condensers are added by Engineering. They are not addressed in RG 1.206 as such	None Note: Emergency Condensers are added by Engineering. They are not addressed in SRP as such	RGs 1.26 and 1.29	ASME Section III, and XI, 2007 w/ 2008 addenda.	N/A	No	3.9, 5.2, 6.3	None

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior to the PSAR submittal.

5.0 Reactor Coolant System and Connected Systems

PSAR PSAR Section 5.0 provides information regarding the reactor coolant system (RCS) and systems connected to it. Special consideration is given to the RCS and pressure-containing appendages out to and including isolation valving. This grouping of components is defined as the Reactor Coolant Pressure Boundary (RCPB).

This section includes evaluations, together with the necessary supporting material, showing that RCS is adequate to accomplish its intended objective and to maintain its integrity under conditions imposed by all foreseeable reactor behaviors, including both normal and accident conditions. This section references evaluations included in other chapters that have a bearing on the RCS.

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FSAR Same contents as mPower standard plant DCD Section 5.0

5.1 Summary Description

PSAR PSAR Section 5.1 provides a description of the RCS and its various components, indicating the independent and interrelated performance and safety related functions of each component and including a tabulation of important design and performance characteristics.

The B&W mPower reactor is a small modular, pressurized water reactor (PWR). It uses an integral reactor design in which the core, steam generator (SG), pressurizer, and the control rod drive mechanisms (CRDMs) are contained in a single pressure vessel; there is no external loop piping as in a standard PWR. The pressure vessel is divided into two sections, an upper vessel and a lower vessel, connected by a flanged joint. The lower vessel contains the CRDMs, control rods, and the core. The upper vessel contains the steam generator (SG), pressurizer, and the reactor coolant pumps (RCPs), where the pump hydraulics are internal and the motor is external to the vessel.

The RCS interfaces primarily with the reactor coolant inventory and purification system (RCIPS) and emergency core cooling system (ECCS) and to a lesser extent, gaseous radwaste and pressurized hydrogen and nitrogen supply systems during plant startup and shutdown. Hydrogen is monitored continuously during power operations as part of the chemistry control program and is injected into the RCIPS makeup lines.

The RCPB includes all pressure-retaining components such as pressure vessels, piping, pumps, and valves, which are part of the RCS, or connected to the RCS and include the outermost containment isolation valve in piping that penetrates containment and the RCS safety valve (SV).

PSAR Section 5.1 includes the following diagrams and drawings:

- schematic flow diagrams of the RCS showing the major components, principal pressures, temperatures, flow rates, and coolant volume under normal, steady-state full power operating conditions
- piping and instrumentation diagram of the RCS showing interfaces with connected systems, points of separation between the RCS (heat transport) and the secondary (heat removal) system, isolation valves between the RCPB, other systems, and basic instrumentation logic
- elevation drawings showing principal dimensions of the RCS in relation to the supporting or surrounding concrete structures from which a measure of the protection afforded by the arrangement and the safety considerations incorporated in the layout can be gained

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DCD DCD Section 5.1 provides description of the reactor coolant system and its various components, indicating the independent and interrelated performance and safety related functions of each component and including a tabulation of important design and performance characteristics.

5.1 Summary Description (cont.)

DCD (cont.) DCD Section 5.1 also includes the following diagrams and drawings:

- schematic flow diagrams of the RCS showing the major components, principal pressures, temperatures, flow rates, and coolant volume under normal, steady-state full power operating conditions
- piping and instrumentation diagram of the RCS showing interfaces with connected systems, points of separation between the RCS (heat transport) and the secondary (heat removal) system, isolation valves between the RCPB, other systems, and basic instrumentation logic.
- elevation drawings showing principal dimensions of the RCS in relation to the supporting or surrounding concrete structures from which a measure of the protection afforded by the arrangement and the safety considerations incorporated in the layout can be gained

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FSAR Same contents as mPower standard plant DCD Section 5.1

5.2 Integrity of the Reactor Coolant Pressure Boundary

PSAR PSAR Section 5.2 discusses measures employed to provide and maintain the integrity of the RCPB.

DCD DCD Section 5.2 discusses measures employed to provide and maintain the integrity of the RCPB.

FSAR Same contents as mPower standard plant DCD Section 5.2

5.2.1 Compliance with Codes and Code Cases

PSAR PSAR Section 5.2.1 provides the following information:

Compliance with 10 CFR 50.55a

- table showing compliance with the regulations of 10 CFR 50.55a, "Codes and Standards," including identification of pressure vessel components, piping, pumps, valves, and storage tanks
- applicable component code, code edition and addenda, when required, of each Class 1 component within the RCPB as defined in Section III, are identified by reference to the table of structures, systems, and components (SSCs) in Section 3.2
- proposed alternatives and their justifications are provided for those cases where conformances to 10 CFR 50.55a have resulted in hardships or unusual difficulties

Compliance with Applicable Code Cases

- PSAR Section 5.2.1 provides a list ASME Code Cases that will be applied to components within the RCPB including identification of each component for which a Code Case has been applied by Code Case number, revision, and title
- assurance is provided for any Code Case related to Section III, Division 1 that is not listed in RG 1.84, to show that their use will result in as acceptable a level of quality and safety for the component, as would be achieved by following the Code Cases that the NRC staff has endorsed in RG 1.84

5.2 Integrity of the Reactor Coolant Pressure Boundary (cont.)

5.2.1 Compliance with Codes and Code Cases (cont.)

DCD DCD Section 5.2.1 provides the following information:

Compliance with 10 CFR 50.55a

- table showing compliance with the regulations of 10 CFR 50.55a, "Codes and Standards," including identification of pressure vessel components, piping, pumps, valves, and storage tanks
- applicable component code, code edition and addenda, when required, of each Class 1 component within the RCPB as defined in Section III, are identified by reference to the table of structures, systems, and components (SSCs) in Section 3.2
- proposed alternatives and their justifications are provided for those cases where conformances to 10 CFR 50.55a have resulted in hardships or unusual difficulties

Compliance with Applicable Code Cases

- DCD Section 5.2.1 provides a list ASME Code Cases that will be applied to components within the RCPB, including identification of each component for which a Code Case has been applied by Code Case number, revision, and title
- assurance is provided for any Code Case related to Section III, Division 1 that is not listed in RG 1.84, to show that their use will result in as acceptable a level of quality and safety for the component, as would be achieved by following the code cases that the NRC staff has endorsed in RG 1.84

FSAR Same contents as mPower standard plant DCD Section 5.2.1

5.2 Integrity of the Reactor Coolant Pressure Boundary (cont.)

5.2.2 Overpressure Protection

PSAR PSAR Section 5.2.2 provides evaluation of the systems that protect the RCPB and the secondary side of the steam generators from overpressure. These systems include all pressure relieving devices (safety and relief valves) for the RCS, primary side of auxiliary or emergency systems connected to RCS, any blowdown or heat dissipation systems connected to the discharge of these pressure-relieving devices, and secondary side of steam generators.

PSAR Section 5.2.2 also includes the following information:

- design bases on which the functional design of the overpressure protection system is established. It addresses overpressure protection for the RCPB during reactor power operation and low-temperature operation
- overpressure protection complies with 10 CFR 50 Appendix A GDC 15 as it relates to not exceeding the RCPB conditions during any condition of normal operation or anticipated operational occurrences (AOO), and 10 CFR 50 Appendix A GDC 31 as it relates to designing the RCPB with sufficient margin to ensure that it behaves in a nonbrittle manner and minimizes their probability of rapidly propagating fracture
- an evaluation of the functional design of the over pressurization protection system
- justification of all assumptions used in the analysis including:
  - plant initial conditions and system parameters
  - systems and equipments that are assumed to operate are listed and their performance characteristics are described
  - studies that show the sensitivities of the system's performance to variations in these conditions, parameters, and performance
- preliminary piping and instrumentation diagrams for the overpressure protection system showing number and location of all components, including valves, piping, tanks, instrumentation and controls, and connections and interfaces with other systems
- description of the equipment and components of the overpressure protection system, including:
  - schematic drawings of the safety and relief valves and discussion of how the valves operate
  - identification of significant design parameters such as the design, throat area, capacity, and set points of the valves, and the diameter, length, and the routing of piping
  - list of the design parameters (e.g., pressure and temperature) for each component
  - the number and type of operating cycles for which each component is designed
  - specification of the environmental conditions (e.g., temperature and humidity) for which the components are designed

5.2 Integrity of the Reactor Coolant Pressure Boundary (cont.)

5.2.2 Overpressure Protection (cont.)

PSAR (cont.)

- description of the design and installation details of the mounting of the pressure-relief devices within the RCPB and the secondary side of steam generators
- the design bases for the assumed loads (i.e., thrust, bending, and torsion) imposed on the valves, nozzles, and connected piping in the event all valves discharge
- description of how these loads can be accommodated
- listing of these loads and resulting stresses
- identification of the applicable codes and classification applied to the system
- identification of the material specifications for each component
- identification of all process instrumentation
- description of the system
- identification of the tests and inspections to be performed
  - before operation and during startup that demonstrate the functional performance
  - an inservice surveillance to ensure continued reliability
- description of specific testing of the low-temperature overpressure protection system, particularly operability testing, exclusive of relief valves, before each shutdown
- description of the design of overpressure protection during low-temperature operations, including the capability to relieve pressure during all overpressure events during startup and shutdown conditions at low temperatures, particularly during water-solid conditions
- an analysis that demonstrates how overpressure protection is achieved, assuming any single active component failure
- identification of all overpressure events
- identification of the events that are avoided by preventive interlocks or locking-out power
- description of how the overpressure protection system is enabled, the alarms and indications associated with the system, and the power source for the system
- discussion on whether any credit is taken for active components to mitigate an overpressure event and the additional analysis performed that considers inadvertent system initiation or actuation
- discussion on how the low-pressure interlocks will not interfere with the operations of this system when this system uses pressure relief from a low-pressure system

5.2 Integrity of the Reactor Coolant Pressure Boundary (cont.)

5.2.2 Overpressure Protection (cont.)

DCD DCD Section 5.2.2 provides evaluation of the systems that protect the RCPB and the secondary side of the steam generators from overpressure. These systems include all pressure relieving devices (safety and relief valves) for the RCS, primary side of auxiliary or emergency systems connected to RCS, any blowdown or heat dissipation systems connected to the discharge of these pressure-relieving devices, and secondary side of steam generators.

DCD Section 5.2.2 also includes the following information:

- design bases on which the functional design of the overpressure protection system is established. It addresses overpressure protection for the RCPB during reactor power operation and low-temperature operation
- overpressure protection complies with 10 CFR 50 Appendix A GDC 15 as it relates to not exceeding the RCPB conditions during any condition of normal operation or anticipated operational occurrences (AOO), and 10 CFR 50 Appendix A GDC 31 as it relates to designing the RCPB with sufficient margin to ensure that it behaves in a nonbrittle manner and minimizes their probability of rapidly propagating fracture
- an evaluation of the functional design of the over pressurization protection system
- justification of all assumptions used in the analysis including:
  - plant initial conditions and system parameters
  - systems and equipments that are assumed to operate are listed and their performance characteristics are described
  - studies that show the sensitivities of the system's performance to variations in these conditions, parameters, and performance
- piping and instrumentation diagrams for the overpressure protection system showing number and location of all components, including valves, piping, tanks, instrumentation and controls, and connections and interfaces with other systems
- description of the equipment components of the overpressure protection system, including:
  - schematic drawings of the safety and relief valves and
  - discussion of how the valves operate
  - identification of significant design parameters such as the design, throat area, capacity, and set points of the valves, and the diameter, length, and the routing of piping
  - list of the design parameters (e.g., pressure and temperature) for each component
  - the number and type of operating cycles for which each component is designed
  - specification of the environmental conditions (e.g., temperature and humidity) for which the components are designed

5.2 Integrity of the Reactor Coolant Pressure Boundary (cont.)

5.2.2 Overpressure Protection (cont.)

DCD (cont.)

- description of the design and installation details of the mounting of the pressure-relief devices within the RCPB and the secondary side of steam generators
- the design bases for the assumed loads (i.e., thrust, bending, and torsion) imposed on the valves, nozzles, and connected piping in the event all valves discharge
- description of how these loads can be accommodated
- listing of these loads and resulting stresses
- identification of the applicable codes and classification applied to the system
- identification of the material specifications for each component
- identification of all process instrumentation
- description of the system
- identification of the tests and inspections to be performed
  - before operation and during startup that demonstrate the functional performance
  - an inservice surveillance to ensure continued reliability
- description of specific testing of the low-temperature overpressure protection system, particularly operability testing, exclusive of relief valves, before each shutdown
- description of the design of overpressure protection during low-temperature operations, including the capability to relieve pressure during all overpressure events during startup and shutdown conditions at low temperatures, particularly during water-solid conditions
- an analysis that demonstrates how overpressure protection is achieved, assuming any single active component failure
- identification of all overpressure events
- identification of the events that are avoided by preventive interlocks or locking-out power
- description of how the overpressure protection system is enabled, the alarms and indications associated with the system, and the power source for the system
- discussion on whether any credit is taken for active components to mitigate an overpressure event and the additional analysis performed that considers inadvertent system initiation or actuation
- discussion on how the low-pressure interlocks will not interfere with the operations of this system when this system uses pressure relief from a low-pressure system

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FSAR Same contents as mPower standard plant DCD Section 5.2.2

5.2 Integrity of the Reactor Coolant Pressure Boundary (cont.)

5.2.3 Reactor Coolant Pressure Boundary Materials

PSAR PSAR Section 5.2.3 provides the following information:

Material Specifications

- material specification for each component in the RCPB including welding materials
- references to other sections for non RCPB materials
- references to other sections for inspection requirements

Compatibility with Reactor Coolant

- reactor coolant water chemistry specifications and brief description of chemical control system/process
- discussion on the use of sensitized austenitic stainless steels
- discussion on any non-metallic materials exposed to reactor coolant in the RCS
- information on the types of insulation used on the RCPB, the effects of accidental leakage and/or the design features to mitigate such effects

Fabrication and Processing of Ferritic Materials

- general information on the fracture toughness requirements and reference to other sections discussing fracture toughness of reactor vessel materials
- information on anticipated welding processes and parameters including cladding and on welder qualification
- reference to other sections for the degree of conformance to RGs 1.31, 1.34, 1.43, 1.50, 1.71
- discussion on non-destructive examination of ferritic steel tubular products of the RCPB if any and reference other sections for testing and inspection of major components

Fabrication and Processing of Austenitic Stainless Steel

- discussion on stress corrosion cracking (SCC) concerns with austenitic stainless steels and the features of the design that mitigate SCC including cleaning and contamination control, heat treatment requirements, cold work requirements and water chemistry
- information on conformance to RGs 1.37 and 1.44 or reference other sections providing such information
- discussion on how RG 1.31 is met including control of welding and material testing to provide required delta ferrite range(s)
- information on welder qualification

5.2 Integrity of the Reactor Coolant Pressure Boundary (cont.)

5.2.3 Reactor Coolant Pressure Boundary Materials (cont.)

PSAR

- discussion on non-destructive examination of austenitic stainless steel tubular products of the RCPB if any and reference other sections for testing and inspection of major components
- information on the resistance to primary water stress corrosion cracking (PWSCC) of nickel based alloys, specifically inconel 690
- reference to PSAR Section 3.13 for information on the materials for threaded fasteners for Class 1 components

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DCD DCD Section 5.2.3 provides the following information:

Material Specifications

- material specification for each component in the RCPB including welding materials
- references to other sections for non RCPB materials
- references to other sections for inspection requirements

Compatibility with Reactor Coolant

- reactor coolant water chemistry specifications and brief description of chemical control system/process
- discussion on the use of sensitized austenitic stainless steels
- discussion on any non-metallic materials exposed to reactor coolant in the RCS
- information on the types of insulation used on the RCPB, the effects of accidental leakage and/or the design features to mitigate such effects

Fabrication and Processing of Ferritic Materials

- general information on the fracture toughness requirements and reference other sections discussing fracture toughness of reactor vessel materials
- information on anticipated welding processes and parameters including cladding and on welder qualification
- reference to other sections for the degree of conformance to RGs 1.31, 1.34, 1.43, 1.50, 1.71
- discussion on non-destructive examination of ferritic steel tubular products of the RCPB if any and reference other sections for testing and inspection of major components

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5.2 Integrity of the Reactor Coolant Pressure Boundary (cont.)

5.2.3 Reactor Coolant Pressure Boundary Materials (cont.)

DCD (cont.)

Fabrication and Processing of Austenitic Stainless Steel

- discussion on SCC concerns with austenitic stainless steels and the features of the design that mitigate SCC including cleaning and contamination control, heat treatment requirements, cold work requirements and water chemistry
- information on conformance to RGs 1.37 and 1.44 or reference other sections providing such information
- discussion on how RG 1.31 is met including control of welding and material testing to provide required delta ferrite range(s)
- information on welder qualification
- discussion on non-destructive examination of austenitic stainless steel tubular products of the RCPB if any and reference other sections for testing and inspection of major components
- information on the resistance to PWSCC of nickel based alloys, specifically Inconel 690
- reference to DCD Section 3.13 for information on the materials for threaded fasteners for Class 1 components

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FSAR Same contents as mPower standard plant DCD Section 5.2.3

5.2 Integrity of the Reactor Coolant Pressure Boundary (cont.)

5.2.4 Inservice Inspection and Testing of the Reactor Coolant Pressure Boundary

PSAR PSAR Section 5.2.4 discusses the inservice inspection and testing program for ASME Section III Class 1 components with sufficient details to show that the inservice inspection program meets the requirements of ASME Section XI.

PSAR Section 5.2.4 includes the following information:

- system boundary subject to inspection, including associated component, supports, structures, and bolting
- arrangement of systems and components to provide accessibility
- examination techniques and procedures, including special techniques that are used to meet the code requirement
- inspection intervals
- evaluation of examination results
- system leakage and hydrostatic pressure tests
- identification of components that are exempt from ASME Code Section XI requirements
- discussion of requests for relief from ASME Code requirements that are impractical as a result of limitations of component design, geometry, or materials of construction
- identification of ASME Code Cases that are invoked

DCD DCD Section 5.2.4 discusses the inservice inspection and testing program for ASME Section III Class 1 components with sufficient details to show that the inservice inspection program meets the requirements of ASME Section XI.

DCD Section 5.2.4 includes the following information:

- system boundary subject to inspection, including associated component, supports, structures, and bolting
- arrangement of systems and components to provide accessibility
- examination techniques and procedures, including special techniques that are used to meet the code requirement
- inspection intervals
- evaluation of examination results
- system leakage and hydrostatic pressure tests
- identification of components that are exempt from ASME Code Section XI requirements
- discussion of requests for relief from ASME Code requirements that are impractical as a result of limitations of component design, geometry, or materials of construction
- identification of ASME Code Cases that are invoked

FSAR Same contents as mPower standard plant DCD Section 5.2.4

5.2 Integrity of the Reactor Coolant Pressure Boundary (cont.)

5.2.5 Reactor Coolant Pressure Boundary Leakage Detection

PSAR PSAR Section 5.2.5 describes leak detection system program with in sufficient information to indicate the extent to which the recommendations of RGs 1.29 and 1.45 have been followed.

PSAR Section 5.2.5 includes the following information:

- information that permits comparison with the regulatory positions of RGs 1.29 and 1.45 detailing descriptions of the systems employed, their sensitivity, response time, the reliance placed on proper functioning, and identification of the limiting leakage conditions that include input to the details and basis in the Technical Specifications
- identification of the leakage detection systems that are designed to meet the sensitivity and response guidelines of RG 1.45
- descriptions of these systems and those that are used for alarm as an indirect indication of leakage and their design criteria
- description of how signals from various leakage detection systems are correlated to provide information to plant operators regarding leakage location and quantitative leakage flow rate
- demonstration that the system is capable of separately monitoring and collecting leakage from both identifiable and unidentifiable sources
- description of the floor drain system to demonstrate that leakage will flow to the sump or tank where it is collected
- identification of all potential intersystem leakage paths and the instrumentation used in each path
- demonstration of adequate monitoring capability to ensure that the limits of intersystem leakage assumed in the accident analyses are not exceeded
- description for provisions to test and calibrate all leakage detection system including the frequency and justification for the frequency of testing and calibration
- description of the periodic testing of the floor drainage system that checks and ensures operability.

DCD DCD Section 5.2.5 describes leak detection system program with in sufficient information to indicate the extent to which the recommendations of RGs 1.29 and 1.45 have been followed.

DCD Section 5.2.5 includes the following information:

- information that permits comparison with the regulatory positions of RGs 1.29 and 1.45 detailing descriptions of the systems employed, their sensitivity, response time, the reliance placed on proper functioning, and identification of the limiting leakage conditions that include input to the details and basis in the Technical Specifications

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5.2 Integrity of the Reactor Coolant Pressure Boundary (cont.)

5.2.5 Reactor Coolant Pressure Boundary Leakage Detection (cont.)

DCD (cont.)

- identification of the leakage detection systems that are designed to meet the sensitivity and response guidelines of RG 1.45
- descriptions of these systems and those that are used for alarm as an indirect indication of leakage and their design criteria
- description of how signals from various leakage detection systems are correlated to provide information to plant operators regarding leakage location and quantitative leakage flow rate
- demonstration that the system is capable of separately monitoring and collecting leakage from both identifiable and unidentifiable sources
- description of the floor drain system to demonstrate that leakage will flow to the sump or tank where it is collected
- identification of all potential intersystem leakage paths and the instrumentation used in each path
- demonstration of adequate monitoring capability to ensure that the limits of intersystem leakage assumed in the accident analyses are not exceeded
- description for provisions to test and calibrate all leakage detection system including the frequency and justification for the frequency of testing and calibration
- description of the periodic testing of the floor drainage system that checks and ensures operability.

FSAR Same contents as mPower standard plant DCD Section 5.2.5

5.4 Reactor Coolant System Component and Subsystem Design

PSAR PSAR Section 5.4 provides information regarding performance requirements and design features to ensure overall safety of the various components and subsystems within or allied with the RCS.

DCD DCD Section 5.4 provides information regarding performance requirements and design features to ensure overall safety of the various components and subsystems within or allied with the RCS.

FSAR Same contents as mPower standard plant DCD Section 5.4

5.4.1 Reactor Coolant Pumps

PSAR PSAR Section 5.4.1 provides the following information:

- RCP design basis including discussion on reactor pressure boundary, and design, fabrication and testing requirements
- description of the RCP Assembly including for its components such as rotor, pump casing, flange, hydraulics, stator and the motor, and the pumps operation
- evaluations for the RCP including the pump performance, overspeed conditions, pressure boundary integrity, and coastdown capability, and integrity of rotating components
- test and Inspections for the RCP including meeting ASME code requirements for pressure boundary components and RCS flow rate verifications
- discussion on measures taken to preclude rotor overspeeding of the RCP in the event of a design-basis LOCA

DCD DCD Section 5.4.1 provides the following information:

- RCP design basis including discussion on reactor pressure boundary, and design, fabrication and testing requirements
- description of the RCP Assembly including for its components such as rotor, pump casing, flange, hydraulics, stator and the motor, and the pumps operation
- evaluations for the RCP including the pump performance, overspeed conditions, pressure boundary integrity, and coastdown capability, and integrity of rotating components
- test and Inspections for the RCP including meeting ASME code requirements for pressure boundary components and RCS flow rate verifications
- discussion on measures taken to preclude rotor overspeeding of the RCP in the event of a design-basis LOCA

FSAR Same contents as mPower standard DCD Section 5.4.1

5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.2 Steam Generators

PSAR

PSAR Section 5.4.2 provides:

- estimates of design limits for radioactivity levels in the secondary side of the Steam Generators (SGs) during normal operation and bases for these estimates
- discussion on potential effects of tube ruptures
- SG design criteria used to prevent unacceptable tube damage from flow-induced vibration and cavitation
- design conditions and transients specified in the design of SG tubes and the service level category (e.g., upset, emergency, or faulted) that defines the allowable stress intensity limits used and justification
- extent of tube wall thinning that could be tolerated without exceeding the allowable stress intensity limits defined above under the postulated condition of a design-basis pipe break in the RCPB or a break in the secondary piping during reactor operation

SG Materials

- information on selection and fabrication of Code Class 1 and 2 SG materials making reference to Section 5.2.3 and including:
  - tubing, tube sheet, channel head casting or plate, access plates (manway and handhole), and bolting
  - methods used to fasten tubes to the tube sheet
  - showing that it meets the requirements of ASME Section III and IX
  - showing the extent of tube expansion and the methods of expansion
  - onsite cleaning and cleanness control provision per RG 1.37 and ANSI N45.21
  - Information on fracture toughness properties of ferritic materials
- design aspects of the SG that affect materials performance
- compatibility of the SG materials with primary and secondary coolant
- selection and fabrication
- cleanup of secondary side

SG Inservice Inspection (ISI)

- describes the provisions in the design of SG to permit inservice inspection of all code Class 1 and 2 components including SG tubes
- compliance with ASME Section XI Code per 10CFR 50.55a

DCD

DCD Section 5.4.2 provides:

- estimates of design limits for radioactivity levels in the secondary side of the SGs during normal operation and bases for these estimates
- discussion on potential effects of tube ruptures
- SG design criteria used to prevent unacceptable tube damage from flow-induced vibration and cavitation

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5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.2 Steam Generators (cont.)

DCD (cont.)

- design conditions and transients specified in the design of SG tubes and the service level category (e.g., upset, emergency, or faulted) that defines the allowable stress intensity limits used and justification
- extent of tube wall thinning that could be tolerated without exceeding the allowable stress intensity limits defined above under the postulated condition of a design-basis pipe break in the RCPB or a break in the secondary piping during reactor operation

SG Materials

- information on selection process, testing and inspection (during fabrication /processing) of the materials used to fabricate the SG making reference to Section 5.2.3 and justifying those Code Cases used, but not listed in RG 1.84. This includes:
  - tubing, tube sheet, channel head casting or plate, tubesheet and channel head cladding, forged nozzles, shell pressure plates, access plates tube supports, feedring, bolting, and threaded fasteners
  - methods used to fasten tubes to the tube sheet
  - shows that it meets the requirements of ASME Section III and IX
  - shows the extent of tube expansion and the methods of expansion
  - onsite cleaning and cleanness control provision per RG 1.37 and ANSI N45.21
  - Information on fracture toughness properties of ferritic materials
- design provisions for limiting susceptibility of the SG to degradation and /or corrosion
- fracture toughness of the ferritic materials used in the SG
- fabrication and processing of austenitic stainless steel materials used in pressure boundary applications
- compatibility of materials with the primary and secondary coolant
- provisions to access the SG secondary side

SG Program

- SG tube Integrity program including design provisions for permitting access to both primary and secondary side of the SG, elements of SG Program, and SG tube inspection and reporting requirements to be adopted in the Technical Specification (TS) and discusses the extent of potential conflicts between TS and ASME Section XI Article IWB-2000
- Compliance with ASME Section XI Code per 10CFR 50.55a
- Program for ISI of SG tubing in accordance with RG 1.83

FSAR Same contents as mPower standard plant DCD Section 5.4.2 supplemented by plant-specific information

5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.3 Reactor Coolant System Piping and Valves

PSAR PSAR Section 5.4.3 provides:
- overall description of reactor coolant piping system including discussion for provisions taken during design, fabrication, isolation from connected systems such as RCIPS, and operation to control factors which contribute to SCC

DCD DCD Section 5.4.3 provides:
- overall description of reactor coolant piping system including discussion for provision taken during design, fabrication, isolation from connected systems such as RCIPS, and operation to control factors which contribute to SCC

FSAR Same contents as mPower standard plant DCD Section 5.4.3

5.4.4 Main Steam Line Flow Restrictions

PSAR PSAR Section 5.4.4 includes a statement that main stream line flow restrictions are not applicable for the Clinch River SMR Plant.

DCD DCD Section 5.4.4 includes a statement that main stream line flow restrictions are not applicable for the mPower standard design.

FSAR FSAR Section 5.4.4 includes a statement that main stream line flow restrictions are not applicable for the Clinch River SMR Plant.

5.4.5 Pressurizer

PSAR PSAR Section 5.4.5 references PSAR Sections 3.9.1, 3.9.2, 3.9.3, 5.2.3, 5.2.4, and 15.6.1 for information on the pressurizer.

DCD DCD Section 5.4.5 references DCD Sections 3.9.1, 3.9.2, 3.9.3, 5.2.3, 5.2.4, and 15.6.1 for information on the pressurizer.

FSAR Same contents as mPower standard plant DCD Section 5.4.5

5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.6 Automatic Depressurization System Valves

PSAR PSAR Section 5.4.6 provides the following information:

- design basis, evaluation, verification, and references Section 5.4.3 for testing and inspection
- design description includes size, number of valves, location, and reference to section 6.3 for further information
- ADV flow testing description

DCD DCD Section 5.4.6 provides the following information:

- design basis, evaluation, verification, and references Section 5.4.3 for testing and inspection
- design description includes size, number of valves, location, and reference to section 6.3 for further information
- ADV flow testing description

FSAR Same contents as mPower standard plant DCD Section 5.4.6

5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.7 Reactor Coolant Inventory and Purification System (RCIPS)

PSAR Note: The RCS interfaces primarily with reactor coolant inventory and purification system (RCIPS). The RCIPS is unique to the B&W mPower reactor design, which performs functions equivalent to the chemical and volume control system (CVCS) and the residual heat removal (RHR) system in other pressurized water reactors. RG 1.70 guidance for the RHR System applies to the RCIPS system for B&W mPower reactor.

PSAR Section 5.4.7 provides the following information on RCIPS:

- design bases, including GDC 2, 4, 5, 19 and 34 criteria, functional design bases, isolation of the RHR system, prevention of an interfacing system LOCA, pressure relief capacity, reliability and operability requirements, protection from physical damage, shutdown and midloop operations
- system design, including schematic P&IDs, equipment and component descriptions, relief valve capacity, settings, and method of collecting fluids discharged through relief valves, controls including interlocks for motor operated isolation valves, valve position indications, and valve interlocks and alarms, applicable codes and classifications, system reliability considerations, manual actions, including actions required to be taken from outside the control room
- performance evaluation, including ability of RHR system to reduce the temperature of the reactor coolant describing analytical methods used and stating all assumptions
- discussion of proposed preoperational testing
- RTNSS evaluation to determine regulatory treatment for the active RHR system (mPower has an active RHR (RCIP) system designated as nonsafety-related system for defense-in-depth functions)
- capability to vary coolant chemistry for control of reactivity and corrosion
- capability to maintain the RCS inventory
- maximum and normal letdown flow rates, charging rates for both normal operation and maximum leakage conditions
- principles of operation, both automatic and manual, for steady-state, transient, startup, shutdown, and accident conditions
- reactor coolant water chemistry requirements
- temperature control provisions for line heat tracing and tank heating, including provision for alarm failures
- tabulate system design parameters and component design data
- demonstrate pumping capability to supply reactor coolant makeup for protection against small pipe or component failures
- demonstrate system is designed to limit radioactive releases to environment to allowable limits for both normal operation and accident conditions
- justify adequacy of component and piping seismic design category and quality class

5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.7 Reactor Coolant Inventory and Purification System (RCIPS) (cont.)

PSAR (cont.)

- FMEA showing system meets single-failure criterion without compromising safe plant shutdown and ability to prevent or mitigate postulated accidents
- compliance with applicable GDC
- indicate extent of compliance with applicable RGs; justify exceptions
- identify essential subsystems are protected from failure of non-seismic category I equipment and also from flooding, tornadoes, internally and externally generated missiles, and effects of high- and moderate-energy line failures

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DCD

DCD Section 5.4.7 provides the following information for the RCIPS:

- design bases, including GDC 2, 4, 5, 19 and 34 criteria, functional design bases, isolation of the RHR system, prevention of an interfacing system LOCA, pressure relief capacity, reliability and operability requirements, protection from physical damage, shutdown and midloop operations
- system design, including schematic P&IDs, equipment and component descriptions. relief valve capacity, settings, and method of collecting fluids discharged through relief valves, controls including interlocks for motor operated isolation valves, valve position indications, and valve interlocks and alarms, applicable codes and classifications, system reliability considerations, manual actions, including actions required to be taken from outside the control room
- performance evaluation, including ability of RHR system to reduce the temperature of the reactor coolant describing analytical methods used and stating all assumptions
- discussion of proposed preoperational testing
- RTNSS evaluation to determine regulatory treatment for the active RHR system (mPower has an active RHR (RCIP) system designated as nonsafety-related system for defense-in-depth functions)
- capability to vary coolant chemistry for control of reactivity and corrosion
- capability to maintain the RCS inventory
- maximum and normal letdown flow rates, charging rates for both normal operation and maximum leakage conditions
- principles of operation, both automatic and manual, for steady-state, transient, startup, shutdown, and accident conditions
- reactor coolant water chemistry requirements
- temperature control provisions for line heat tracing and tank heating, including provision for alarm failures
- tabulate system design parameters and component design data
- demonstrate pumping capability to supply reactor coolant makeup for protection against small pipe or component failures

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5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.7 Reactor Coolant Inventory and Purification System (RCIPS) (cont.)

DCD (cont.)

- demonstrate system is designed to limit radioactive releases to environment to allowable limits for both normal operation and accident conditions
- justify adequacy of component and piping seismic design category and quality class
- FMEA showing system meets single-failure criterion without compromising safe plant shutdown and ability to prevent or mitigate postulated accidents
- compliance with applicable GDC
- indicate extent of compliance with applicable RGs; justify exceptions
- identify essential subsystems are protected from failure of non-seismic category I equipment and also from flooding, tornadoes, internally and externally generated missiles, and effects of high- and moderate-energy line failures

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FSAR Same contents as mPower standard plant DCD Section 5.4.7

5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.8 Reactor Water Cleanup System (BWR)

PSAR PSAR Section 5.4.8 includes a statement that reactor water cleanup system is not applicable for the Clinch River SMR plant.

DCD DCD Section 5.4.8 includes a statement that reactor water cleanup system is not applicable for the mPower standard design.

FSAR FSAR Section 5.4.8 includes a statement that reactor water cleanup system is not applicable for the Clinch River SMR plant.

5.4.9 Reactor Coolant System Pressure Relief Devices

PSAR PSAR Section 5.4.9 provides references to PSAR Sections 3.9.1, 3.9.2, 3.9.3, 3.9.6, 3.10, 5.2.3, 5.2.4, 6.1.1, 6.6, 10.3.6 and 15.6.1 for information on the RCS pressure relief devices.

DCD DCD Section 5.4.9 provides references to DCD Sections 3.9.1, 3.9.2, 3.9.3, 3.9.6, 3.10, 5.2.3, 5.2.4, 6.1.1, 6.6, 10.3.6 and 15.6.1.

FSAR Same contents as mPower standard plant DCD Section 5.4.9

5.4.10 Reactor Coolant System Component Supports

PSAR PSAR Section 5.4.10 provides references to PSAR Sections 3.9.1, 3.9.2, 3.9.3, and 3.9.6 for information on the RCS component supports.

DCD DCD Section 5.4.10 provides references to Sections 3.9.1, 3.9.2, 3.9.3, and 3.9.6 for information on the RCS component supports.

FSAR Same contents as mPower standard plant DCD Section 5.4.10

5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.11 Pressurizer Relief Discharge System

PSAR PSAR Section 5.4.11 provides the following information:

- design bases for pressurizer relief discharge system including compliance with GDC 2 and GDC 4 that covers maximum step load and the consequent steam volume that the RWST must absorb and maximum heat input that the volume of water in the RWST must absorb under any normal plant condition or AOO
- system description including RWST, piping connections, safety and relief valves
- safety evaluation demonstrating that the system is designed to handle maximum heat load, and shows that the discharge system's capacity is at least equal to the combined capacity of the pressurizer relief and safety valves
- instrumentation requirements

DCD DCD Section 5.4.11 provides the following information:

- design bases for pressurizer relief discharge system including compliance with GDC 2 and GDC 4 that covers maximum step load and the consequent steam volume that the RWST must absorb and maximum heat input that the volume of water in the RWST must absorb under any normal plant condition or AOO
- system description including RWST, piping connections, safety and relief valves
- safety evaluation demonstrating that the system is designed to handle maximum heat load, and shows that the discharge system's capacity is at least equal to the combined capacity of the pressurizer relief and safety valves
- instrumentation requirements

FSAR Same contents as mPower standard DCD Section 5.4.11

5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.12 Reactor Coolant System High Point Vents

PSAR PSAR Section 5.4.12 provides the following information:

- summary of the RCS high point vents system and discusses the design bases and criteria describing compliance with the provisions of 10 CFR 50.34(f)(2)(vi), 10 CFR 50.44, 10 CFR 50.46, 10 CFR 50.49, 10 CFR 50.55a, and GDCs1, 14, 17, 19, 30, 34 and 36
- system design including the description of the vent system including its location, size, discharge capacity, functions, and discharge areas, electrical power supply and system instrumentation
- performance evaluation of the vent system including system's capability to remove noncondensible gases from the primary coolant system with a minimal probability of advertent or spurious actuation and covers vent system operation

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DCD DCD Section 5.4.12 provides the following information:

- summary of the RCS high point vents system and discusses the design bases and criteria describing compliance with the provisions of 10 CFR 50.34(f)(2)(vi), 10 CFR 50.44, 10 CFR 50.46, 10 CFR 50.49, 10 CFR 50.55a, GDC 1, GDC 14, GDC 17, GDC 19, GDC 30, GDC 34 and GDC 36.
- system design including the description of the vent system including its location, size, discharge capacity, functions, and discharge areas, electrical power supply and system instrumentation
- performance evaluation of the vent system including system's capability to remove noncondensible gases from the primary coolant system with a minimal probability of advertent or spurious actuation and covers vent system operation

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FSAR Same contents as mPower standard DCD Section 5.4.12

5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.13 Emergency Boration Tanks

PSAR PSAR Section 5.4.13 provides the following information on the emergency boration tanks:

- design bases for the emergency boration tanks includes its design and fabrication requirements, materials of construction and their compatibility with the operational environment
- design description of the tank showing its components, orientation, capacity, design and operating temperatures and pressures
- test and inspections including access for the inspection and maintenance and the ASME code requirements for hydrostatic tests

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DCD DCD Section 5.4.13 provides the following information on the emergency boration tanks:

- design bases for the emergency boration tanks includes its design and fabrication requirements, materials of construction and their compatibility with the operational environment
- design description of the tank showing its components, orientation, capacity, design and operating temperatures and pressures
- test and inspections including access for the inspection and maintenance and the ASME code requirements for hydrostatic tests

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FSAR Same contents as mPower standard plant DCD Section 5.4.13

5.4 Reactor Coolant System Component and Subsystem Design (cont.)

5.4.14 Emergency Condensers

PSAR PSAR Section 5.4.14 provides the following information on the emergency condensers:

- design bases for the condensers includes its design and fabrication requirements, materials of construction and their compatibility with operational environment
- design description of the condensers shell and tubes including operating and design temperatures and pressures
- test and inspections including orientation of the test specimen, and the ASME code requirements for the material and weld inspections

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DCD DCD Section 5.4.14 provides the following information on the emergency condensers:

- design bases for the condensers includes its design and fabrication requirements, materials of construction and their compatibility with operational environment
- design description of the condensers shell and tubes including operating and design temperatures and pressures
- test and Inspections including orientation of the test specimen, and the ASME code requirements for the material and weld inspections

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FSAR Same contents as mPower standard plant DCD Section 5.4.14

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Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
6.1 Engineered Safety Feature Materials	PSAR	10 CFR 50, App. A GDC 1, 4, 14, 31, 35, 41 10 CFR 50, App. B, Criteria IX, XIII 10 CFR 50.55a 10 CFR 50.65	No	RG 1.70	6.1 BTP 6-1	RGs 1.7, 1.31, 1.36, 1.37, 1.44, 1.50, 1.54, 1.71, 1.84	ASME Section II, Section III, Section IX, 2007 w/ 2008 Addenda ASTM A-262-2010 AWS D1.1-2010 ASTM D5144-08 ASTM D3911-08 WASH-1233 (1972)	No	No	None	3.6, 3.9, 3.11 3.13, 5.2, 5.4 6.2, 6.3, 10.3
	DCD	10 CFR 50, App. A GDC 1, 4, 14, 31, 35, 41 10 CFR 50, App. B, Criteria IX, XIII 10 CFR 50.55a 10 CFR 50.65 10 CFR 52.47(b)(1)	No	RG 1.206	6.1 BTP 6-1	RGs 1.7, 1.31, 1.36, 1.37, 1.44, 1.50, 1.54, 1.71, 1.84	ASME Section II, Section III, Section IX, 2007 w/ 2008 Addenda ASTM A-262-2010 AWS D1.1-2010 ASTM D5144-08 ASTM D3911-08 WASH-1233 (1972)	N/A	N/A	None	3.6, 3.9, 3.11 3.13, 5.2, 5.4 6.2, 6.3, 10.3 14.3
	FSAR	10 CFR 50, App. A GDC 1, 4, 14, 31, 35, 41 10 CFR 50, App. B, Criteria IX, XIII 10 CFR 50.55a 10 CFR 50.65	No	RG 1.206	6.1 BTP 6-1	RGs 1.7, 1.31, 1.36, 1.37, 1.44, 1.50, 1.54, 1.71, 1.84	ASME Section II, Section III, Section IX, 2007 w/2008 Addenda ASTM A-262-2010 AWS D1.1-2010 ASTM D5144-08 ASTM D3911-08 WASH-1233 (1972)	N/A	No	None	3.6, 3.9, 3.11 3.13, 5.2, 5.4 6.2, 6.3, 10.3

Note:
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NRC Version

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
6.2 Containment Systems	PSAR	10 CFR 50.34(f)(2)(xiv), (f)(2)(xv) 10 CFR 50.44 10 CFR 50.46 10 CFR 50 App. J 10 CFR 50, App. K 10 CFR 50, App. A, GDC 1, 2, 4, 5, 13, 16, 38, 39, 40, 41, 42, 43, 50, 51, 52, 53, 54, 55, 56, 57, 64 10 CFR 50.63(a)(2)	No	RG 1.70	6.2 BTP 6-2 BTP 6-3 BTP 6-4 BTP 7-10	RGs 1.7, 1.11, 1.26, 1.29, 1.52, 1.82, 1.97, 1.141, 1.155, 1.163, 1.174, 1.183, 1.195 NUREG-0577, -0588 NUREG-0609, -0718, -0737, -1449 GL 83-02, 88-17 SECY 93-087	ASME Code, Section III, 2007 w/ 2008 Addenda ASME Journal Vol 87, No. 1, Feb. 1965 ANSI/ANS-56.8-2002 NEI-04-07 NEI-94-01	No	No	Track NRC issuance of Proposed Revision 1 to RG 1.183 (DG-1199), Proposed Revision 4 to RG 1.82 (DG-1234), and Proposed Revision 1 to RG 1.163 (DG-1220)	3.2, 3.6, 3.8 3.9, 3.10, 3.11 3.13, 6.1, 6.2 6.3, 6.4, 6.5 7.1, 7.2, 7.3 7.4, 7.5, 8.3 8.4, 9.2, 10.4 12.3, 15.0, 15.6 16.0, 19.0
	DCD	10 CFR 50.34(f)(2)(xiv), (f)(2)(xv) 10 CFR 50.44 10 CFR 50.46 10 CFR 50 App. J 10 CFR 50, App. K 10 CFR 50, App. A, GDC 1, 2, 4, 5, 13, 16, 38, 39, 40, 41, 42, 43, 50, 51, 52, 53, 54, 55, 56, 57, 64 10 CFR 50.63(a)(2) 10 CFR 52.47(b)(1)	No	RG 1.206	6.2 BTP 6-2 BTP 6-3 BTP 6-4 BTP 7-10	RGs 1.7, 1.11, 1.26, 1.29, 1.52, 1.82, 1.97, 1.141, 1.155, 1.163, 1.174, 1.183, 1.195 NUREG-0577, -0588 NUREG-0609, -0718, -0737, -1449 GL 83-02, 88-17 SECY 93-087	ASME Code, Section III, 2007 w/ 2008 Addenda ASME Journal Vol 87, No. 1, Feb. 1965 ANSI/ANS-56.8-2002 NEI-04-07 NEI-94-01	N/A	N/A	Track NRC issuance of Proposed Revision 1 to RG 1.183 (DG-1199), Proposed Revision 4 to RG 1.82 (DG-1234), and Proposed Revision 1 to RG 1.163 (DG-1220)	3.2, 3.6, 3.8 3.9, 3.10, 3.11 3.13, 6.1, 6.2 6.3, 6.4, 6.5 7.1, 7.2, 7.3 7.4, 7.5, 8.3 8.4, 9.2, 10.4 12.3, 14.3, 15.0 15.6, 16.0, 19.0
	FSAR	10 CFR 50.34(f)(2)(xiv), (f)(2)(xv) 10 CFR 50.44 10 CFR 50.46 10 CFR 50 App. J 10 CFR 50, App. K 10 CFR 50, App. A, GDC 1, 2, 4, 5, 13, 16, 38, 39, 40, 41, 42, 43, 50, 51, 52, 53, 54, 55, 56, 57, 64 10 CFR 50.63(a)(2)	No	RG 1.206	6.2 BTP 6-2 BTP 6-3 BTP 6-4 BTP 7-10	RGs 1.7, 1.11, 1.26, 1.29, 1.52, 1.82, 1.97, 1.141, 1.155, 1.163, 1.174, 1.183, 1.195 NUREG-0577, -0588 NUREG-0609, -0718, -0737, -1449 GL 83-02, 88-17 SECY 93-087	ASME Code, Section III, 2007 w/ 2008 Addenda ASME Journal Vol 87, No. 1, Feb. 1965 ANSI/ANS-56.8-2002 NEI-04-07 NEI-94-01	N/A	No	Track NRC issuance of Proposed Revision 1 to RG 1.183 (DG-1199), Proposed Revision 4 to RG 1.82 (DG-1234), and Proposed Revision 1 to RG 1.163 (DG-1220)	3.2, 3.6, 3.8 3.9, 3.10, 3.11 3.13, 6.1, 6.2 6.3, 6.4, 6.5 7.1, 7.2, 7.3 7.4, 7.5, 8.3 8.4, 9.2, 10.4 12.3, 15.0, 15.6 16.0, 19.0

Note:
Regualtory Guide revisions are not identified as these will be consistent with the version in dffect 6 months prior to the PSAR submittal.

Clinch River Regulatory Framework Document
NRC Version

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
6.3 Emergency Core Cooling System	PSAR	10 CFR 50.34(f) 10 CFR 50.46 10 CFR 50 App. A, GDC 2, 4, 5, 17, 27, 35, 36, 37 10 CFR 50 App. K 10 CFR 50.63	No	RG 1.70	6.3 BTP 6-5	RGs 1.29, 1.47, 1.68, 1.79, 1.82, 1.155 NUREG-0737 (Items III.D.1.1, II.D.3, and II.F.2) NUREG-0927 SECY 77-439, 90-016, 93-087, 94-084 GL 88-17 GL 89-04 GL 04-02	ANSI N658 (ANS 51.7), 1976 NEI 04-07	No	No	Track NRC issuance of Proposed Revision 2 to RG 1.79 (DG-1253) and Proposed Revision 4 to RG 1.82 (DG-1234)	3.2, 3.6, 3.9 3.11, 3.12, 5.3 5.4, 6.2, 6.6 7.3, 8.1, 8.2 8.3, 8.4, 9.2 9.3, 12.1, 12.2 12.3, 12.4, 12.5 13.5, 14.2, 15.6 16.0, 17.5, 19.0
	DCD	10 CFR 50.34(f) 10 CFR 50.46 10 CFR 50 App. A, GDC 2, 4, 5, 17, 27, 35, 36, 37 10 CFR 50 App. K 10 CFR 50.63 10 CFR 52.47(b)(1)	No	RG 1.206	6.3 BTP 6-5	RGs 1.29, 1.47, 1.68, 1.79, 1.82, 1.155 NUREG-0737 (Items III.D.1.1, II.D.3, and II.F.2) NUREG-0927 SECY 77-439, 90-016, 93-087, 94-084 GL 88-17 GL 89-04 GL 04-02	ANSI N658 (ANS 51.7), 1976 NEI 04-07	N/A	N/A	Track NRC issuance of Proposed Revision 2 to RG 1.79 (DG-1253) and Proposed Revision 4 to RG 1.82 (DG-1234)	3.2, 3.6, 3.9 3.11, 3.12, 5.3 5.4, 6.2, 6.6 7.3, 8.1, 8.2 8.3, 8.4, 9.2 9.3, 12.1, 12.2 12.3, 12.4, 12.5 13.5, 14.2, 15.6 16.0, 17.5, 19.0
	FSAR	10 CFR 50.34(f) 10 CFR 50.46 10 CFR 50 App. A, GDC 2, 4, 5, 17, 27, 35, 36, 37 10 CFR 50 App. K 10 CFR 50.63	No	RG 1.206	6.3 BTP 6-5	RGs 1.29, 1.47, 1.68, 1.79, 1.82, 1.155 NUREG-0737 (Items III.D.1.1, II.D.3, and II.F.2) NUREG-0927 SECY 77-439, 90-016, 93-087, 94-084 GL 88-17 GL 89-04 GL 04-02	ANSI N658 (ANS 51.7), 1976 NEI 04-07	N/A	No	Track NRC issuance of Proposed Revision 2 to RG 1.79 (DG-1253) and Proposed Revision 4 to RG 1.82 (DG-1234)	3.2, 3.6, 3.9 3.11, 3.12, 5.3 5.4, 6.2, 6.6 7.3, 8.1, 8.2 8.3, 8.4, 9.2 9.3, 12.1, 12.2 12.3, 12.4, 12.5 13.5, 14.2, 15.6 16.0, 17.5, 19.0
6.4 Habitability Systems	PSAR	10 CFR 50, App. A, GDC 4, 5, 19 10 CFR 50.34(f)(2)(xxviii)	No	RG 1.70	6.4	RGs 1.52, 1.78, 1.183, 1.195, 1.196, 1.197 NUREG-0737 (Item III.D.3.4)	ASME Code AG-1, 2009	No	No	Track NRC issuance of Proposed Revision 1 to RG 1.183 (DG-1199)	2.2, 2.3, 6.5 9.4, 9.5, 12.1 12.2, 12.3, 12.4 12.5, 15.0
	DCD	10 CFR 50, App. A, GDC 4, 5, 19 10 CFR 50.34(f)(2)(xxviii) 10 CFR 52.47(b)(1)	No	RG 1.206	6.4	RGs 1.52, 1.78, 1.183, 1.195, 1.196, 1.197 NUREG-0737 (Item III.D.3.4) IMC-2504	ASME Code AG-1, 2009	N/A	N/A	Track NRC issuance of Proposed Revision 1 to RG 1.183 (DG-1199)	2.2, 2.3, 6.5 9.4, 9.5, 12.1 12.2, 12.3, 12.4 12.5, 14.3, 15.0
	FSAR	10 CFR 50, App. A, GDC 4, 5, 19 10 CFR 50.34(f)(2)(xxviii)	No	RG 1.206	6.4	RGs 1.52, 1.78, 1.183, 1.195, 1.196, 1.197 NUREG-0737 (Item III.D.3.4)	ASME Code AG-1, 2009	N/A	No	Track NRC issuance of Proposed Revision 1 to RG 1.183 (DG-1199)	2.2, 2.3, 6.5 9.4, 9.5, 12.1 12.2, 12.3, 12.4 12.5, 15.0

Note:
Regualtory Guide revisions are not identified as these will be consistent with the version in effect 6 months prior to the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
6.5 Fission Product Removal and Control Systems	PSAR	NOTE: 10 CFR 50, App. A, GDC 19, 41, 42, 43, 61, 64 may be applicable if the mPower design credits plateout on containment surfaces in dose calculations.	No	NOTE: Sections 6.5.1, 6.5.2, 6.5.4, and 6.5.5 are not applicable to the mPower design. Section 6.5.3 (Fission Product Control Systems) will contain a reference to Chapter 15 for analysis of Containment passive radiation removal and control processes following a DBA.	6.5	N/A	N/A	N/A	No	None	15, 6.2.1, 6.2.6 3.2.1, 3.2.2
	DCD								N/A		
	FSAR								No		
6.6 Inservice Inspection of Class 2 and Class 3 Components	PSAR	10 CFR 50, App. A, GDC 36, 37, 39, 40, 42, 43, 45, 46 10 CFR 50.55a	No	RG 1.70	6.6	NUREG-1344 GL 89-08	ASME Code, Section III, 2007 w/2008 Addenda Article NCA-2000 ASME Code, Section XI, Division 1, 2007 w/2008 Addenda	No	No	None	3.2, 3.6, 5.2 5.4, 9.2, 13.3 13.4
	DCD	10 CFR 50, App. A, GDC 36, 37, 39, 40, 42, 43, 45, 46 10 CFR 50.55a 10 CFR 52.47(b)(1)	No	RG 1.206	6.6	NUREG-1344 GL 89-08 IMC-2504	ASME Code, Section III, 2007 w/2008 addenda Article NCA-2000 ASME Code, Section XI, Division 1, 2007 w/2008 Addenda	N/A	N/A	None	3.2, 3.6, 5.2 5.4, 9.2, 13.3 13.4, 14.3
	FSAR	10 CFR 50 App. A, GDC 36, 37, 39, 40, 42, 43, 45, 46 10 CFR 50.55a	No	RG 1.206	6.6	NUREG-1344 GL 89-08	ASME Code, Section III, 2007 w/2008 Addenda Article NCA-2000 ASME Code, Section XI, Division 1, 2007 w/2008 Addenda	N/A	No	None	3.2, 3.6, 5.2 5.4, 9.2, 13.3 13.4
6.7 Main Steam Isolation Valve Leakage Control System (BWR)	PSAR	N/A-BWR	N/A-BWR	N/A-BWR	N/A-BWR	N/A-BWR	N/A-BWR	N/A-BWR	N/A-BWR	N/A-BWR	N/A-BWR
	DCD										
	FSAR										

Note:
Regualtory Guide revisions are not identified as these will be consistent with the version in dffect 6 months prior to the PSAR submittal.

Chapter 6 Outline

6.1 Engineered Safety Feature Materials

PSAR The Clinch River SMR Plant engineered safety feature (ESF) systems include the containment system and the emergency core cooling system (ECCS). The selection and fabrication of the ESF system materials are presented in PSAR Section 6.1 as described below:

- preliminary description of methods to ensure integrity of safety-related components of the ESF systems
- preliminary description of methods for storing ESF coolants and assuring the avoidance of fissuring during weld fabrication and assembly of austenitic stainless steel materials
- preliminary description of ESF component and construction materials compatibilities with the system fluids
- proposed safety evaluation for the system (if required)
- preliminary table(s) for the material specifications of engineered safety features materials as well as organic materials (coatings, lubricants, etc.)

DCD The mPower standard plant ESF systems include the containment system and the ECCS. The selection and fabrication of the ESF system materials are presented in DCD Section 6.1 as described below:

- description of methods to avoid potentials for either stress corrosion cracking of austenitic stainless steel components or excessive hydrogen generation due to corrosion of metals in the containment, as well as anticipated flow paths for all ESF operating modes
- description of methods for evaluating containment fluid compatibility with ESF component materials
- description of methods for controlling chemistry of the water used in the ESF system (ECCS, etc.) during storage mode
- description of hydrogen release safety evaluation per RG 1.7, to include basis for ESF materials selection, experience, testing, or extrapolation of existing knowledge to show that the ESF materials can withstand accident environments, and to show the adequacy of hydrogen gas generation control
- description of ESF components and system cleaning process and compliance with RG 1.37
- table(s) identifying all metallic materials utilized in each of the ESF system components (tanks, pumps, piping, valves, etc.), to include all pressure-retaining ferritic materials, austenitic stainless steels, non-ferrous metals, bolting and welding materials
- table(s) identifying material specifications for each of the metallic materials identified for the ESF system components, to include bases for selection, metallurgical properties, fabrication requirements, cleaning requirements, cold work restrictions, corrosion allowances, and welding requirements and procedures

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Chapter 6 Outline

6.1 Engineered Safety Feature Materials (cont.)

DCD (cont.)

- table(s) identifying all organic materials (plastics, lubricants, coatings, etc.) utilized inside the containment building, to include classifications and total coating thickness (where overcoating is applicable)
- table(s) identifying all non-metallic thermal insulation used on ESF system components, to include composition selection bases, testing, storage, and installation information to demonstrate acceptable leachable concentrations of contaminants such as chlorides, lead, zinc, sulfur, and mercury

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FSAR Same contents as mPower standard plant DCD Section 6.1.

Chapter 6 Outline

6.2 Containment Systems

PSAR The Clinch River SMR Plant containment systems provide a leak-tight barrier against release of radioactivity to the environment under normal and accident conditions. The containment systems include the Ultimate Heat Sink (UHS) subsystem, a safety-related system consisting of the UHS tank(s) and associated auxiliary components. Specific aspects of the system are presented in PSAR Section 6.2 as described below:

Containment Functional Design

- description and preliminary design bases for the containment structure, including postulated accident conditions, maximum calculated accident pressures, sources of energy release, and capability for energy removal
- preliminary design features, including preventing loss of integrity, functional capability of support systems, and features to protect the systems against loss of function from dynamic effects
- provisions for protecting the integrity of the containment structure
- preliminary failure modes and effects analysis (FMEA) to determine single active failure that maximizes energy release to the containment
- preliminary description of accident chronologies for most severe reactor coolant system (RCS) pipe rupture events, including energy inventories and distribution prior to the accident, at the time of peak pressure, at the end of the blowdown phase, and at the end of core re-flood phase
- description of proposed instrumentation to monitor and record the containment pressure and temperature during the course of an accident within containment
- preliminary in-service inspection and testing requirements for the containment structure
- description and preliminary design bases for sub-compartments within the containment systems, including pipe break analysis, elevation drawing(s), and computer programs available for mass and energy release
- preliminary description of bases and analyses for the prevention of fracture of the containment pressure boundary per SRP 6.2.7
- proposed plans for environmental qualification testing applicable to components that may be exposed to the accident environment
- table(s) identifying the containment structure design pressure and temperature, maximum calculated accident pressure and temperature, sources and quantities of mass and energy that may be released inside containment, and containment depressurizing rate
- preliminary table(s) identifying the containment pressure and temperature responses to the spectrum of postulated accident conditions (loss of coolant accident – LOCA pipe breaks, including location and size for each), to include RCS pipe ruptures as well as secondary system pipe ruptures

Chapter 6 Outline

6.2 Containment Systems (cont.)

PSAR (cont.)

- preliminary table(s) identifying estimated structural heat sink within the containment structure, sub-compartment free volumes, vent areas, initial operating conditions of the plant, piping break details (system, location, size, etc.), pressure response vs. time, mass and energy release data, flow conditions, vent paths, and loss coefficients

UHS System

- description and preliminary design basis of the UHS system, including provisions for maintaining adequate cooling water inventory at an acceptable temperature for 7 days without makeup
- proposed approach to demonstrate how the system will function as the emergency core cooling system (ECCS) heat sink during design basis events
- proposed safety evaluation, including single failure analysis, protection against natural phenomena and adverse environmental conditions, capability to withstand design loadings, and approach to demonstrate how the system functions without compromising the safe operation of the plant under both normal operating or transient situations
- proposed provisions to detect, prevent, or contain leakage of radioactive material to the outside environment
- proposed plans to address long-term corrosion and fouling mechanisms that may degrade system performance
- proposed provisions for inspection of essential structures and subsystems
- proposed testing and inspection requirements
- proposed instrumentation requirements
- preliminary figure(s) showing simplified piping and instrumentation diagram (P&ID) of the UHS system, including interfaces with the ECCS system and other auxiliary functions (cleanup, makeup, etc.)

Containment Isolation System

- description and preliminary design bases and requirements for the containment isolation system, including conditions under which isolation is required, requirements for isolation barriers, criteria for fluid and instrument lines that penetrate containment, and environmental qualification tests to be performed on mechanical and electrical components that may be subjected to an accident environment
- preliminary in-service inspection and testing requirements for the containment isolation valves and containment isolation barriers (determination of leakage rate)

Chapter 6 Outline

6.2 Containment Systems (cont.)

PSAR (cont.)

- table(s) showing preliminary containment penetration information, to include identification number, system, size, fluid contained, isolation valve data including failure position, power sources, valve closure times, plant protection signals that initiate valve closure, calculated pressure and temperature responses, etc.
- preliminary figure(s) showing simplified P&ID of the containment isolation system

Combustible Gas Control in Containment

- description, preliminary design bases, and FMEA for combustible gas control in containment, including evaluation of capability to mix the containment atmosphere, prevent local high concentrations for as long as accident conditions exist, and to monitor gas concentrations
- proposed description of in-service inspection and testing requirements for the combustible gas control systems and components
- table(s) identifying all major components of the containment combustible gas control system, including design and performance parameters
- preliminary in-service inspection and testing requirements for the combustible gas control systems and components
- preliminary figure(s) showing the simplified P&ID for the containment combustible gas control system, including all equipment, ducting, dampers, and instrumentation

Containment Leakage Testing

- preliminary description of bases and analyses for performance of the containment integrated leakage rate testing and local leakage rate testing
- proposed description of containment integrated leakage rate testing plan
- preliminary figure(s) showing simplified P&ID of the containment leakage rate testing system

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DCD

The mPower standard plant containment systems provide a leak-tight barrier against release of radioactivity to the environment under normal and accident conditions. The containment systems include the Ultimate Heat Sink (UHS) subsystem, a safety-related system consisting of the UHS tank(s) and associated auxiliary components. Specific aspects of the system are presented in DCD Section 6.2 as described below:

Chapter 6 Outline

6.2 Containment Systems (cont.)

DCD (cont.)

Containment Functional Design

- description of the design bases of the containment structure, to include discussion of the postulated accident scenarios, conditions, and extent of simultaneous occurrences (single active failures, loss-of-offsite power/station blackout, etc.)
- description of the design features of the containment structure, to include identification of qualification testing and provisions to protect against external pressure loading
- description of the containment functional capability and safety analyses performed, including identification and justification of computer codes and analysis methods, mass and energy releases for postulated LOCAs, mass and energy releases for postulated secondary side pipe ruptures inside containment, and results of FMEA of ECCS single active failures that result in maximum accident pressure and temperature
- description of accident chronologies for most severe RCS pipe rupture events, to include energy inventories and distribution prior to the accident, at the time of peak pressure, at the end of the blowdown phase, and at the end of core re-flood phase
- description of minimum containment pressure analysis, including computer codes, used to determine minimum containment pressure to be used to analyze the effectiveness of the ECCS
- description of the capability of structural heat sinks within the containment structure
- description of instrumentation provided to monitor and record containment pressure and temperature during accident conditions, including qualification testing requirements
- description of in-service inspection and testing requirements for the containment structure
- description of containment sub-compartment design basis, accident analyses performed, computer codes and other methods utilized, including selection of DBA and extent to which pipe restraints are credited
- description of bases and analyses for the prevention of fracture of the containment pressure boundary per SRP 6.2.7
- description of the environmental qualification testing applicable to components that may be exposed to the accident environment
- table(s) identifying the containment structure design pressure and temperature, maximum calculated accident pressure and temperature, sources and quantities of mass and energy that may be released inside containment, and containment depressurizing rate
- figure(s) showing the general arrangement of the containment, including internal structures

Chapter 6 Outline

6.2 Containment Systems (cont.)

DCD (cont.)

- table(s) identifying the containment pressure and temperature responses to the spectrum of postulated accident conditions (LOCA – pipe breaks, including location and size for each), to include RCS pipe ruptures as well as secondary system pipe ruptures
- figure(s) showing graphical presentation of containment pressure and temperature response and the refueling canal water temperature response as functions of time for each accident analyzed
- table(s) identifying each structural heat sink within the containment structure, including appropriate heat transfer correlations
- figure(s) showing the arrangement of all sub-compartments evaluated
- table(s) identifying sub-compartment free volumes, vent areas, initial operating conditions of the plant, piping break details (system, location, size, etc.), pressure response vs. time, mass and energy release data, flow conditions, vent paths, and loss coefficients

<u>UHS System</u>

- detailed description and design basis of the UHS system, including provisions for maintaining and adequate cooling water inventory at an acceptable temperature for 7 days without makeup
- description of approach to demonstrate how the system will function as the emergency core cooling system (ECCS) heat sink during design basis events
- description of safety evaluation, including single failure analysis, protection against natural phenomena and adverse environmental conditions, capability to withstand design loadings, and approach to demonstrate how the system functions without compromising the safe operation of the plant under both normal operating or transient situations
- description of provisions to detect, prevent, or contain leakage of radioactive material to the outside environment
- description of plans to address long-term corrosion and fouling mechanisms that may degrade system performance
- description of provisions for inspection of essential structures and subsystems
- description of testing and inspection requirements
- description of instrumentation requirements
- figure(s) showing simplified P&ID of the UHS system, including interfaces with the ECCS system and other auxiliary functions (cleanup, makeup, etc.)

Chapter 6 Outline

6.2 Containment Systems (cont.)

DCD (cont.)

Containment Isolation System

- description of the design bases and requirements for the containment isolation system, to include conditions under which isolation is required, requirements for isolation barriers, criteria for fluid and instrument lines that penetrate containment, and environmental qualification tests to be performed on mechanical and electrical components that may be subjected to an accident environment
- description of in-service inspection and testing requirements for the containment isolations valves and containment isolation barriers (determination of leakage rate)
- description of test pressure(s) to be used for containment penetration leakage rate testing and containment isolation valve leakage rate testing
- proposed schedule for performing preoperational and periodic leakage rate testing for containment penetrations and containment isolation valves
- table(s) providing containment penetration information, including identification number, notes for those exempt from leakage rate testing, system, size, fluid contained, isolation valve data with failure position, power sources, valve closure times, plant protection signals that initiate valve closure, etc.
- table(s) identifying containment isolation valves, with notes for those exempt from leakage rate testing
- figure(s) showing simplified P&ID of the containment isolation system

Combustible Gas Control in Containment

- description of the design bases for combustible gas control in containment, including capability to mix the containment atmosphere, prevent local high concentrations for as long as accident conditions exist, and to monitor gas concentrations
- description of the combustible gas production and accumulation analysis inside containment under a LOCA, including a fault mode event analysis
- description of in-service inspection and testing requirements for the combustible gas control systems and components
- table(s) identifying major components of the containment combustible gas control system, including design and performance parameters
- figure(s) showing the simplified P&ID for the containment combustible gas control system, including all equipment, ducting, dampers, and instrumentation

Chapter 6 Outline

6.2 Containment Systems (cont.)

DCD (cont.) Containment Leakage Testing

- description of bases and analyses for performance of the containment integrated leakage rate testing and local leakage rate testing
- description of containment integrated leakage rate testing plan
- proposed schedule for performing preoperational and periodic leakage rate testing for containment integrated leakage rate
- figure(s) showing simplified P&ID of the containment leakage rate testing system

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FSAR Same contents as mPower standard plant DCD Section 6.2.

Chapter 6 Outline

6.3 Emergency Core Cooling System

PSAR The Clinch River SMR Plant emergency core cooling system (ECCS) is a safety-related system which provides off-normal operating functions, such as reactor coolant system pressure relief suppression and reactor coolant makeup, as well as passive reactor core cooling capability under a variety of design basis accidents (DBAs). Specific aspects of the system are presented in PSAR Section 6.3 as described below:

- summary description of the ECCS, including design bases for selecting functional and reliability requirements, and including design bases for post DBA environmental conditions and protection from fire, flooding, and dynamic effects
- proposed design parameters for each component (pressures, temperatures), quantity of coolant available, component characteristics, and control and actuation descriptions
- reference to PSAR Section 6.1 for proposed discussion on material specifications for the ECCS
- discussion of ECCS reliability considerations which ensure the system will start when needed
- preliminary FMEA of the ECCS; identification of the fundamental consequences of each possible single failure or operator error, the potential for passive failures, as well as single failures of any active components; identification of specific equipment arrangement
- provisions for protection of the system against dynamic effects, thermal stresses, or other causes
- identification of manual actions required by operators for proper ECCS operation
- summary of DBA analyses; reference to PSAR Chapter 15 for details including system performance curves
- description of the extent that components or portions of the ECCS are required for operation of other systems and the extent which portions of other systems are required for ECCS operation, including priority, conditions, and limitations on operation or maintenance
- proposed description of design features that ensure long term recirculation of the ECCS following a LOCA
- proposed ECCS instrumentation requirements, including description of bases for selection and system actuation methods
- proposed description of plans for preoperational testing and in-service inspection requirements for the ECCS
- figure(s) depicting the ECCS performance, including flow delivery curves as a function of time for each accident type and time sequence of ECCS operation for short and long term cooling (valve opening time, operator actions if required, and other parameters affecting the selection of lag times)

Chapter 6 Outline

6.3 Emergency Core Cooling System (cont.)

PSAR (cont.)

- preliminary figure(s) showing simplified P&IDs of the ECCS, including component locations, piping, connecting systems, normal alignment of valves, flow rates, and capacities

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DCD

The mPower standard plant ECCS is a safety-related system which provides off-normal operating functions, such as reactor coolant system pressure relief suppression and reactor coolant makeup, as well as passive reactor core cooling capability under a variety of design basis accidents (DBAs). Specific aspects of the system are presented in DCD Section 6.3 as described below:

- summary description of the ECCS design basis, including identification of all major components and subsystems, reliability and redundancy considerations, capability to maintain sub-criticality under accident conditions, references to nuclear plant certifications with similar designs, applicable industry codes and classifications, and compliance with relevant regulations and rules
- summary description of the ECCS safety design basis, including identification of each transient or accident for which the required protection includes ECCS actuation
- ECCS component design parameters, including design and operating pressures and temperatures, available quantity and location(s) of coolant, water elevations in tanks with reference to core elevation, heat exchanger characteristics, and relief valve parameters
- description of ECCS instrumentation available in the control room to assist in assessing post-accident conditions
- description of instrumentation provisions for the various actuation methods (both automatic and manual), including locations, conditions requiring system actuation, and the bases for their selection
- description of required repositioning of valves necessary to achieve ECCS functions
- reference to DCD Section 6.1 for description of material specifications and material compatibility with all anticipated fluid and environmental conditions
- description of reliability considerations, including redundancy, separation of components, power sources, etc., as wells as the results of a FMEA, including the effects of any single failure or operator error that could affect operation of the ECCS

Chapter 6 Outline

6.3 Emergency Core Cooling System (cont.)

DCD (cont.)

- reference to PSAR Section 3.4 for description of specific ECCS equipment arrangement showing that valve motor operators located within containment will not become submerged during a LOCA
- description of how the passive system reliability and the impact of adverse system interactions on the safety functions are considered, as well as how regulatory oversight of the active nonsafety-related systems (RTNSS) are considered in providing defense-in-depth capabilities for reactor coolant makeup and decay heat removal
- description of the extent that components or portions of the ECCS are required for operation of other systems and the extent which portions of other systems are required for ECCS operation, including priority, conditions, and limitations on operation or maintenance
- description of design features that ensure long term recirculation of the ECCS following a LOCA
- description of the bounds within which the system parameters (coolant reserve in storage volumes, maximum number of inoperable components, etc.) must be maintained to support constant standby readiness
- description of the proposed preoperational ECCS test program, including demonstration of flow rates through each injection flow path are within design specifications under both ambient and simulated hot operating conditions
- description of the proposed in-service ECCS test program, including those surveillance-type tests that may become part of the Technical Specifications
- figure(s) showing simplified P&IDs of the ECCS, including all components, piping, interfaces with the connecting systems, normal alignment of valves, flow rates, capacities, and instrumentation and controls
- table(s) presenting ECCS performance through the safety analyses of a spectrum of postulated accidents, including a list of each specific accident analyzed and the conclusion and the basis for any operational restrictions

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FSAR Same contents as mPower standard plant DCD Section 6.3, including:

- description of the results from the ECCS preoperational test program

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Chapter 6 Outline

6.4 Control Room Habitability System

PSAR The Clinch River SMR Plant control room habitability system is designed such that control room operators are adequately protected against the effects of accidental releases of toxic and radioactive gases, smoke and steam, and can remain in the control room and take appropriate actions to operate the nuclear power plant safely under normal conditions, and maintain it in a safe condition under accident conditions. Control Room Envelope (CRE) habitability is demonstrated in PSAR Section 6.4 based on the following information:

- proposed physical definition of the CRE area and description of the CRE ventilation system, including the following features:
  - isolation and interaction of the CRE with adjacent zones by maintaining pressure difference criteria as required by NUREG 0800
  - description of the major components, design parameters and classifications to maintain CRE habitability
  - seismic classifications of CRE habitability system components, instrumentation, and ductwork
  - placement and operation of sensing detector instruments that monitor radiation, smoke and toxic gases
  - charcoal filter train specifications and details based on recommendations in RG 1.52, ANSI/ASME Code AG-1, N509 & N510
- preliminary system description for control room habitability system, including description of operating procedures for both normal and emergency operation modes
- preliminary shielding design for the control room
- identification of all major components with their design parameters, including leak tightness characteristics, flow rates, free-air volume, and filter efficiencies for both normal and emergency operating modes, along with closure times of the isolation dampers
- control room habitability evaluation based on- and off-site hazardous chemical releases
- preliminary figure(s) (elevation and plan view) detailing the physical location of the control room including control room air intakes, surrounding corridors, doors, and stairwells, as well as the location of potential release points including a description of radiation shielding
- preliminary figure(s) and table(s) showing simplified P&ID of the control room habitability and ventilation system (CRE and non-emergency ventilation portion of the system), including all equipment, ductwork, control and isolation dampers, and instrumentation, as well as the identification of all airflows

Chapter 6 Outline

6.4 Control Room Habitability System (cont.)

DCD The mPower standard plant control room habitability system is designed such that control room operators are adequately protected against the effects of accidental releases of toxic and radioactive gases, smoke and steam, and can remain in the control room and take appropriate actions to operate the nuclear power plant safely under normal conditions, and maintain it in a safe condition under accident conditions. Control Room Envelope (CRE) habitability is demonstrated in DCD Section 6.4 based on the following information:

- detailed design bases for the functional design of the CRE, including definition of the emergency zone, period of habitability, personnel capacity, radiation protection, smoke protection, toxic gas protection, emergency monitors and control equipment, respiratory, eye, and skin protection for emergencies, and food, water, medical supplies, and sanitary facilities
- physical definition of the CRE area and detailed description of the CRE habitability system, including the following features:
  - the CRE is contained inside a Seismic Category I structure, protected from wind and tornado effects, from external and internal flooding, from external and internal missiles, from dynamic effects associated with the postulated rupture of piping, seismic qualification of electrical and mechanical components, environmental design
  - the CRE area walls, floor & ceiling maintain space temperature by acting as a passive heat sink by providing thermal fin to enhance the heat transfer from the CRE areas to the heat sink via concrete
  - isolation and interaction of CRE with adjacent zones by maintaining pressure difference criteria as required by NUREG 0800
  - description of the major components, design parameters and classifications to maintain CRE habitability
  - seismic classifications of CRE habitability system components, instrumentation, and ductwork
  - placement and operation of sensing detector instruments that monitor radiation, smoke and toxic gases
  - charcoal filter train specifications and details based on recommendations in RG 1.52, ANSI/ASME Code AG-1, N509 & N510
- description of methods and assumptions used in leak tightness evaluation including the exfiltration and infiltration analyses used to determine pressurization airflow requirements and identification of all potential leak paths
- description of control room habitability ventilation system design, including description of operating procedures for both normal and emergency operation modes
- description of shielding design for the control room
- definition of source terms and radiation attenuation by shielding and separation, including evaluation of DBA doses to control room operators

Chapter 6 Outline

6.4 Control Room Habitability System (cont.)

DCD (cont.)

- inspection, testing, and instrumentation requirements
- identification/disposition of onsite chemicals and evaluation of control room habitability for toxic chemicals based on RG 1.78
- figure(s) showing the general arrangement of the CRE including the physical location of the control room, zone identification, ventilation system layout drawings, control room air intakes, and elevation and plan views, as well as its relation to adjacent zones and pressure containing equipment and potential release points
- figure(s) and table(s) showing the simplified P&ID of the control room ventilation system (CRE and non-emergency ventilation portion of the system), including all equipment, ductwork, control and isolation dampers, and instrumentation, as well as the identification of all airflows for both normal and emergency operating modes
- table(s) identifying all major components with their design parameters, including leakage characteristics, filter efficiencies and closure times of the isolation dampers

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FSAR Same contents as mPower standard plant DCD Section 6.4, with the following supplemental information:

- description of program for CRE habitability, including procedures and testing
- updated control room habitability analyses, if required, based on site-specific information on toxic chemicals of mobile and stationary sources within the requirements of RG 1.78

Chapter 6 Outline

6.5 Fission Product Removal and Control System

PSAR The Clinch River SMR Plant fission product removal and control system is handled by passive removal processes (natural circulation/condensation mechanisms) inside of the steel primary containment following a DBA. There are no active fission product control systems (filter systems, containment spray systems, or other fission product control systems) which are required to limit accidental releases of fission products to doses less than the regulatory guideline limits.

- reference to PSAR Chapter 15 for analysis of containment passive radiation removal and control processes following a DBA

DCD The mPower standard plant fission product removal and control system is handled by passive removal processes (natural circulation/condensation mechanisms) inside of the steel primary containment following a DBA. There are no active fission product control systems (filter systems, containment spray systems, or other fission product control systems) which are required to limit accidental releases of fission products to doses less than the regulatory guideline limits.

- reference to DCD Chapter 15 for analysis of containment passive radiation removal and control processes following a DBA

FSAR Same contents as mPower standard plant DCD Section 6.5.

Chapter 6 Outline

6.6 Inservice Inspection of Class 2 and 3 Components

PSAR The Clinch River SMR Plant Quality Groups B and C components are included in an In-service Inspection (ISI) Program that is compliant with Section XI of the ASME Code, including all examination tests, techniques, procedures, intervals, results evaluations, and augmented ISI to protect against postulated piping failures. Specific aspects of the ISI Program are described below:

- discussion regarding the examination plans for all of the Quality Group B (Class 2) components, including those listed in Table IWC-2600 of Section XI in accordance with ASME Code requirements
- description of proposed accessibility requirements for components that will be included for inservice inspections
- discussion of the extent to which Quality Group C (Class 3) components, including those listed in Subarticle IWD-2600 of Section XI, will be examined in accordance with the ASME Code
- plans for ISI program, including information on areas subject to examination, method of examination, and extent and frequency of examination, is provided in the Technical Specifications (reference PSAR Chapter 16)

DCD For the mPower standard plant, all Quality Groups B and C components are included in an ISI Program that is compliant with Section XI of the ASME Code, including all examination tests, techniques, procedures, intervals, results evaluations, and augmented ISI to protect against postulated piping failures. Specific aspects of the ISI Program are described below:

- proposed approach for development of preservice and ISI program for ASME Section III Class 2 and 3 components

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FSAR Same contents as PSAR Section 6.6 and mPower standard plant DCD Section 6.6, with the following supplemental information:

- updated description of preservice and ISI program for ASME Section III Class 2 and 3 components

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Chapter 6 Outline

6.7 Main Steam Isolation Valve Leakage Control System (BWR)

PSAR PSAR Section 6.7 includes a statement that the main steam isolation valve leakage control system is not applicable to the Clinch River SMR Plant.

DCD DCD Section 6.7 includes a statement that the main steam isolation valve leakage control system is not applicable to the mPower standard plant design.

FSAR FSAR Section 6.7 includes a statement that the main steam isolation valve leakage control system is not applicable to the Clinch River SMR Plant.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
9.4.1 Control Room Area Ventilation System	PSAR	10 CFR 50 Appendix A, GDC 2, 4, 5, 19, 60 10 CFR 50.63	No	RG 1.70 Note: PSAR Section 9.4.1 will also address SBO and toxic gas events, consistent with RG 1.206.	9.4.1	RGs 1.29, 1.52, 1.78, 1.140, 1.155, 1.195, 1.196, 1.197	ANSI/ASME Code AG-1, 2009 ANS 59.2-1985 ASHRAE 62.1-2010 ASME N509-2002 ASME N510-2007	Yes PSAR will also address SBO requirements per 10 CFR 50.63, as discussed in RG 1.206	No	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 6.4, 6.5, 6.6, 7.3, 8.3, 9.5, 12.3, 12.4, 16, 17
	DCD	10 CFR 50 Appendix A, GDC 2, 4, 5, 19, 60 10 CFR 50.63 10 CFR 52.47(b)(1)	No	RG 1.206	9.4.1	RGs 1.29, 1.52, 1.78, 1.140, 1.155, 1.195, 1.196, 1.197	ANSI/ASME Code AG-1, 2009 ANS 59.2-1985 ASHRAE 62.1-2010 ASME N509-2002 ASME N510-2007	N/A	N/A	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 6.4, 6.5, 6.6, 7.3, 8.3, 9.5, 12.3, 12.4, 16, 17
	FSAR	10 CFR 50 Appendix A, GDC 2, 4, 5, 19, 60 10 CFR 50.63	No	RG 1.206	9.4.1	RGs 1.29, 1.52, 1.78, 1.140, 1.155, 1.195, 1.196, 1.197	ANSI/ASME Code AG-1, 2009 ANS 59.2-1985 ASHRAE 62.1-2010 ASME N509-2002 ASME N510-2007	N/A	No	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 6.4, 6.5, 6.6, 7.3, 8.3, 9.5, 12.3, 12.4, 16, 17
9.4.2 Spent Fuel Pool Area Ventilation System	PSAR	10 CFR 50 Appendix A, GDC 2, 4, 5, 61, 64 10 CFR 50.63	No	RG 1.70 Note: PSAR Section 9.4.2 will also address SBO consistent with RG 1.206.	9.4.2	RGs 1.13, 1.115, 1.117, 1.25, 1.29, 1.52, 1.140	ASME Code AG-1-2009 ASME N509-2002 ASME N510-2007	Yes PSAR will also address SBO requirements per 10 CFR 50.63, as discussed in RG 1.206	No	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 3.11, 6.6, 7.7, 8.3, 11.5, 12, 15.7, 16, 17
	DCD	10 CFR 50 Appendix A, GDC 2, 4, 5, 61, 64 10 CFR 50.63 10 CFR 52.47(b)(1)	No	RG 1.206	9.4.2	RGs 1.13, 1.115, 1.117, 1.25, 1.29, 1.52, 1.140	ASME Code AG-1-2009 ASME N509-2002 ASME N510-2007	N/A	N/A	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 3.11, 6.6, 7.7, 8.3, 11.5, 12, 15.7, 16, 17
	FSAR	10 CFR 50 Appendix A, GDC 2, 4, 5, 61, 64 10 CFR 50.63	No	RG 1.206	9.4.2	RGs 1.13, 1.115, 1.117, 1.25, 1.29, 1.52, 1.140	ASME Code AG-1-2009 ASME N509-2002 ASME N510-2007	N/A	No	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 3.11, 6.6, 7.7, 8.3, 11.5, 12, 15.7, 16, 17
9.4.3 Reactor Service Building HVAC Systems	PSAR	10 CFR 50 Appendix A, GDC 2, 5, 60 10 CFR 50.63	No	RG 1.70 Note: PSAR Section 9.4.3 will also address SBO consistent with RG 1.206.	9.4.3	RGs 1.21, 1.29, 1.140	ANS 59.2-1985	Yes PSAR will also address SBO requirements per 10 CFR 50.63, as discussed in RG 1.206	No	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 6.6, 7.7, 8.3, 11.5, 12, 16, 17
	DCD	10 CFR 50 Appendix A, GDC 2, 5, 60 10 CFR 50.63 10 CFR 52.47(b)(1)	No	RG 1.206	9.4.3	RGs 1.21, 1.29, 1.140	ANS 59.2-1985	N/A	N/A	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 6.6, 7.7, 8.3, 11.5, 12, 16, 17
	FSAR	10 CFR 50 Appendix A, GDC 2, 5, 60 10 CFR 50.63	No	RG 1.206	9.4.3	RGs 1.21, 1.29, 1.140	ANS 59.2-1985	N/A	No	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 6.6, 7.7, 8.3, 11.5, 12, 16, 17
9.4.4 Turbine Area Ventilation System	PSAR	10 CFR 50 Appendix A, GDC 2, 5, 60	No	RG 1.70	9.4.4	RGs 1.29	ANS 59.2-1985	No	No	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 6.6, 7.7, 8.3, 11.5, 12, 16, 17
	DCD	10 CFR 50 Appendix A, GDC 2, 5, 60 10 CFR 52.47(b)(1)	No	RG 1.206	9.4.4	RGs 1.29	ANS 59.2-1985	N/A	N/A	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 6.6, 7.7, 8.3, 11.5, 12, 16, 17
	FSAR	10 CFR 50 Appendix A, GDC 2, 5, 60	No	RG 1.206	9.4.4	RGs 1.29	ANS 59.2-1985	N/A	No	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 6.6, 7.7, 8.3, 11.5, 12, 16, 17

Note 1: RG revisions are not identified as these will be consistent with the version in effect 6 months prior to the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
9.4.5 Engineered Safety Feature Ventilation System	PSAR DCD FSAR	The Engineered Safety Feature (ESF) ventilation system functions are performed by the safety-related control room habitability system as discussed in Section 9.4.1	See Section 9.4.1	See Section 9.4.1	9.4.1	See Section 9.4.1	See Section 9.4.1	See Section 9.4.1	No	None	See Section 9.4.1
9.4.6 Containment HVAC System	PSAR	10 CFR 50 Appendix A, GDC 2, 16, 38, 40, 54, 56, 57 10 CFR 50.63	No	1.70 Note: The section contents are consistent with the general guidelines of RG 1.70, Section 9.4 based on the specific system function and also addresses SBO consistent with RG 1.206.	9.4.3	RGs 1.29, 1.45, 1.140, 1.141, 1.155	ASME Code AG-1-2009 ASME N509-2002 ASME N510-2007	Yes PSAR will also address SBO requirements per 10 CFR 50.63, as discussed in RG 1.206	No	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 6.6, 7.7, 8.3, 11, 12, 16, 17
	DCD	10 CFR 50 Appendix A, GDC 2, 16, 38, 40, 54, 56, 57 10 CFR 50.63 10 CFR 52.47(b)(1)	No	RG 1.206, Section C.I.9.4 Note: The section contents are consistent with the general guidelines of RG 1.206 Section 9.4 based on the specific system function.	9.4.3	RGs 1.29, 1.45, 1.140, 1.141, 1.155	ASME Code AG-1-2009 ASME N509-2002 ASME N510-2007	N/A	N/A	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 6.6, 7.7, 8.3, 11, 12, 16, 17
	FSAR	10 CFR 50 Appendix A, GDC 2, 16, 38, 40, 54, 56, 57 10 CFR 50.63	No	RG 1.206, Section C.I.9.4 Note: The section contents are consistent with the general guidelines of RG 1.206 Section 9.4 based on the specific system function.	9.4.3	RGs 1.29, 1.45, 1.140, 1.141, 1.155	ASME Code AG-1-2009 ASME N509-2002 ASME N510-2007	N/A	No	None	3.2, 3.3, 3.5, 3.7, 3.8, 3.9, 3.10, 6.6, 7.7, 8.3, 11, 12, 16, 17
9.4.7 Diesel Generator Room Ventilation Systems	PSAR	10 CFR 50 Appendix A, GDC 2, 4, 5, 60 10 CFR 50.63	No	RG 1.206, Section C.I.9.4 Note: The section contents are consistent with the general guidelines of RG 1.206 Section 9.4 based on the specific system function.	9.4.5, 9.5.8	RGs 1.29, 1.140	ANS 59.2-1985	Yes PSAR will also address SBO requirements per 10 CFR 50.63, as discussed in RG 1.206	No	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 6.5, 6.6, 7, 8.4, 9.5, 11.3, 16, 17
	DCD	10 CFR 50 Appendix A, GDC 2, 4, 5, 60 10 CFR 50.63 10 CFR 52.47(b)(1)	No	RG 1.206, Section C.I.9.4 Note: The section contents are consistent with the general guidelines of RG 1.206 Section 9.4 based on the specific system function.	9.4.5, 9.5.8	RGs 1.29, 1.140	ANS 59.2-1985	N/A	N/A	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 6.5, 6.6, 7, 8.4, 9.5, 11.3, 16, 17
	FSAR	10 CFR 50 Appendix A, GDC 2, 4, 5, 60 10 CFR 50.63	No	RG 1.206, Section C.I.9.4 Note: The section contents are consistent with the general guidelines of RG 1.206 Section 9.4 based on the specific system function.	9.4.5, 9.5.8	RGs 1.29, 1.140	ANS 59.2-1985	N/A	No	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 6.5, 6.6, 7, 8.4, 9.5, 11.3, 16, 17
9.4.8 Technical Support Center HVAC System	PSAR	10 CFR 50 Appendix A, GDC 2, 4, 5, 19 10 CFR 50.63	No	RG 1.206, Section C.I.9.4 Note: The section contents are consistent with the general guidelines of RG 1.206 Section 9.4 based on the specific system function.	9.4.1, 9.4.4	RGs 1.29, 1.140 NUREG-0696	ANS 59.2-1985	Yes PSAR will address applicable guidance for TSC HVAC per NUREG-0696	No	None	3.2, 3.3, 3.5, 3.10, 6.4, 7, 8.4, 9.5, 11, 12, 14, 15, 17
	DCD	10 CFR 50 Appendix A, GDC 2, 4, 5, 19 10 CFR 50.63 10 CFR 52.47(b)(1)	No	RG 1.206, Section C.I.9.4 Note: The section contents are consistent with the general guidelines of RG 1.206 Section 9.4 based on the specific system function.	9.4.1, 9.4.4	RGs 1.29, 1.140 NUREG-0696	ANS 59.2-1985	N/A	N/A	None	3.2, 3.3, 3.5, 3.10, 6.4, 7, 8.4, 9.5, 11, 12, 14, 15, 17
	FSAR	10 CFR 50 Appendix A, GDC 2, 4, 5, 19 10 CFR 50.63	No	RG 1.206, Section C.I.9.4 Note: The section contents are consistent with the general guidelines of RG 1.206 Section 9.4 based on the specific system function.	9.4.1, 9.4.4	RGs 1.29, 1.140 NUREG-0696	ANS 59.2-1985	N/A	No	None	3.2, 3.3, 3.5, 3.10, 6.4, 7, 8.4, 9.5, 11, 12, 14, 15, 17

Note 1: RG revisions are not identified as these will be consistent with the version in effect 6 months prior to the PSAR submittal.

Section 9.4 Outline

9.4 Air Conditioning, Heating, Cooling and Ventilation Systems

9.4.1 Control Room Area Ventilation System

PSAR The Clinch River SMR Plant control room area ventilation (CRAV) system is a subsystem of the Reactor Service Building (RSB) heating, ventilation, and air conditioning (HVAC) system. The nonsafety-related portion of the CRAV system provides a controlled environment for the comfort and safety of control room personnel, assuring operability of control room components during all normal operating conditions when AC power is available. The safety-related control room habitability system provides pressurization of the main control room envelope (MCRE) and protection from the effects of smoke, inhaled radionuclides, and toxic gases as discussed in PSAR Section 6.4. The MCRE structural design provides a passive heat sink to maintain suitable ambient control room temperature under design basis event (DBE) conditions. Specific aspects of the CRAV system included in the PSAR are provided below:

- preliminary design bases for the CRAV system, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature and humidity limits, and filtration)
  - criteria to ensure reliability of the system (redundancy, seismic design, missile protection features, and meeting single failure criterion for safety-related portion of the system) for all modes of operation (normal, smoke, radiation, and toxic gas modes)
  - identification of criteria for manual or automatic actuation of system components or dampers
  - criteria for monitoring for radiation and/or toxic gas
  - criteria for other controls essential to the system performance
  - identification of applicable General Design Criteria (GDCs)
- preliminary system description, including plans for plant operator comfort and safety, and requirements for radiation protection requirements as required by regulatory guide
- reference to PSAR Section 6.4 for description of preliminary methods for detection and monitoring of dangerous environmental conditions (smoke, radiation, toxic gases, etc.)
- proposed safety evaluation of the control room air treatment system, including capability to mitigate and/or exclude entry of contaminants, methods for the removal of contaminants by air filtration system, detection of adverse or dangerous environmental conditions (as discussed in Section 6.4), maintenance of acceptable zone conditions, and anticipated degradation of equipment performance if temperature limits are exceeded
- preliminary evaluation of the control room ventilation system's ability to mitigate the effects (and/or exclude entry) of smoke, radiation, toxic gas conditions, station blackout (SBO), and the coincidental loss of offsite power

Section 9.4 Outline

9.4.1 Control Room Area Ventilation System (cont.)

PSAR (cont.)

- proposed inspection and testing requirements
- preliminary figure(s) showing simplified piping and instrumentation diagram (P&ID) of the CRAV system

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DCD

The mPower standard plant CRAV system is a subsystem of the RSB HVAC system. The nonsafety-related portion of the CRAV system provides a controlled environment for the comfort and safety of control room personnel, assuring operability of control room components during all operating conditions when AC power is available. The safety-related control room habitability system provides pressurization of the MCRE and protection from the effects of smoke, inhaled radionuclides, and toxic gases as discussed in DCD Section 6.4. The MCRE structural design provides a passive heat sink to maintain suitable ambient control room temperature under DBE conditions. Specific aspects of the CRAV system included in the DCD are provided below:

- design bases for the CRAV system, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature and humidity limits, and filtration)
  - criteria to ensure reliability of the system (redundancy, seismic design, missile protection features, and meeting single failure criterion for safety-related portion of the system) for all modes of operation (normal, smoke, radiation, and toxic gas modes)
  - identification of criteria for manual or automatic actuation of system components or dampers
  - criteria for monitoring for radiation and/or toxic gas
  - criteria for other controls essential to the system performance
  - identification of applicable General Design Criteria (GDCs)
- detailed system description, including identification of major components, flow paths, key parameters, essential controls, and operating modes
- reference to DCD Section 6.4 for description of methods for detection and monitoring of dangerous environmental conditions (smoke, radiation, toxic gases, etc.)
- safety evaluation of the control room air treatment system, including the results of a failure mode and effects analysis (FMEA), safety objectives and the manner in which the system achieves each, such as capability to mitigate and/or exclude entry of contaminants, methods for the removal of contaminants by air filtration system, detection of adverse or dangerous environmental conditions (as discussed in Section 6.4), maintenance of acceptable zone conditions, and anticipated degradation of equipment performance if temperature limits are exceeded

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Section 9.4 Outline

9.4.1 Control Room Area Ventilation System (cont.)

DCD (cont.)

- evaluation of the CRAV system's ability to mitigate the effects (and/or exclude entry) of smoke, radiation, toxic gas conditions, SBO, and the coincidental loss of offsite power
- description of operational testing procedures
- description of inspection and testing requirements
- description of the system instrumentation requirements including detection and monitoring of radiation and toxic gas conditions, and features incorporated to verify system availability in correct operating mode
- identification of COL Information Item to determine HVAC coil capacities affected by site-specific conditions
- table(s) showing key parameters (flow rates, temperature limits, humidity limits, filtration capacities/efficiencies, etc.) and features of major components
- figure(s) showing simplified P&ID of the CRAV system

FSAR Same contents as mPower Standard Plant DCD Section 9.4.1 with the following supplemental information:

- information on HVAC coil capacities affected by site-specific conditions

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Section 9.4 Outline

9.4.2 Spent Fuel Pool Area Ventilation System

PSAR The Clinch River SMR Plant spent fuel pool (SFP) area ventilation system is a nonsafety-related subsystem of the Reactor Service Building (RSB) HVAC system. The SFP area ventilation system maintains acceptable ambient conditions in the SFP area, permits personnel access, and controls radioactivity in the area during normal and off-normal operational modes when AC power is available. Specific aspects of the SFP area ventilation system are provided below:

- preliminary design bases for the SFP area ventilation system, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature and humidity limits, and filtration)
  - criteria to ensure reliability of the system (redundancy, seismic design, and missile protection features) for all modes of operation (normal, smoke, and radiation modes)
  - identification of criteria for manual or automatic actuation of system components or dampers
  - criteria for radiation monitoring and other controls essential to the system performance
  - identification of applicable General Design Criteria (GDCs)
- preliminary system description, including identification of flow paths, operating modes, and system instrumentation
- proposed safety evaluation of the SFP air treatment system, including identification of safety objectives and the manner in which the system achieves each, such as capability for the removal of contaminants by filtration, ability to detect radiation in the SFP area, ability to prevent contaminated air from leaving the spent fuel area, maintenance of acceptable zone conditions, and anticipated degradation of equipment performance if temperature limits are exceeded
- preliminary evaluation of the SFP area ventilation system's ability to function during an SBO
- proposed inspection and testing requirements
- preliminary figure(s) showing simplified P&ID for the SFP area ventilation system

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DCD The mPower standard plant SFP area ventilation system is a nonsafety-related subsystem of the RSB HVAC system. The SFP area ventilation system maintains acceptable ambient conditions in the SFP area, permits personnel access, and controls radioactivity in the area during normal and off-normal operational modes when AC power is available. Specific aspects of the SFP area ventilation system are provided below:

- design bases for the SFP area ventilation system, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature and humidity limits, and filtration)

Section 9.4 Outline

9.4.2 Spent Fuel Pool Area Ventilation System (cont.)

DCD (cont.)

- criteria to ensure reliability of the system (redundancy, seismic design, and missile protection features) for all modes of operation (normal, smoke, and radiation modes)
- identification of criteria for manual or automatic actuation of system components or dampers
- criteria for radiation monitoring and other controls essential to the system performance
- identification of applicable General Design Criteria (GDCs)

- detailed system description, including identification of major components, flow paths, key parameters, essential controls, operating modes, and requirements to re-align the system as a result of automatic actuation or operator action for all operational modes with reference to response to radiation or other actuation signals
- safety evaluation of the SFP air treatment system, including identification of safety objectives and the manner in which the system achieves each, such as capability for the removal of contaminants by filtration, ability to detect radiation in the SFP area, ability to prevent contaminated air from leaving the spent fuel area, maintenance of acceptable zone conditions, and anticipated degradation of equipment performance if temperature limits are exceeded
- evaluation of the SFP area ventilation system's ability to function during an SBO
- description of operational testing procedures
- description of inspection and testing requirements
- description of the system instrumentation requirements including radiation detection and monitoring and features incorporated to verify correct operating mode
- COL information item to determine HVAC coil capacities affected by site-specific conditions
- table(s) showing key parameters (flow rates, temperature limits, humidity limits, filtration capacities/efficiencies, etc.) and features of major components
- figure(s) showing simplified P&ID for the SFP area ventilation system

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FSAR Same contents as mPower standard plant DCD Section 9.4.2 with the following supplemental information:

- information on HVAC coil capacities affected by site-specific conditions

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Section 9.4 Outline

9.4.3 Reactor Service Building HVAC Systems

PSAR The Clinch River SMR Plant RSB HVAC systems consist of both radiological controlled area (RCA) and non-RCA subsystems, which are independent with no cross ties from any non-RCA subsystem to a RCA subsystem. The subsystems are identified as follows:

RCA HVAC Subsystems

- SFP Area (reference PSAR Section 9.4.2 for discussion)
- Radwaste Storage Building
- Decontamination Area
- Hot Machine Shop
- Chemical Calibration Lab
- Nuclear Sampling Room

Non-RCA HVAC Subsystems

- Class 1E Battery Rooms and Class 1E Switchgear Rooms
- Alternate Shutdown Area
- Diesel Generator Rooms (reference PSAR Section 9.4.7 for discussion)
- Security Area
- SSE Fire Pump Room
- Main Access Area
- Control Room Area Ventilation System (reference PSAR Section 9.4.1 for discussion)

The RSB HVAC systems are nonsafety-related, with the exception of the control room habitability system. The RSB HVAC systems are designed to provide proper environmental conditions during normal plant operations when AC power is available. Specific aspects of the systems included in the PSAR are provided below:

- preliminary design bases for the RSB HVAC systems, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature and humidity limits, and filtration)
  - criteria to ensure reliability of the system (redundancy, seismic design, and missile protection features) for all modes of operation (normal, smoke, and radiation modes)
  - identification of criteria for manual or automatic actuation of system components or dampers
  - criteria for radiation monitoring and other controls essential to the system performance
  - identification of applicable General Design Criteria (GDCs)
  - requirements to detect the need for isolation and to isolate portions of the system in the event of failures or malfunctions and the capability of the system to function under such conditions

Section 9.4 Outline

9.4.3 Reactor Service Building HVAC Systems (cont.)

PSAR (cont.)

- preliminary system description for each subsystem, including identification of flow paths, operating modes, and system instrumentation
- proposed safety evaluation of each subsystem, including a failure analysis and identification of safety objectives and the manner in which the system achieves each, such as capability for the removal of contaminants by filtration, maintenance of acceptable zone conditions, anticipated degradation of equipment performance if temperature limits are exceeded, and effects of the inability to maintain preferred airflow directions
- preliminary evaluation of the system's ability to function during an SBO
- proposed inspection and testing requirements
- reference to applicable sections in PSAR Chapters 11 and 12 that describe radiological considerations for normal operation
- preliminary figure(s) showing simplified P&ID for each subsystem

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DCD

The mPower standard plant RSB HVAC systems consist of both RCA and non-RCA subsystems, which are independent with no cross ties from any non-RCA subsystem to RCA subsystem. The subsystems are identified as follows:

RCA HVAC Subsystems

- SFP Area (reference DCD Section 9.4.2 for discussion)
- Radwaste Storage Building
- Decontamination Area
- Hot Machine Shop
- Chemical Calibration Lab
- Nuclear Sampling Room

Non-RCA HVAC Subsystems

- Class 1E Battery Rooms and Class 1E Switchgear Rooms
- Alternate Shutdown Area
- Diesel Generator Rooms (reference DCD Section 9.4.7 for discussion)
- Security Area
- SSE Fire Pump Room
- Main Access Area
- Control Room Area Ventilation System (reference DCD Section 9.4.1 for discussion)

The RSB HVAC systems are nonsafety-related, with the exception of the control room habitability system. The RSB HVAC systems are designed to provide proper environmental conditions during normal plant operations when AC power is available. Specific aspects of the systems included in the DCD are provided below:

Section 9.4 Outline

9.4.3 Reactor Service Building HVAC Systems (cont.)

DCD (cont.)

- design bases for the RSB HVAC systems, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature and humidity limits, and filtration)
  - criteria to ensure reliability of the system (redundancy, seismic design, and missile protection features) for all modes of operation (normal, smoke, and radiation modes)
  - identification of criteria for manual or automatic actuation of system components or dampers
  - criteria for radiation monitoring and other controls essential to the system performance
  - identification of applicable General Design Criteria (GDCs)
  - requirements to detect the need for isolation and to isolate portions of the system in the event of failures or malfunctions and the capability of the system to function under such conditions
- detailed system description for each subsystem, including identification of major components, flow paths, key parameters, essential controls, operating modes, and requirements to realign the system as a result of automatic actuation or operator action for all operational modes with reference to response to radiation or other actuation signals
- safety evaluation of each subsystem, including results of a failure analysis and identification of safety objectives and the manner in which the system achieves each, such as capability for the removal of contaminants by filtration, maintenance of acceptable zone conditions, anticipated degradation of equipment performance if temperature limits are exceeded, and effects of the inability to maintain preferred airflow directions
- evaluation of the system's ability to function during an SBO
- description of operational testing procedures
- description of inspection and testing requirements
- description of each subsystems' instrumentation requirements including radiation detection and monitoring and features incorporated to verify correct operating mode
- reference to applicable sections in DCD Chapters 11 and 12 that describe radiological considerations for normal operation
- COL information item to determine HVAC coil capacities affected by site-specific conditions
- table(s) showing key parameters (flow rates, temperature limits, humidity limits, filtration capacities/efficiencies, etc.) and features of major components for each subsystem
- figure(s) showing simplified P&ID for each subsystem

Section 9.4 Outline

9.4.3 Reactor Service Building HVAC Systems (cont.)

FSAR Same contents as mPower standard plant DCD Section 9.4.3 with the following supplemental information:

- information on HVAC coil capacities affected by site-specific conditions

Section 9.4 Outline

9.4.4 Turbine Building Ventilation System

PSAR The Clinch River SMR Plant turbine building ventilation system is nonsafety-related and provides heating and ventilation in the turbine building for normal operating modes when AC power is available. The turbine building ventilation system maintains building temperature within acceptable environmental conditions for personnel and equipment. Specific aspects of the system are provided below:

- preliminary design bases for the turbine building ventilation system, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature limits, and filtration)
  - criteria to ensure reliability of the system for all modes of operation (normal and smoke modes)
  - identification of criteria for manual or automatic actuation of system components or dampers
  - criteria for other controls essential to the system performance
  - identification of applicable General Design Criteria (GDCs)
- preliminary system description, including identification of flow paths, operating modes, and system instrumentation
- proposed safety evaluation, including a failure analysis that addresses the effects of the inability to maintain preferred airflow directions
- proposed inspection and testing requirements
- preliminary figure(s) showing simplified P&ID for the turbine building area ventilation system

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DCD The mPower standard plant turbine building ventilation system is nonsafety-related and provides heating and ventilation in the turbine building for normal operating modes when AC power is available. The turbine building ventilation system maintains building temperature within acceptable environmental conditions for personnel and equipment. Specific aspects of the design are provided below:

- design bases for the turbine building ventilation system, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature limits, and filtration)
  - criteria to ensure reliability of the system for all modes of operation (normal and smoke modes)
  - identification of criteria for manual or automatic actuation of system components or dampers
  - criteria for other controls essential to the system performance
  - identification of applicable General Design Criteria (GDCs)

Section 9.4 Outline

9.4.4 Turbine Building Ventilation System (cont.)

DCD (cont.)

- detailed system description, including identification of major components, flow paths, key parameters, essential controls, operating modes, and requirements to re-align the system as a result of automatic actuation or operator action for all operational modes
- safety evaluation, including results of a failure analysis that addresses the effects of the inability to maintain preferred airflow directions
- description of operational testing procedures
- description of inspection and testing requirements
- description of the system instrumentation requirements
- COL information item to determine HVAC coil capacities affected by site-specific conditions
- table(s) showing key parameters (flow rates, temperature limits, etc.) and features of major components
- figure(s) showing simplified P&ID for the turbine building area ventilation system

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FSAR Same contents as mPower standard plant DCD Section 9.4.4 with the following supplemental information:

- information on HVAC coil capacities affected by site-specific conditions

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Section 9.4 Outline

9.4.5 Engineered Safety Feature Ventilation System

PSAR For the Clinch River SMR Plant, the engineered safety feature (ESF) ventilation system functions are performed by the safety-related control room habitability system as discussed in PSAR Section 9.4.1.

DCD For the mPower standard plant, the ESF ventilation system functions are performed by the safety-related control room habitability system as discussed in DCD Section 9.4.1.

FSAR Same contents as mPower standard plant DCD Section 9.4.5.

Section 9.4 Outline

9.4.6 Containment HVAC System

PSAR The Clinch River SMR Plant containment HVAC system is a nonsafety-related system that controls air temperature and humidity within containment to provide a suitable environment for equipment operability during normal operation and shutdown when AC power is available. Specific aspects of the system included in the PSAR are provided below:

- preliminary design bases for the containment HVAC system, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature and humidity limits, and filtration)
  - criteria to ensure reliability of the system (redundancy, seismic design, and missile protection features) for all modes of operation (normal, smoke, and radiation modes)
  - identification of criteria for manual or automatic actuation of system components or dampers
  - criteria for radiation monitoring and other controls essential to the system performance
  - identification of applicable General Design Criteria (GDCs)
- preliminary system description, including identification of flow paths, operating modes, and system instrumentation
- proposed safety evaluation of the containment HVAC system, including results of a failure analysis and identification of safety objectives and the manner in which the system achieves each, such as capability for the removal of contaminants by filtration, maintenance of acceptable zone conditions, anticipated degradation of equipment performance if temperature limits are exceeded, effects of the inability to maintain preferred airflow directions, and the containment HVAC system's ability to function during an SBO
- proposed inspection and testing requirements
- reference to applicable sections in PSAR Chapters 11 and 12 that describe radiological considerations for normal operation
- preliminary figure(s) showing simplified P&ID for the containment HVAC system

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DCD The mPower standard plant containment HVAC system is a nonsafety-related system that controls air temperature and humidity within containment to provide a suitable environment for equipment operability during normal operation and shutdown when AC power is available. Specific aspects of the system included in the DCD are provided below:

- design bases for the containment HVAC system, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature and humidity limits, and filtration)

Section 9.4 Outline

9.4.6 Containment HVAC System (cont.)

DCD (cont.)

- criteria to ensure reliability of the system (redundancy, seismic design, and missile protection features) for all modes of operation (normal, smoke, and radiation modes)
- identification of criteria for manual or automatic actuation of system components or dampers
- criteria for radiation monitoring and other controls essential to the system performance
- identification of applicable General Design Criteria (GDCs)

- detailed system description, including identification of major components, flow paths, key parameters, essential controls, operating modes, and requirements to re-align the system as a result of automatic actuation or operator action for all operational modes with reference to response to radiation or other actuation signals
- safety evaluation of the containment HVAC system, including results of a failure analysis and identification of safety objectives and the manner in which the system achieves each, such as capability for the removal of contaminants by filtration, maintenance of acceptable zone conditions, anticipated degradation of equipment performance if temperature limits are exceeded, effects of the inability to maintain preferred airflow directions, and the containment HVAC system's ability to function during an SBO
- description of operational testing procedures
- description of inspection and testing requirements
- description of the system instrumentation requirements including radiation detection and monitoring and features incorporated to verify correct operating mode
- reference to applicable sections in DCD Chapters 11 and 12 that describe radiological considerations for normal operation
- COL information item to determine HVAC coil capacities affected by site-specific conditions
- table(s) showing key parameters (flow rates, temperature limits, humidity limits, filtration capacities/efficiencies, etc.) and features of major components
- figure(s) showing simplified P&ID for the containment HVAC system

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FSAR Same contents as mPower standard plant DCD Section 9.4.6 with the following supplemental information:

- information on HVAC coil capacities affected by site-specific conditions

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Section 9.4 Outline

9.4.7 Diesel Generator Room Ventilation Systems

PSAR The Clinch River SMR Plant diesel generator (DG) room ventilation systems are nonsafety-related subsystems of the RSB HVAC System. Individual DG room ventilation systems are provided for each RSB room or compartment which house standby or ancillary DG equipment. The systems provide sufficient quantities of ambient air flow to maintain acceptable operating temperatures within the generator rooms for equipment operation and reliability during all modes of DG operation. Specific aspects of the system included in the PSAR are provided below:

- preliminary design bases for the DG room ventilation systems, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature limits, and filtration)
  - criteria to ensure reliability of the system (redundancy and seismic design) for all modes of operation (normal and smoke modes)
  - identification of criteria for manual or automatic actuation of system components or dampers
  - criteria for monitoring for carbon monoxide
  - criteria for other controls essential to the system performance
  - identification of applicable General Design Criteria (GDCs)
- preliminary system descriptions, including identification of flow paths, operating modes, and system instrumentation
- proposed safety evaluation, including a failure analysis that addresses the effects of the inability to maintain preferred airflow directions
- preliminary evaluation of the DG room ventilation system's ability to function during an SBO
- proposed methods for detection and monitoring of dangerous environmental conditions (smoke, carbon monoxide, etc.)
- proposed inspection and testing requirements
- preliminary figure(s) showing simplified P&ID for the diesel generator room ventilation systems

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DCD The mPower standard plant DG room ventilation systems are nonsafety-related subsystems of the RSB HVAC System. Individual DG room ventilation systems are provided for each RSB room or compartment which house standby or ancillary DG equipment. The systems provide sufficient quantities of ambient air flow to maintain acceptable operating temperatures within the generator rooms for equipment operation and reliability during all modes of DG operation. Specific aspects of the system included in the DCD are provided below:

- design bases for the DG room ventilation systems, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature limits, and filtration)

Section 9.4 Outline

9.4.7 Diesel Generator Room Ventilation Systems (cont.)

DCD (cont.)

- criteria to ensure reliability of the system (redundancy and seismic design) for all modes of operation (normal and smoke modes)
- identification of criteria for manual or automatic actuation of system components or dampers
- criteria for monitoring for carbon monoxide
- criteria for other controls essential to the system performance
- identification of applicable General Design Criteria (GDCs)

- detailed system descriptions, including identification of major components, flow paths, key parameters, essential controls, operating modes, and requirements to re-align the system as a result of automatic actuation or operator action for all operational modes with reference to response to smoke or other actuation signals
- safety evaluation, including results of a failure analysis that addresses the effects of the inability to maintain preferred airflow directions
- evaluation of the DG room ventilation system's ability to function during an SBO
- description of operational testing procedures
- description of inspection and testing requirements
- description of the system instrumentation requirements, including detection and monitoring of radiation and carbon monoxide levels, and features incorporated to verify correct operating mode
- COL information item to determine HVAC coil capacities affected by site-specific conditions
- table(s) showing key parameters (flow rates, temperature limits, etc.) and features of major components
- figure(s) showing simplified P&ID for the diesel generator room ventilation systems

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FSAR Same contents as mPower standard plant DCD Section 9.4.7 with the following supplemental information:

- information on HVAC coil capacities affected by site-specific conditions

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Section 9.4 Outline

9.4.8 Technical Support Center HVAC System

PSAR The Clinch River SMR Plant Technical Support Center (TSC) HVAC system is a nonsafety-related system which provides a controlled environment for the comfort and safety of operations personnel during all plant modes of operation. Specific aspects of the system included in the PSAR are provided below:

- preliminary design bases for the TSC HVAC system, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature and humidity limits, and filtration)
  - criteria to ensure reliability of the system (redundancy and seismic design) for all modes of operation (normal, smoke, and radiation modes)
  - identification of criteria for manual or automatic actuation of system components or dampers
  - criteria for radiation monitoring and other controls essential to the system performance
  - identification of applicable General Design Criteria (GDCs)
- preliminary system description, including identification of flow paths, operating modes, and system instrumentation
- proposed methods for detection and monitoring of dangerous environmental conditions (smoke, radiation, toxic gases, etc.)
- proposed safety evaluation that addresses the effects of the inability to maintain preferred airflow directions
- preliminary evaluation of the TSC HVAC system's ability to function during toxic gas conditions or an SBO
- proposed inspection and testing requirements
- preliminary figure(s) showing simplified P&ID for the TSC HVAC system

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DCD DCD Section 9.4.8 identifies COL Information Items for an applicant to provide design information regarding the TSC HVAC system addressing the following aspects of the system:

- design bases for the TSC HVAC system, including:
  - criteria to ensure performance (flow rates, preferred airflow directions, pressure differential criteria, temperature and humidity limits, and filtration)
  - criteria to ensure reliability of the system (redundancy and seismic design) for all modes of operation (normal, smoke, and radiation modes)
  - identification of criteria for manual or automatic actuation of system components or dampers
  - criteria for radiation monitoring and other controls essential to the system performance
  - identification of applicable General Design Criteria (GDCs)

Section 9.4 Outline

9.4.8 Technical Support Center HVAC System (cont.)

DCD (cont.)

- system description, including identification of major components, flow paths, key parameters, essential controls, and operating modes
- description of the system instrumentation requirements including features incorporated to verify correct operating mode
- description of methods for detection and monitoring of dangerous environmental conditions (smoke, radiation, toxic gases, etc.)
- safety evaluation that addresses the effects of the inability to maintain preferred airflow directions
- evaluation of the TSC HVAC system's ability to function during toxic gas conditions or an SBO
- description of inspection and testing requirements
- table(s) showing key parameters (flow rates, temperature limits, etc.) and features of major components
- figure(s) showing simplified P&ID for the TSC HVAC system

FSAR Same contents as PSAR Section 9.4.8 with updated information as needed, based on COL Information Item identified in the DCD.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
9.5.1 Fire Protection Program	PSAR	10 CFR 50.48(a) 10 CFR 50, App. A, GDC 3, 5, 19, 23, 34, 56	No	RG 1.70 Note: RG 1.70 will be supplemented with current regulatory guidance on fire protection.	9.5.1.1	RG 1.101, 1.189 SECY 89-013 SECY 90-016 and SRM SECY 93-087 and SRM SECY 94-084 SECY 05-0197 and SRM SECY 11-0093 GL 86-10 and Supplement 1	NFPA 804 IEEE 383 (2003) IEEE 1202 (2006)	Yes - Content will be supplemented to address current regulatory guidance on fire protection	No	Exceptions from RG 1.189 and NFPA standards are anticipated based on the preliminary mPower standard plant design. Specific exceptions and a justification that necessary safe shutdown and safety functions are not adversely affected will be presented in the PSAR. Assess and apply lessons learned from the Fukushima Daiichi power station regarding fire prevention during and after earthquakes or other natural phenomena.	13.6, 19.0
	DCD	10 CFR 50.48(a) 10 CFR 50, App. A, GDC 3, 5, 19, 23, 34, 56 10 CFR 52.47(b)(1)	No	RG 1.206	9.5.1.1	RG 1.101, 1.189 SECY 89-013 SECY 90-016 and SRM SECY 93-087 and SRM SECY 94-084 SECY 05-0197 and SRM SECY 11-0093 GL 86-10 and Supplement 1	NFPA 804 IEEE 383 (2003) IEEE 1202 (2006)	N/A	N/A	Exceptions from RG 1.189 and NFPA standards are anticipated based on the final mPower standard plant design. Specific exceptions and a justification that necessary safe shutdown and safety functions are not adversely affected will be presented in the DCD. Assess and apply lessons learned from the Fukushima Daiichi power station regarding fire prevention during and after earthquakes or other natural phenomena.	13.6, 14.3, 19.0
	FSAR	10 CFR 50.48(a) 10 CFR 50, App. A, GDC 3, 5, 19, 23, 34, 56	No	RG 1.206	9.5.1.1	RG 1.101, 1.189 SECY 89-013 SECY 90-016 and SRM SECY 93-087 and SRM SECY 94-084 SECY 05-0197 and SRM SECY 11-0093 GL 86-10 and Supplement 1	NFPA 804 IEEE 383 (2003) IEEE 1202 (2006)	N/A	No	Exceptions from RG 1.189 and NFPA standards are anticipated based on the final mPower standard plant design. Specific exceptions and a justification that necessary safe shutdown and safety functions are not adversely affected will be presented in the FSAR. Assess and apply lessons learned from the Fukushima Daiichi power station regarding fire prevention during and after earthquakes or other natural phenomena.	13.6, 19.0

Note 1: RG revisions are not identified as these will be consistent with the version in effect 6 months prior to the PSAR submittal.

Section 9.5.1 Outline

9.5.1 Fire Protection Program

PSAR The Clinch River SMR Plant Fire Protection Program (FPP) provides assurance, through application of defense-in-depth, that the following objectives are satisfied: 1) prevent fires from starting, 2) rapidly detect, control and promptly extinguish those fires that do occur, and 3) provide protection for structures, systems and components (SSCs) important to safety so that a fire that is not promptly extinguished will not prevent the safe shutdown of the plant. The fire protection system is a nonsafety-related system and is shared between two units. Section 9.5.1 provides preliminary information on the following topics:

Design Basis

- overall FPP design bases for meeting 10 CFR 50.48, 10 CFR 50 Appendix A GDC 3, and the enhanced fire protection criteria for new reactors
- utilization of the defense-in-depth concept
- consequences of inadvertent operation, or a crack in, a moderate energy fire protection line
- the ability to detect and suppress fires with particular emphasis on providing passive and active measures of appropriate capability and adequate capacity for the systems necessary to achieve and maintain safe shutdown with or without offsite power
- table(s) listing codes and standards used for design, installation, acceptance testing and inspection, in-service inspection, and maintenance of the fire protection system
- implications for fire protection for multi-unit sites including the effects of fire in one unit on another, the integrity and operability of shared fire protection features, and the operation of a unit during construction of additional units

System Description

- proposed FPP provisions including the proposed Emergency Response Plan (ERP) with respect to fire protection
- building features that contribute to fire prevention and fire control, such as use of non-combustible and fire resistant materials, fire barriers, smoke, heat and flame control, combustible and explosive gas control, operating functions of the ventilating and exhaust systems, and means of egress

Section 9.5.1 Outline

9.5.1 Fire Protection Program (cont.)

PSAR (cont.)

- requirements and features of the fire water supply components, detection and alarm systems, and automatic and manual fire suppression systems, including seismic design requirements, backup suppression capabilities, power supplies, and design of floor drain, ventilation, lighting, and communication systems to the extent that they impact the FPP
- electrical cable fire resistance (IEEE 383), raceway fire barrier systems, cable and raceway penetrations in fire barriers, cable fire protection systems, including control, extinguishing, and detection methods, and fire containment
- identification of any emergency backup functions performed by the fire protection system to support operation of safe-shutdown systems and the extent that which the facility relies on the fire protection system for safe shutdown
- description of the portion of the fire protection system designed to remain functional following a safe shutdown earthquake (SSE) and provisions for isolating those portions from the rest of the system
- description of the features that prevent migration of smoke, hot gases, and fire suppressant into other fire areas, causing adverse effects on safe shutdown capabilities, including operator actions
- description of the facility's design with respect to smoke and heat control in areas important to safety
- fire protection for the control room, other safety-related areas, and Class IE cable and equipment
- table(s) listing safety and nonsafety-related mechanical and electrical equipment by fire area
- figure(s) showing simplified fire protection system piping and instrumentation diagrams (P&IDs), including fire water storage tanks, fire water pumps, fire water mains, and hydrants
- figure(s) showing locations of fire areas, zones, barriers, and pertinent details of construction

<u>Safety Evaluation</u>

- Fire Hazards Analysis (FHA) methodology and preliminary results, including fire area description, identification of SSCs important to safety in each area, combustible material survey, fire severity categorizations, in-situ and transient combustibles by area, selection and design of primary and backup fire protection features, fire protection adequacy, and fire protection system integrity

Section 9.5.1 Outline

9.5.1 Fire Protection Program (cont.)

PSAR (cont.)

- evaluation of the ability to support safe shutdown functions, and minimize radioactive release, including alternative shutdown capabilities, where required
- failure modes and effects analysis (FMEA) that demonstrates that operation of the fire protection system or fire fighting activities in areas containing engineered safety features will not produce an unsafe condition or preclude safe shutdown and the fire protection systems' ability to withstand failures
- demonstration that the standard plant design includes sufficient protection from fire, smoke, hot gases, fire suppressant, and fire-induced multiple spurious actuations to ensure that one train of safe-shutdown SSCs remains free of fire damage and that the FPP satisfies the fire protection objectives
- evaluation of the FPP against RG 1.189
- methodology, design basis, assumptions, acceptance criteria and results of the safe shutdown analysis (SSA) by defined fire area/zone, including spurious actuation and operator manual actions

Inspection and Testing Requirements

- proposed inspection, testing and installation requirements, including inspections planned during construction of the fire protection system to demonstrate system integrity

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DCD The mPower standard plant FPP provides assurance, through application of defense-in-depth, that the following objectives are satisfied: 1) prevent fires from starting, 2) rapidly detect, control and promptly extinguish those fires that do occur, and 3) provide protection for SSCs important to safety so that a fire that is not promptly extinguished will not prevent the safe shutdown of the plant. The fire protection system is a nonsafety-related system and is shared between two units. Section 9.5.1 provides detailed information on the following topics:

Design Basis

- overall FPP design bases for meeting 10 CFR 50.48, 10 CFR 50 Appendix A GDC 3, and the enhanced fire protection criteria for new reactors
- utilization of the defense-in-depth concept
- consequences of inadvertent operation, or a crack in, a moderate energy fire protection line

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Section 9.5.1 Outline

9.5.1 Fire Protection Program (cont.)

DCD (cont.)

- the ability to detect and suppress fires with particular emphasis on providing passive and active measures of appropriate capability and adequate capacity for the systems necessary to achieve and maintain safe shutdown with or without offsite power
- table(s) listing codes and standards used for design, installation, acceptance testing and inspection, in-service inspection, and maintenance of the fire protection system
- implications for fire protection for multi-unit sites including the effects of fire in one unit on another, the integrity and operability of shared fire protection features, and the operation of a unit during construction of additional units

System Description

- FPP provisions including the ERP with respect to fire protection
- building features that contribute to fire prevention and fire control, such as use of non-combustible and fire resistant materials, fire barriers, smoke, heat and flame control, combustible and explosive gas control, operating functions of the ventilating and exhaust systems, and means of egress
- requirements and features of the fire water supply components, detection and alarm systems, and automatic and manual fire suppression systems, including seismic design requirements, backup suppression capabilities, power supplies, and design of floor drain, ventilation, lighting, and communication systems to the extent that they impact the FPP
- electrical cable fire resistance (IEEE 383), raceway fire barrier systems, cable and raceway penetrations in fire barriers, cable fire protection systems, including control, extinguishing, and detection methods, and fire containment
- identification of any emergency backup functions performed by the fire protection system to support operation of safe-shutdown systems and the extent that which the facility relies on the fire protection system for safe shutdown
- description of the portion of the fire protection system designed to remain functional following an SSE and provisions for isolating those portions from the rest of the system

Section 9.5.1 Outline

9.5.1 Fire Protection Program (cont.)

DCD (cont.)

- description of the features that prevent migration of smoke, hot gases, and fire suppressant into other fire areas, causing adverse effects on safe shutdown capabilities, including operator actions
- description of the facility's design with respect to smoke and heat control in areas important to safety
- fire protection for the control room, other safety related areas, and Class IE cable and equipment
- identification of a COL Information Item for an applicant to provide the schedule for implementation of the FPP to ensure that the program is properly established and implemented in time to provide adequate fire protection prior to fueling and operation of the nuclear power plant
- table(s) listing safety and nonsafety-related mechanical and electrical equipment by fire area
- figure(s) showing simplified fire protection system P&IDs including fire water storage tanks, fire water pumps, fire water mains, and hydrants
- figure(s) showing locations of fire areas, zones, barriers, and pertinent details of construction

Safety Evaluation

- FHA methodology and results, including fire area description, identification of SSCs important to safety in each area, combustible material survey, fire severity categorizations, in-situ and transient combustibles by area, selection and design of primary and backup fire protection features, fire protection adequacy, and fire protection system integrity
- evaluation of the ability to support safe shutdown functions, and minimize radioactive release, including alternative shutdown capabilities, where required
- FMEA that demonstrates that operation of the fire protection system or fire fighting activities in areas containing engineered safety features will not produce an unsafe condition or preclude safe shutdown and the fire protection systems' ability to withstand failures
- demonstration that the standard plant design includes sufficient protection from fire, smoke, hot gases, fire suppressant, and fire-induced multiple spurious actuations to ensure that one train of safe-shutdown SSC remains free of fire damage and that the FPP satisfies the fire protection objectives
- evaluation of the FPP against RG 1.189

Section 9.5.1 Outline

9.5.1 Fire Protection Program (cont.)

DCD (cont.)

- methodology, design basis, assumptions, acceptance criteria and results of the SSA by defined fire area/zone, including spurious actuation and operator manual actions
- table(s) listing systems and components required to provide post-fire safe shutdown capability

Inspection and Testing Requirements

- inspection, testing and installation requirements, including inspections planned during construction of the fire protection system to demonstrate system integrity
- fire barrier and fire barrier penetration seal systems qualification test methodology

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FSAR Same contents as mPower standard plant DCD Section 9.5.1 with the following supplemental information, as required:

- updated FHA based on purchased materials and final equipment arrangements, including description of access for manual fire fighting based on final layouts
- updated post-fire SSA based on final plant cable routing and equipment arrangement including demonstration that purchased components required for post-fire safe shutdown are not impacted by indirect effects of fire such as smoke migration from one fire area to another
- description of the site-specific information on the fire water supply systems, components, and water quality
- evaluation of site-specific features of the FPP, including the site specific fire protection operational program, against RG 1.189
- reference to Chapter 13 for the schedule for implementation of the FPP to ensure that the program is properly established and implemented in time to provide adequate protection prior to fueling and operation of the nuclear power plant
- updated FPP inspection, testing and maintenance requirements for both startup and operation not already provided by the DCD
- updated table(s) listing applicable industry codes and standards and, if required, any deviations from the code requirements appropriately justified
- updated figure(s) showing final plant layout and site arrangement, including pertinent structural design features, if required

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Section 9.5.1 Outline

9.5.1 Fire Protection Program (cont.)

FSAR (cont.)

- updated figure(s) showing location of fire areas, zones, and barriers, if required
- updated figure(s) showing the fire protection system P&IDs, if required

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Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
10.1 Summary Description - Steam and Power Conversion System	PSAR	10 CFR 50, App. A, GDC 4	No	RG 1.70	10.2 10.3 10.4	N/A	N/A	No	No	None	10.2, 10.3, 10.4
	DCD	10 CFR 50, App. A, GDC 4	No	RG 1.206	10.2 10.3 10.4	N/A	N/A	N/A	N/A	None	10.2, 10.3, 10.4
	FSAR	10 CFR 50, App. A, GDC 4	No	RG 1.206	10.2 10.3 10.4	N/A	N/A	N/A	No	None	10.2, 10.3, 10.4
10.2 Turbine Generator	PSAR	10 CFR 50, App. A, GDC 4	No	RG 1.70	10.2 10.2.3 BTP 3-3 BTP 3-4	RG 1.68 NUREG-1275-V11	ASME Sections III, NB-2530 and NB-2540, V and XI, 2007 with 2008 Addenda ASME B31.1, 2007 ASTM E-208-95a (R2000) ASTM A-370-05	No	No	None	3.2, 3.5.1.3, 3.6, 3.9, 5.2, 7.1, 7.4, 7.5, 7.7, 9.5, 10.3, 11, 12, 14, 16, 17
	DCD	10 CFR 50, App. A, GDC 4 10 CFR 52.47(b)(1)	No	RG 1.206	10.2 10.2.3 BTP 3-3 BTP 3-4	RG 1.68 NUREG-1275-V11	ASME Sections III, NB-2530 and NB-2540, V and XI, 2007 with 2008 Addenda ASME B31.1, 2007 ASTM E-208-95a (R2000) ASTM A-370-05	N/A	N/A	None	3.2, 3.5.1.3, 3.6, 3.9, 5.2, 7.1, 7.4, 7.5, 7.7, 9.5, 10.3, 11, 12, 14, 16, 17
	FSAR	10 CFR 50, App. A, GDC 4	No	RG 1.206	10.2 10.2.3 BTP 3-3 BTP 3-4	RG 1.68 NUREG-1275-V11	ASME Sections III, NB-2530 and NB-2540, V and XI, 2007 with 2008 Addenda ASME B31.1, 2007 ASTM E-208-95a (R2000) ASTM A-370-05	N/A	No	None	3.2, 3.5.1.3, 3.6, 3.9, 5.2, 7.1, 7.4, 7.5, 7.7, 9.5, 10.3, 11, 12, 14, 16, 17
10.3 Main Steam Supply System	PSAR	10 CFR 50, App. A, GDC 1, 2, 4, 5, 34, and 35 10 CFR 50.55a 10 CFR 50.63	No	RG 1.70 Note: In addition to the content specified by RG 1.70, the PSAR will also address compliance with 10 CFR 50.63 and RG 1.155 for consistency with RG 1.206	10.3 10.3.6 BTP 5-4	RGs 1.26, 1.29, 1.31, 1.36, 1.37, 1.44, 1.50, 1.71, 1.84, 1.115, 1.117, 1.155 SECY 93-087 NUREG-0138 NUREG-1344 GL 89-08	ASME Section XI, 2007 with 2008 Addenda ASME Section II, III, and IX, 2007 with 2008 Addenda ASME B31.1, 2007 EPRI TR-1008224, Rev. 6 ANSI N45.2.1-1973 NSAC-202L-R2, 1999 NEI 03-08	Yes Section to include discussion on compliance with 10 CFR 50.63 and RG 1.155; also discussion on the flow accelerated corrosion (FAC) program	No	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.13, 5.2, 5.4, 6.2, 6.6, 6.7, 7.1, 7.4, 7.5, 7.7, 8.3, 8.4, 9.5, 10.2, 10.3, 14.2, 16, 17
	DCD	10 CFR 50, App. A, GDC 1, 2, 4, 5, 34, and 35 10 CFR 52.47(a)(1)(vi) 10 CFR 52.47(b)(1) 10 CFR 50.55a 10 CFR 50.63	No	RG 1.206	10.3 10.3.6 BTP 5-4	RGs 1.26, 1.29, 1.31, 1.36, 1.37, 1.44, 1.50, 1.71, 1.84, 1.115, 1.117, 1.155 SECY 93-087 NUREG-0138 NUREG-1344 GL 89-08	ASME Section XI, 2007 with 2008 Addenda ASME Section II, III, and IX, 2007 with 2008 Addenda ASME B31.1, 2007 EPRI TR-1008224, Rev. 6 ANSI N45.2.1-1973 NSAC-202L-R2, 1999 NEI 03-08	N/A	N/A	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.13, 5.2, 5.4, 6.2, 6.6, 6.7, 7.1, 7.4, 7.5, 7.7, 8.3, 8.4, 9.5, 10.2, 10.3, 14.2, 16, 17
	FSAR	10 CFR 50, App. A, GDC 1, 2, 4, 5, 34, and 35 10 CFR 50.55a 10 CFR 50.63	No	RG 1.206	10.3 10.3.6 BTP 5-4	RGs 1.26, 1.29, 1.31, 1.36, 1.37, 1.44, 1.50, 1.71, 1.84, 1.115, 1.117, 1.155 SECY 93-087 NUREG-0138 NUREG-1344 GL 89-08	ASME Section XI, 2007 with 2008 Addenda ASME Section II, III, and IX, 2007 with 2008 Addenda ASME B31.1, 2007 EPRI TR-1008224, Rev. 6 ANSI N45.2.1-1973 NSAC-202L-R2, 1999 NEI 03-08	N/A	No	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.13, 5.2, 5.4, 6.2, 6.6, 6.7, 7.1, 7.4, 7.5, 7.7, 8.3, 8.4, 9.5, 10.2, 10.3, 14.2, 16, 17

Note:
RG revisions are not identified as these will be consistent the versions in effect 6 months prior to the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
10.4.1 Main Condensers	PSAR	10 CFR 50, App. A, GDC 60 10 CFR 50, App. I	No	RG 1.70	10.4.1	SECY 93-087	ASME B31.1, 2007 Standards for Steam Surface Condensers, HEI - 2006	No	No	None	3.2, 3.4, 3.7, 9.3, 9.5, 11.5, 16, 17
	DCD	10 CFR 50, App. A, GDC 60 10 CFR 52.47(b)(1) 10 CFR 50, App. I	No	RG 1.206	10.4.1	SECY 93-087	ASME B31.1, 2007 Standards for Steam Surface Condensers, HEI - 2006	N/A	N/A	None	3.2, 3.4, 3.7, 9.3, 9.5, 11.5, 16, 17
	FSAR	10 CFR 50, App. A, GDC 60 10 CFR 50, App. I	No	RG 1.206	10.4.1	SECY 93-087	ASME B31.1, 2007 Standards for Steam Surface Condensers, HEI - 2006	N/A	No	None	3.2, 3.4, 3.7, 9.3, 9.5, 11.5, 16, 17
10.4.2 Main Condenser Evacuation System	PSAR	10 CFR 50, App. A, GDC 60, 64 10 CFR 50, App. I	No	RG 1.70 Note: In addition to the content specified by RG 1.70, the PSAR will also address GDCs 60 and 64, consistent with RG 1.206, as they relate to controlling and monitoring radioactive releases to the environment.	10.4.2	RG 1.26	ASME B31.1, 2007 Standards for Steam Surface Condensers, HEI - 2006	No	No	None	3.2, 11.3, 11.5, 17
	DCD	10 CFR 50, App. A, GDC 60, 64 10 CFR 50, App. I 10 CFR 52.47(b)(1)	No	RG 1.206	10.4.2	RG 1.26	ASME B31.1, 2007 Standards for Steam Surface Condensers, HEI - 2006	N/A	N/A	None	3.2, 11.3, 11.5, 17
	FSAR	10 CFR 50, App. A, GDC 60, 64 10 CFR 50, App. I	No	RG 1.206	10.4.2	RG 1.26	ASME B31.1, 2007 Standards for Steam Surface Condensers, HEI - 2006	N/A	No	None	3.2, 11.3, 11.5, 17
10.4.3 Turbine Gland Sealing System	PSAR	10 CFR 50, App. A, GDC 60, 64	No	RG 1.70 Note: In addition to the content specified by RG 1.70, the PSAR will also address GDCs 60 and 64, consistent with RG 1.206, as they relate to controlling and monitoring radioactive releases to the environment	10.4.3	RG 1.26	ASME B31.1, 2007	No	No	None	3.2, 3.6, 11.3, 11.5, 17
	DCD	10 CFR 50, App. A, GDC 60, 64 10 CFR 52.47(b)(1)	No	RG 1.206	10.4.3	RG 1.26	ASME B31.1, 2007	N/A	N/A	None	3.2, 3.6, 11.3, 11.5, 17
	FSAR	10 CFR 50, App. A, GDC 60, 64	No	RG 1.206	10.4.3	RG 1.26	ASME B31.1, 2007	N/A	No	None	3.2, 3.6, 11.3, 11.5, 17
10.4.4 Turbine Bypass System	PSAR	10 CFR 50, App. A, GDC 4, 34	No	RG 1.70 Note: In addition to the content specified by RG 1.70, the PSAR will also address GDCs 4 and 34, consistent with RG 1.206, as they relate to the integrity of safety-related components and RHR, and the extent of conformance to RG 1.68 and BTP 3-3	10.4.4 BTP 10-2 BTP 3-3 BTP 3-4	RG 1.68 SECY 93-087	ASME B31.1, 2007	No	No	None	3.2, 3.6, 4.4, 9.5, 14.2, 16, 17
	DCD	10 CFR 50, App. A, GDC 4, 34 10 CFR 52.47(b)(1)	No	RG 1.206	10.4.4 BTP 10-2 BTP 3-3 BTP 3-4	RG 1.68 SECY 93-087	ASME B31.1, 2007	N/A	N/A	None	3.2, 3.6, 4.4, 9.5, 14.2, 16, 17
	FSAR	10 CFR 50, App. A, GDC 4, 34	No	RG 1.206	10.4.4 BTP 10-2 BTP 3-3 BTP 3-4	RG 1.68 SECY 93-087	ASME B31.1, 2007	N/A	No	None	3.2, 3.6, 4.4, 9.5, 14.2, 16, 17

Note:
RG revisions are not identified as these will be consistent the versions in effect 6 months prior to the PSAR submittal.

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Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
10.4.5 Circulating Water System	PSAR	10 CFR 50, App. A, GDC 4	No	RG 1.70 Note: In addition to the content specified by RG 1.70, the PSAR will also address GDC 4, consistent with RG 1.206, relating to provisions implemented to accommodate the effects of water discharge from a failure of a pipe or component	10.4.5	N/A	ASME B31.1, 2007 AWWA C301-2007 AWWA C950-2007	No	Yes	None	2.4, 3.2, 3.4, 3.6, 7.1, 7.6, 8.3
	DCD	10 CFR 50, App. A, GDC 4 10 CFR 52.47(b)(1)	No	RG 1.206	10.4.5	N/A	ASME B31.1, 2007 AWWA C301-2007 AWWA C950-2007	N/A	N/A	None	2.4, 3.2, 3.4, 3.6, 7.1, 7.6, 8.3
	FSAR	10 CFR 50, App. A, GDC 4	No	RG 1.206	10.4.5	N/A	ASME B31.1, 2007 AWWA C301-2007 AWWA C950-2007	N/A	Yes	None	2.4, 3.2, 3.4, 3.6, 7.1, 7.6, 8.3
10.4.6 Condensate Cleanup System	PSAR	10 CFR 50, App. A, GDC 14	No	RG 1.70	10.4.6	N/A	ASME B31.1, 2007 EPRI TR-1008224, Revision 6	No	No	None	3.6, 10.4, 11.2, 11.3, 11.4, 12.2, 16
	DCD	10 CFR 50, App. A, GDC 14 10 CFR 52.47(b)(1)	No	RG 1.206	10.4.6	N/A	ASME B31.1, 2007 EPRI TR-1008224, Revision 6	N/A	N/A	None	3.6, 10.4, 11.2, 11.3, 11.4, 12.2, 16
	FSAR	10 CFR 50, App. A, GDC 14	No	RG 1.206	10.4.6	N/A	ASME B31.1, 2007 EPRI TR-1008224, Revision 6	N/A	No	None	3.6, 10.4, 11.2, 11.3, 11.4, 12.2, 16
10.4.7 Condensate and Feedwater System	PSAR	10 CFR 50, App. A, GDC 2, 4, 5, 44, 45, 46	No	RG 1.70	10.4.7 BTP 10-2	RG 1.29 GL 89-08 NUREG-0927	ASME B31.1, 2007 ASME Section III and XI, 2007 with 2008 Addenda EPRI NP-3944	No	No	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 6.6, 7.7, 8.3, 9.5, 10.3, 10.4, 15.1, 15.2, 16, 17
	DCD	10 CFR 50, App. A, GDC 2, 4, 5, 44, 45, 46 10 CFR 52.47(b)(1)	No	RG 1.206	10.4.7 BTP 10-2	RG 1.29 GL 89-08 NUREG-0927	ASME B31.1, 2007 ASME Section III and XI, 2007 with 2008 Addenda EPRI NP-3944	N/A	N/A	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 6.6, 7.7, 8.3, 9.5, 10.3, 10.4, 15.1, 15.2, 16, 17
	FSAR	10 CFR 50, App. A, GDC 2, 4, 5, 44, 45, 46	No	RG 1.206	10.4.7 BTP 10-2	RG 1.29 GL 89-08 NUREG-0927	ASME B31.1, 2007 ASME Section III and XI, 2007 with 2008 Addenda EPRI NP-3944	N/A	No	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 6.6, 7.7, 8.3, 9.5, 10.3, 10.4, 15.1, 15.2, 16, 17
10.4.8 Steam Generator Blowdown System	PSAR	10 CFR 50, App. A, GDC 1, 2, 13, 14 10 CFR 50.34	No	RG 1.70	10.4.8 BTP 5-3	RGs 1.26, 1.29, 1.143 NUREG-0737	ASME B31.1, 2007 ASME Section III and XI, 2007 with 2008 Addenda EPRI TR-1008224, Rev. 6	No	No	None	3.2, 3.3, 3.5, 3.6, 3.7, 3.8, 6.2, 9.3, 10.3, 11.2, 11.3, 11.4, 11.5, 16, 17
	DCD	10 CFR 50, App. A, GDC 1, 2, 13, 14 10 CFR 50.34 10 CFR 52.47(b)(1)	No	RG 1.206	10.4.8 BTP 5-3	RGs 1.26, 1.29, 1.143 NUREG-0737	ASME B31.1, 2007 ASME Section III and XI, 2007 with 2008 Addenda EPRI TR-1008224, Rev. 6	N/A	N/A	None	3.2, 3.3, 3.5, 3.6, 3.7, 3.8, 6.2, 9.3, 10.3, 11.2, 11.3, 11.4, 11.5, 16, 17
	FSAR	10 CFR 50, App. A, GDC 1, 2, 13, 14 10 CFR 50.34	No	RG 1.206	10.4.8 BTP 5-3	RGs 1.26, 1.29, 1.143 NUREG-0737	ASME B31.1, 2007 ASME Section III and XI, 2007 with 2008 Addenda EPRI TR-1008224, Rev. 6	N/A	No	None	3.2, 3.3, 3.5, 3.6, 3.7, 3.8, 6.2, 9.3, 10.3, 11.2, 11.3, 11.4, 11.5, 16, 17

Note:
RG revisions are not identified as these will be consistent the versions in effect 6 months prior to the PSAR submittal.

Clinch River Regulatory Framework Document
NRC Version

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
10.4.9 Auxiliary Condenser System	PSAR	10 CFR 50, App. A, GDC 2, 4, 5, 17, 34, 44, 45, 46, 60 10 CFR 50.34(f) 10 CFR 50.62 10 CFR 50.63	No	1.206	10.4.9 BTP 5-1 BTP 5-4	RGs 1.29, 1.59, 1.62, 1.76, 1.102, 1.117, 1.155 NUREG-0611 NUREG-0635 NUREG/CR-2300 NUREG/CR-2815	ASME B31.1, 2007 ASME Section III and XI, 2007 with 2008 Addenda	No	No	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 6.1, 6.6, 7.1, 7.3, 7.5, 7.8, 8.3, 9.5, 15.8, 16, 17
	DCD	10 CFR 50, App. A, GDC 2, 4, 5, 17, 34, 44, 45, 46, 60 10 CFR 50.34(f) 10 CFR 50.62 10 CFR 50.63 10 CFR 52.47(b)(1)	No	1.206	10.4.9 BTP 5-1 BTP 5-4	RGs 1.29, 1.59, 1.62, 1.76, 1.102, 1.117, 1.155 NUREG-0611 NUREG-0635 NUREG/CR-2300 NUREG/CR-2815	ASME B31.1, 2007 ASME Section III and XI, 2007 with 2008 Addenda	N/A	N/A	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 6.1, 6.6, 7.1, 7.3, 7.5, 7.8, 8.3, 9.5, 15.8, 16, 17
	FSAR	10 CFR 50, App. A, GDC 2, 4, 5, 17, 34, 44, 45, 46, 60 10 CFR 50.34(f) 10 CFR 50.62 10 CFR 50.63	No	1.206	10.4.9 BTP 5-1 BTP 5-4	RGs 1.29, 1.59, 1.62, 1.76, 1.102, 1.117, 1.155 NUREG-0611 NUREG-0635 NUREG/CR-2300 NUREG/CR-2815	ASME B31.1, 2007 ASME Section III and XI, 2007 with 2008 Addenda	N/A	No	None	3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 6.1, 6.6, 7.1, 7.3, 7.5, 7.8, 8.3, 9.5, 15.8, 16, 17
10.4.10 Auxiliary Steam Supply System	PSAR	10 CFR 50, App. A, GDC 1, 2, 4	No	Note: The section contents are consistent with the general guidelines of RG 1.70, Section 10.4 based on the specific system function	10.3	RGs 1.26, 1.29	ASME B31.1-2007	No	No	None	3.2, 3.3
	DCD	10 CFR 50, App. A, GDC 1, 2, 4 10 CFR 52.47(b)(1)	No	Note: The section contents are consistent with the general guidelines of RG 1.206, Section 10.4 based on the specific system function	10.3	RGs 1.26, 1.29	ASME B31.1-2007	N/A	N/A	None	3.2, 3.3
	FSAR	10 CFR 50, App. A, GDC 1, 2, 4	No	Note: The section contents are consistent with the general guidelines of RG 1.206, Section 10.4 based on the specific system function	10.3	RGs 1.26, 1.29	ASME B31.1-2007	N/A	No	None	3.2, 3.3
10.4.11 Condensate and Feedwater Chemistry Control	PSAR	10 CFR 50, App. A, GDC 2, 4, 5	No	Note: The section contents are consistent with the general guidelines of RG 1.70, Section 10.4 based on the specific system function	10.4.7	RGs 1.26, 1.29	EPRI TR-1008224, Rev. 6	No	No	None	3.2, 3.3, 3.11, 10.4.7
	DCD	10 CFR 50, App. A, GDC 2, 4, 5 10 CFR 52.47(b)(1)	No	Note: The section contents are consistent with the general guidelines of RG 1.206, Section 10.4 based on the specific system function	10.4.7	RGs 1.26, 1.29	EPRI TR-1008224, Rev. 6	N/A	N/A	None	3.2, 3.3, 3.11, 10.4.7
	FSAR	10 CFR 50, App. A, GDC 2, 4, 5	No	Note: The section contents are consistent with the general guidelines of RG 1.206, Section 10.4 based on the specific system function	10.4.7	RGs 1.26, 1.29	EPRI TR-1008224, Rev. 6	N/A	No	None	3.2, 3.3, 3.11, 10.4.7

Note:
RG revisions are not identified as these will be consistent the versions in effect 6 months prior to the PSAR submittal.

Chapter 10 Outline

10.1 Summary Description – Steam and Power Conversion System

PSAR The Clinch River SMR Plant steam and power conversion system is made up of multiple individual steam, water, and power generation systems which work together to convert thermal energy into electric power. A summary level description of the steam and power conversion system is described in PSAR Section 10.1. Specific aspects of the steam and power conversion system included in the PSAR are provided below:

- preliminary description of the steam cycle and principle design features
- preliminary description of the system design features that are safety related
- preliminary figure(s) depicting the simplified piping and instrumentation diagram (P&ID) of the steam cycle
- preliminary heat balance diagram(s) showing anticipated cycle design and performance parameters at rated and stretch power modes of operation

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DCD The mPower standard plant steam and power conversion system is made up of multiple individual steam, water, and power generation systems which work together to convert thermal energy into electric power. A summary level description of the steam and power conversion system is described in DCD Section 10.1. Specific aspects of the design included in the DCD are provided below:

- description of the steam cycle and principle design features
- figure(s) depicting the simplified P&ID of the steam cycle
- heat balance diagram(s) showing cycle design and performance parameters at rated and stretch power modes of operation
- diagram(s) listing those system design features that are safety related

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FSAR Same contents as mPower standard plant DCD Section 10.1.

Chapter 10 Outline

10.2 Turbine Generator

PSAR The Clinch River SMR Plant turbine generator system functions to convert thermal energy into electric power. PSAR Section 10.2 provides a description and preliminary design basis for the turbine generator system and turbine rotor integrity. Analysis of the turbine rotor integrity provides assurance that the failure of a turbine disk or rotor will not produce a high-energy missile that could adversely impact safety related equipment. Specific aspects of the turbine generator and rotor integrity included in the PSAR are provided below:

- preliminary description of the turbine generator equipment including moisture separator reheater (MSR), use of extraction steam, and control functions that could influence operation of the reactor coolant system (RCS)
- preliminary turbine generator system design bases, including performance requirements under normal, upset, emergency and faulted conditions, intended modes of operation (base loaded or load following), functional limitations imposed by the design or operating characteristics of the RCS, and applicable design codes
- preliminary evaluation of anticipated operational radioactive contaminant concentrations in the turbine generator and associated equipment, including shielding requirements and extent of access control
- preliminary description of the turbine generator overspeed control system
- preliminary description of proposed materials specifications, fabrication history, and chemical analysis of the turbine generator rotor disk and rotor forgings (including mechanical properties and listing of the methods used to obtain these properties) to demonstrate disk and rotor integrity.
- preliminary description of the criteria utilized to ensure protection against brittle failure of the turbine generator rotor including stress-rupture properties of the high-pressure rotor material, and description of the methods proposed to confirm them
- preliminary turbine generator rotor tangential stresses due to centrifugal loads and the maximum tangential and radial stresses and their locations
- proposed pre-service inspection and testing procedures and acceptance criteria for the turbine generator rotor assembly
- proposed pre-operational and startup testing for the turbine generator and associated equipment
- proposed in-service inspection program for the turbine generator assembly
- preliminary figure(s) showing the layout of the turbine generator system with respect to essential safety-related structures, systems, and components (SSCs)
- preliminary figure(s) showing the simplified P&ID for the turbine generator system

Chapter 10 Outline

10.2 Turbine Generator (cont.)

DCD The mPower standard plant turbine generator system functions to convert thermal energy into electric power. DCD Section 10.2 provides a description and design basis for the turbine generator system and turbine rotor integrity. Analysis of the turbine rotor integrity provides assurance that the failure of a turbine disk or rotor will not produce a high-energy missile that could adversely impact safety related equipment. Specific aspects of the turbine generator and rotor integrity included in the DCD are provided below:

- description of turbine-generator equipment including MSR, extraction, over-speed protection, steam seals, lube oil and hydraulic control systems
- turbine generator system design bases, including performance requirements under normal, upset, emergency and faulted conditions, intended modes of operation (base loaded or load following), functional limitations imposed by the design or operating characteristics of the RCS, and applicable design codes
- description of seismic design criteria and bases for the chosen criteria, along with seismic and quality group classifications for the turbine generator system
- evaluation of operational radioactive contaminant concentrations in the turbine generator system, including identification of shielding requirements and extent of access control
- description of the turbine generator control and overspeed system, including redundancy and diversity of controls, type(s) of controls utilized, overspeed setpoints, required valve actions for each setpoint, how the system precludes an unsafe rotor speed, and how the system functions in conjunction with support systems
- description of portions of safety related systems located close to the turbine generator system and how layout is compliant with GDC 4 (if necessary)
- description of the turbine generator rotor and disk material selection process (materials specifications, chemical analysis, fabrication history and techniques, etc.) and methods of obtaining these properties to demonstrate disk and rotor integrity.
- description of the criteria utilized to ensure protection against brittle failure of the turbine generator rotor including the turbine rotor materials' fracture toughness properties, including ductile-brittle transition temperatures and minimum operating temperatures, and Charpy V-notch test programs
- description of the turbine generator rotor pre-service inspection and testing procedures and acceptance criteria
- description of the turbine generator system pre-operational and startup testing
- description for how the turbine rotor assembly is designed to withstand various conditions and transients (including design overspeed conditions, allowable stresses, maximum tangential and radial stresses, and temperature distributions in the rotor)

Chapter 10 Outline

10.2 Turbine Generator (cont.)

DCD (cont.)

- description of the in-service inspection program for the turbine generator assembly and associated equipment (including main steam stop and control valves, turbine generator rotor assembly, etc.)
- description of main steam stop valves, control valves, reheat stop control valves, intercept, and extraction steam valves with respect to types, locations, and closure times
- figure(s) showing turbine generator rotor features
- figure(s) showing the layout of the turbine generator system with respect to essential SSCs
- figure(s) showing the simplified P&ID for the turbine generator system

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FSAR Same contents as mPower standard plant DCD Section 10.2.

Chapter 10 Outline

10.3 Main Steam Supply System

PSAR The Clinch River SMR Plant main steam supply system (MSSS) is a nonsafety-related system with the exception of the safety-related containment and steam generator isolation function which receives steam from the outlet of the steam generator and supplies the turbine generator with high-pressure steam over a range of flows and pressures. PSAR Section 10.3 provides a description of the MSSS. Specific aspects of the system included in the PSAR are provided below:

- preliminary design bases, including performance requirements, environmental considerations, and applicable design codes
- preliminary description of the main steam piping design features, including ability to perform functional testing of components important to safety, ensure the ability of essential portions of the MSSS to function following a design basis accident (DBA), minimization of the potential for steam hammer or relief valve discharge loads, capability to bypass the turbine generator, provision for overpressure protection, and containment isolation
- preliminary evaluation of the system piping, including analysis of the ability to withstand limiting environmental and accident conditions
- proposed pre-operational and in-service inspection and testing requirements and acceptance criteria
- proposed steam generator secondary side water chemistry program, including methods of treatment and methods to monitor and control chemistry
- proposed seismic design criteria and the bases for the selected criteria
- preliminary description of steam and feedwater materials used for ASME Code Section III, Class 2 and 3 components and how the regulatory requirements of 10 CFR 50.55a are satisfied, as well as the fracture toughness per Articles NC-2300, and ND-2300 of ASME Section III
- preliminary indication of the degree of compliance with test methods and acceptance criteria of the ASME Code Section III for all Class 2 and 3 components used in the steam and feedwater piping systems, to include:
    - for material not included in App. I to Section II of the ASME Code provide data called for under Appendix IV for approved new materials
    - for austenitic stainless steel components, provide the degree to which RG 1.44, 1.36, and 1.31 are followed
    - information on the cleaning and handling of Class 2, and 3 components
    - whether preheat temperatures used for welding low-alloy steel are in accordance with RG 1.50
    - degree to which RG 1.71 is followed for applicable components
    - non-destructive examination (NDE) procedures used for tubular products
- preliminary description of methods of compliance with 10 CFR 50.63 and RG 1.155
- preliminary figure(s) showing the MSSS simplified P&ID

Chapter 10 Outline

10.3 Main Steam Supply System (cont.)

DCD The mPower standard plant main steam supply system (MSSS) is a nonsafety-related system with the exception of the safety-related containment isolation function which receives steam from the outlet of the steam generators and supplies the turbine generator with high-pressure steam over a range of flows and pressures. DCD Section 10.3 provides a description of the MSSS. Specific aspects of the system included in the DCD are provided below:

- description of design bases, including performance requirements, environmental considerations, and applicable design codes
- description of the main steam piping design features, including ability to perform functional testing of components important to safety, ensure the ability of essential portions of the MSSS to function following a DBA, minimization of the potential for water hammer or relief valve discharge loads, capability to bypass the turbine generator, and provision for overpressure protection, and containment isolation
- description of MSSS piping system evaluation, including analysis of the ability to withstand limiting environmental and accident conditions (loss of offsite power, pipe breaks, etc.)
- description of pre-operational and in-service inspection and testing requirements and acceptance criteria of the MSSS
- describe the steam generator secondary side water chemistry program, including treatment methods, specification limits, and methods for monitoring and controlling water chemistry
- provide seismic design criteria and the bases for the selected criteria
- description of steam and feedwater materials used for ASME Code Section III, Class 2 and 3 components and how the regulatory requirements of 10 CFR 50.55a are satisfied, as well as the fracture toughness per Articles NC-2300, and ND-2300 of ASME Section III
- description of the degree of compliance with the test methods and acceptance criteria of the ASME Code Section III, Class 2 and 3 components, including the following information on materials selection:
    - extent of conformance with the guidance in RG 1.36 or 1.44 for austenitic stainless steel components
    - cleaning and handling for all class 2 and 3 components
    - indicate whether the preheat temperatures used for welding low-alloy steel and in accordance with RG 1.50
    - qualification procedures and acceptance criteria for tubular products
    - a plant specific pre-service inspection (ISI) and ISI program
    - measure to ensure cast austenitic stainless steel materials can be adequately inspected by volumetric methods, as required by ISI program

Chapter 10 Outline

10.3 Main Steam Supply System (cont.)

DCD (cont.)

- description of the design features implemented to mitigate flow-accelerated corrosion (FAC), including the degree of incorporation of the recommendations in EPRI NSAC-202L-R2 and use of FAC resistant materials
- figure(s) showing the MSSS simplified P&ID
- table(s) identifying the secondary side water chemistry specification limits

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FSAR Same contents as mPower standard plant DCD Section 10.3 with the following supplemental information:

- description of a FAC monitoring program for the carbon steel portions of the MSSS that contain water or wet steam

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Chapter 10 Outline

10.4.1 Main Condensers

PSAR The Clinch River SMR Plant main condenser is a nonsafety-related component within the condensate system and functions along with the circulating water system (coolant water) as the steam cycle heat sink. The main condenser receives and condenses exhaust steam from the main turbine, the turbine bypass system, and drains from the feedwater heaters during start-up, shut-down, and normal modes of operation. PSAR Section 10.4.1 provides a description of the main condenser. Specific aspects of the system included in the PSAR are provided below:

- preliminary design basis, including performance requirements, materials of construction, and methods to reduce corrosion and erosion
- preliminary description of the main condenser, including functionality within the condensate system and interfaces with related systems (circulating water, main steam, etc.)
- proposed pre-operational and in-service inspection and testing requirements and acceptance criteria
- preliminary description of instrumentation associated with the main condenser
- preliminary safety evaluation, to include the following topics:
    - anticipated inventory of radioactive contaminants during power operation and shutdown
    - anticipated air leakage limits
    - identification of control functions that could influence operation of primary reactor coolant or secondary systems and potential for hydrogen buildup
    - identification of provisions for protection of safety-related equipment from flooding in the event of condenser failure
    - identification of methods used to detect leakage of cooling water into the condensate
    - anticipated contaminant concentrations allowed in the condensate
    - proposed procedure to repair condenser (tube) leaks
    - anticipated length of time the condenser may operate with degraded conditions without affecting condensate/feedwater quality for safe operation

Chapter 10 Outline

10.4.1 Main Condensers (cont.)

DCD The mPower standard plant main condenser is a nonsafety-related component within the condensate system and functions along with the circulating water system (coolant water) as the steam cycle heat sink. The main condenser receives and condenses exhaust steam from the main turbine, the turbine bypass system, and drains from the feedwater heaters during start-up, shut-down, and normal modes of operation. DCD Section 10.4.1 provides a description of the main condenser. Specific aspects of the system included in the DCD are provided below:

- description of design basis, including performance requirements, materials of construction, methods to reduce corrosion and erosion, and applicable design codes
- description of the main condenser, including functionality within the condensate system and interfaces with related systems (circulating water, main steam, etc.)
- description of pre-operational and in-service inspection and testing requirements and acceptance criteria
- description of instrumentation associated with the main condenser, including provisions to detect loss of vacuum and to effect isolation of the steam source
- description of seismic design criteria and bases for the chosen criteria, along with seismic and quality group classifications for the main condenser
- safety evaluation, to include the following topics:
    - anticipated inventory of radioactive contaminants during power operation and shutdown
    - air leakage limits
    - identification of control functions that could influence operation of primary reactor coolant or secondary systems and potential for hydrogen buildup
    - identification of provisions for protection of safety-related equipment from flooding in the event of condenser failure
    - identification of methods used to detect leakage of cooling water into the condensate
    - potential for hydrogen buildup
    - anticipated contaminant concentrations allowed in the condensate
    - proposed procedure to repair condenser (tube) leaks
    - anticipated length of time the condenser may operate with degraded conditions without affecting condensate/feedwater quality for safe operation
    - description of methods used to preclude accidental releases of radioactive material and to detect radioactive leakage into the system

Chapter 10 Outline

10.4.1 Main Condensers (cont.)

DCD (cont.)

- description of how the plant meets the regulatory requirements of GDC 60, and demonstrate conformance with guidelines of RG 1.68

- figure(s) showing the layout of the main condenser
- figure(s) showing the simplified P&ID for the main condenser (condensate system, interfaces with main steam, circulating water, etc.)
- figure(s) showing the process flow diagram for the main condenser (condensate system, interfaces with main steam, circulating water, etc.)

FSAR Same contents as mPower standard plant DCD Section 10.4.1.

Chapter 10 Outline

10.4.2 Main Condenser Evacuation System

PSAR The Clinch River SMR Plant main condenser evacuation system is a nonsafety-related sub-system within the condensate system which removes non-condensable gases and air from the main condenser during plant start-up, shut-down, and normal operating modes. Vacuum pumps are provided for this function. PSAR Section 10.4.2 provides a description of the main condenser evacuation system. Specific aspects of the system included in the PSAR are provided below:

- preliminary design basis, including performance requirements for start-up and normal operation
- preliminary description of the main condenser evacuation system, including modes of operation, type, capacity, method of operation, and anticipated release rate of radioactive materials
- proposed pre-operational and in-service inspection and testing requirements and acceptance criteria
- preliminary description of instrumentation associated with the main condenser evacuation system
- preliminary safety evaluation, to include the following topics:
  - evaluation of the capability to limit or control release of radioactivity to the environment
  - identification of design features that preclude the existence of explosive materials
  - identification of control functions that could influence operation of the reactor coolant system

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DCD The mPower standard plant main condenser evacuation system is a nonsafety-related sub-system within the condensate system which removes non-condensable gases and air from the main condenser during plant start-up, shut-down, and normal operating modes. Vacuum pumps are provided for this function. DCD Section 10.4.2 provides a description of the main condenser evacuation system. Specific aspects of the system included in the DCD are provided below:

- description of design basis, including performance requirements for start-up and normal operation and applicable design codes
- description of the main condenser evacuation system, including design objectives, modes of operation, type, capacity, method of operation, factors that influence gaseous radioactive material handling, and anticipated release rate of radioactive materials
- description of pre-operational and in-service inspection and testing requirements and acceptance criteria

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Chapter 10 Outline

10.4.2 Main Condenser Evacuation System (cont.)

DCD (cont.)

- description of instrumentation associated with the main condenser evacuation system, including provisions to detect explosive gas mixtures and to monitor radioactive materials in gaseous effluents from the system
- description of seismic design criteria and bases for the chosen criteria, along with seismic and quality group classifications for the main condenser
- safety evaluation, to include the following topics:
  - capability to limit or control release of radioactivity to the environment
  - identification of control functions that could influence operation of the reactor coolant system
  - identification of design features that preclude the existence of explosive materials
  - description of how the plant meets the regulatory requirements of GDC 60 and 64, and demonstrate compliance with 10 CFR 50.55a and conformance to RG 1.26
- figure(s) showing the layout of the main condenser evacuation system
- figure(s) showing the simplified P&ID for the main condenser evacuation system
- figure(s) showing the process flow diagram for the main condenser evacuation system

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FSAR Same contents as mPower standard plant DCD Section 10.4.2.

Chapter 10 Outline

10.4.3 Turbine Gland Sealing System

PSAR The Clinch River SMR Plant turbine gland sealing system is a nonsafety-related sub-system within the turbine system which prevents air leakage into and steam leakage out of the steam turbine generator casings during all operational modes of the turbine generator (warm-up, start-up, normal operation, shut-down/hot stand-by). PSAR Section 10.4.3 provides a description of the turbine gland sealing system. Specific aspects of the system included in the PSAR are provided below:

- preliminary design basis, including performance requirements for start-up and normal operation
- preliminary description of the turbine gland sealing system, including identification of the sources of non-contaminated steam
- proposed pre-operational and in-service inspection and testing requirements and acceptance criteria
- preliminary description of instrumentation associated with the turbine gland sealing system, including the means to monitor system performance
- preliminary safety evaluation, to include the identification of potential pathways for radioactivity leakage to the environment in the event of a system malfunction

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DCD The mPower standard plant turbine gland sealing system is a nonsafety-related sub-system within the turbine system which prevents air leakage into and steam leakage out of the steam turbine generator casings during all operational modes of the turbine generator (warm-up, start-up, normal operation, shut-down/hot stand-by. DCD Section 10.4.3 provides a description of the turbine gland sealing system. Specific aspects of the system included in the DCD are provided below:

- description of design basis, including performance requirements for start-up and normal operation, and applicable design codes
- description of the turbine gland sealing system, including design objectives, modes of operation, identification of the sources of non-contaminated steam, method of operation, and factors that influence gaseous radioactive material handling such as sources of sealing steam, interfaces with other systems, and potential leakage paths
- description of pre-operational and in-service inspection and testing requirements and acceptance criteria
- description of instrumentation associated with the turbine gland sealing system, including means to control and monitor system performance and radioactive materials in gaseous effluents from the seal condenser vent
- description of seismic design criteria and bases for the chosen criteria, along with seismic and quality group classifications for the gland sealing system

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Chapter 10 Outline

10.4.3 Turbine Gland Sealing System (cont.)

DCD (cont.)

- safety evaluation, to include the following topics:
  - potential for radioactivity leakage to the environment in the event of a system malfunction
  - description of how the plant meets the regulatory requirements of GDC 60 and 64, and demonstrate conformance to RG 1.26
- figure(s) showing the layout of the turbine gland sealing system
- figure(s) showing the simplified P&ID for the turbine gland sealing system
- figure(s) showing the process flow diagram for the turbine gland sealing system

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FSAR Same contents as mPower standard plant DCD Section 10.4.3.

Chapter 10 Outline

10.4.4 Turbine Bypass System

PSAR The Clinch River SMR Plant turbine bypass system is a nonsafety-related subsystem within the MSSS which provides the capability to bypass main steam from the steam generator to the main condenser in a controlled manner to dissipate heat and to minimize transient effects on the RCS during various operating conditions. PSAR Section 10.4.4 provides a description of the turbine bypass system. Specific aspects of the system included in the PSAR are provided below:

- preliminary design basis, including performance requirements for all modes of operation, capability to meet design criteria, applicable design codes, and environmental criteria
- preliminary description of the turbine bypass system
- proposed pre-operational and in-service inspection and testing requirements and acceptance criteria
- preliminary description of instrumentation associated with the turbine bypass system
- preliminary safety evaluation, to include a failure analysis to determine the effect of equipment malfunctions on the RCS

DCD The mPower standard plant turbine bypass system is a nonsafety-related subsystem within the MSSS which provides the capability to bypass main steam from the steam generator to the main condenser in a controlled manner to dissipate heat and to minimize transient effects on the RCS during various operating conditions. DCD Section 10.4.4 provides a description of the turbine bypass system. Specific aspects of the system are provided below:

- description of design basis, including performance requirements for all modes of operation, capability to meet design criteria, applicable design codes, and environmental criteria
- description of the turbine bypass system, including design objectives, modes of operation, and interfaces with other systems
- description of pre-operational and in-service inspection and testing requirements and acceptance criteria
- description of instrumentation associated with the turbine bypass system
- description of seismic design criteria and bases for the chosen criteria, along with seismic and quality group classifications

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Chapter 10 Outline

10.4.4 Turbine Bypass System (cont.)

DCD (cont.)

- safety evaluation, to include the following topics:
  - failure analysis to determine the effect of equipment malfunctions on the RCS
  - description of how the plant meets the regulatory requirements of GDC 4 and 34, and indicate the extent of conformance to RG 1.68, BTP 3-3, and BTP 3-4
- figure(s) showing the layout of the turbine bypass system
- figure(s) showing the simplified P&ID for the turbine bypass system
- figure(s) showing the process flow diagram for the turbine bypass system

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FSAR Same contents as mPower standard plant DCD Section 10.4.4.

Chapter 10 Outline

10.4.5 Circulating Water System

PSAR The Clinch River SMR Plant circulating water system is a nonsafety-related system which provides cooling water to the main condenser in order to condense the steam turbine generator exhaust and remove heat from the power cycle under varying conditions of power plant operation and site environmental conditions. PSAR Section 10.4.5 provides a description of the circulating water system. Specific aspects of the system included in the PSAR are provided below:

- preliminary design basis, including performance requirements for all modes of operation
- preliminary description of the circulating water system, including interfaces with other systems and methods for control of the circulating water chemistry, corrosion, and organic fouling
- proposed pre-operational and in-service inspection and testing requirements and acceptance criteria
- preliminary description of instrumentation associated with the circulating water system
- preliminary safety evaluation, to include the following topics:
  - level of dependence on the circulating water system for cooling during shutdown
  - impacts from environmental influences
  - impact from anticipated operational occurrences and accidents
  - potential interaction of cooling towers with the plant structure
  - potential for flooding safety-related equipment due to system or piping component failure
- preliminary figure(s) showing the layout of the circulating water system
- preliminary figure(s) showing the simplified P&ID of the circulating water system

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DCD The mPower standard plant circulating water system is a nonsafety-related system which provides cooling water to the main condenser in order to condense the steam turbine generator exhaust and remove heat from the power cycle under varying conditions of power plant operation and site environmental conditions. DCD Section 10.4.5 provides a description of the circulating water system. Specific aspects of the system included in the DCD are provided below:

- description of design basis, including performance requirements for all modes of operation and applicable design codes
- description of the circulating water system, including modes of operation and interfaces with other systems

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Chapter 10 Outline

10.4.5 Circulating Water System (cont.)

DCD (cont.)

- discuss the methods used to control circulating water system chemistry, corrosion, and organic fouling and their compatibility with the system materials
- description of pre-operational and in-service inspection and testing requirements and acceptance criteria
- description of instrumentation associated with the circulating water system, including capability to detect and control flooding of safety-related equipment due to failure of a system component, and to annunciate abnormal and unsafe operating conditions
- description of seismic design criteria and bases for the chosen criteria, along with seismic and quality group classifications
- safety evaluation, to include the following topics:
  - level of dependence on the circulating water system for cooling during shutdown
  - impacts from environmental influences
  - impact from anticipated operational occurrences (AOO) and accident conditions (such as loss of offsite power – LOOP)
  - potential interaction of cooling towers with the plant structure
  - provisions to prevent flooding of safety-related equipment due to system component failure
  - description of how the plant meets the regulatory requirements of GDC 4
- figure(s) showing the layout (elevation drawings) of the circulating water system
- figure(s) showing the simplified P&ID for the circulating water system
- figure(s) showing the process flow diagram for the circulating water system

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FSAR Same contents as mPower standard plant DCD Section 10.4.5 with the following site-specific supplemental information:

- site-specific description of the circulating water system
- site-specific figure(s) showing simplified P&ID for the circulating water system
- site-specific figure(s) showing the process flow diagram for the circulating water system

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Chapter 10 Outline

10.4.6 Condensate Cleanup System

PSAR The Clinch River SMR Plant condensate cleanup system is a nonsafety-related sub-system within the condensate system which is used to remove corrosion products and ionic impurities from the condensate system during various plant operating conditions. PSAR Section 10.4.6 provides a description of the condensate cleanup system. Specific aspects of the system included in the PSAR are provided below:

- preliminary design basis, including identification of the fraction of condensate flow to be treated, impurity levels to be maintained, and applicable design codes
- preliminary description of the condensate cleanup system, including interfaces with other systems, and provisions for control of contaminants (including chloride ion)
- proposed pre-operational and in-service inspection and testing requirements and acceptance criteria
- preliminary description of instrumentation associated with the condensate cleanup system, including performance monitoring
- preliminary safety evaluation, to include the following topics:
  - analysis of the contribution of impurity levels from the secondary system to RCS activity levels
  - analysis of demineralizer capacity and anticipated impurity levels

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DCD The mPower standard plant condensate cleanup system is a nonsafety-related sub-system within the condensate system which is used to remove corrosion products and ionic impurities from the condensate system during various plant operating conditions. DCD Section 10.4.6 provides a description of the condensate cleanup system. Specific aspects of the system included in the DCD are provided below:

- description of design basis, including identification of the fraction of condensate flow to be treated, impurity levels to be maintained and their basis, and applicable design codes
- description of the condensate cleanup system, including modes of operation, interfaces with other systems, provisions for control of contaminants chloride ion and other contaminants, compatibility of the materials of construction with service conditions and reactor water chemistry, and design features provided to ensure limiting the concentrations of chloride and other contaminants in the condensate to allowable values in the case of condenser tube leaks
- description of pre-operational and in-service inspection and testing requirements and acceptance criteria
- description of instrumentation associated with the condensate cleanup system, including performance monitoring

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Chapter 10 Outline

10.4.6 Condensate Cleanup System (cont.)

DCD (cont.)

- description of seismic design criteria and bases for the chosen criteria, along with seismic and quality group classifications
- safety evaluation, to include the following topics:
  - analysis of the contribution of impurity levels from the secondary system to RCS activity levels
  - analysis of demineralizer capacity and anticipated impurity levels
  - analysis of performance monitoring
  - description of how the plant complies with GDC 14
- figure(s) showing the layout of the condensate cleanup system
- figure(s) showing the simplified P&ID for the condensate cleanup system
- figure(s) showing the process flow diagram for the condensate cleanup system

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FSAR Same contents as mPower standard plant DCD Section 10.4.6.

Chapter 10 Outline

10.4.7 Condensate and Feedwater Systems

PSAR The Clinch River SMR Plant condensate and feedwater systems are nonsafety-related systems with the exception of the safety related containment and steam generator isolation function (feedwater system only) which are used to provide feedwater at the required temperature, pressure, and flow rate to the steam generator. Condensate is pumped from the main condenser hotwell, through the condensate cleanup system and low-pressure feedwater heater(s) to the deaerator tank. The feedwater is subsequently pumped through the high-pressure feedwater heater(s) to the steam generator. PSAR Section 10.4.7 provides a description of the condensate and feedwater systems. Specific aspects of the system included in the PSAR are provided below:

- preliminary design basis, including criteria for isolation from the steam generator, supply of condensate available for emergency purposes, environmental design requirements, and applicable design codes
- preliminary description of the condensate and feedwater systems, including interfaces with other systems and operating modes
- proposed pre-operational and in-service inspection and testing requirements and acceptance criteria
- preliminary description of instrumentation associated with the condensate and feedwater systems
- preliminary safety evaluation, to include the following topics:
    - analysis of component failure, effects of equipment malfunction, and an analysis of isolation provisions to preclude release of radioactivity into the environment in the event of a pipe leak or break
    - analysis of potential for fluid flow instabilities, including a description of normal operating transients, a summary of the criteria for routing feedwater piping from the steam generator to the closest restraint upstream of the feedwater containment isolation valve located outside the containment, and a description of the piping system analyses

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DCD The mPower standard plant condensate and feedwater systems are nonsafety-related systems with the exception of the safety related containment steam generator isolation function (feedwater system only) which are used to provide feedwater at the required temperature, pressure, and flow rate to the steam generator. Condensate is pumped from the main condenser hotwell, through the condensate cleanup system and low-pressure feedwater heater(s) to the deaerator tank. The feedwater is subsequently pumped through the high-pressure feedwater heater(s) to the steam generator. DCD Section 10.4.7 provides a description of the condensate and feedwater systems. Specific aspects of the system included in the DCD are provided below:

Chapter 10 Outline

10.4.7 Condensate and Feedwater Systems (cont.)

DCD (cont.)

- description of design basis, including capability to supply adequate feedwater to the nuclear steam supply system (NSSS), criteria for isolation from the steam generator, supply of condensate available for emergency purposes, environmental design requirements, and applicable design codes
- description of the condensate and feedwater systems, including interfaces with other systems, modes of operation, and design considerations incorporated to minimize erosion/corrosion, referencing applicable guidance in GL 89-08 and EPRI NP-3944
- description of pre-operational and in-service inspection and testing requirements and acceptance criteria
- description of instrumentation associated with the condensate and feedwater systems
- description of seismic design criteria and bases for the chosen criteria, along with seismic and quality group classifications
- safety evaluation, to include the following topics:
  - analysis of component failure, effects of equipment malfunction, and an analysis of isolation provisions to preclude release of radioactivity into the environment in the event of a pipe leak or break and/or degradation of the integrity of safety-related equipment
  - analysis of potential for fluid flow instabilities, including a description of normal operating transients that could cause the water level in the steam generator to drop below the inlet baffle or allow steam to enter the feedwater piping, a summary of the criteria for routing feedwater piping from the steam generator to the closest restraint upstream of the feedwater containment isolation valve located outside the containment, and a description of the piping system analyses, including any forcing functions, or the result of test programs performed to verify that uncovering of feedwater lines could not occur or that such uncovering would not result in unacceptable damage to the system
  - description of how the plant conforms with the guidance in RG 1.29, and BTP 10-2, and is in compliance with the requirements of GDC 2, 4, 5, 44, 45, and 46
- figure(s) showing the layout of the condensate and feedwater systems
- figure(s) showing the simplified P&ID for the condensate and feedwater systems
- figure(s) showing the process flow diagram for the condensate and feedwater systems

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FSAR Same contents as mPower standard plant DCD Section 10.4.7.

Chapter 10 Outline

10.4.8 Steam Generator Blowdown System

PSAR The Clinch River SMR Plant steam generator blowdown system is a nonsafety-related system with the exception of the safety-related steam generator and containment isolation function. The steam generator blowdown system is used to maintain acceptable steam generator secondary-side coolant (i.e. feedwater) chemistry during plant heat-up, start-up and shut-down operating modes. This is accomplished by controlled liquid purge flow from the low point of the steam generator secondary-side feedwater annulus in order to remove impurities concentrated in the steam generator. PSAR Section 10.4.8 provides a description of the steam generator blowdown system. Specific aspects of the system included in the PSAR are provided below:

- preliminary design basis, including ability of the system to maintain optimum secondary-side water chemistry during all plant operating modes and anticipate operating occurrences (main condenser in-leakage and primary-to-secondary leakage)
- preliminary description of the steam generator blowdown system, including interfaces with other systems, operating modes, expected and design flows for all operating modes, process design parameters and equipment design capacities, expected temperature variations, and provisions to re-route blowdown to the plant liquid radwaste treatment system in the event of secondary-side radioactive contamination
- proposed pre-operational and in-service inspection and testing requirements and acceptance criteria
- preliminary description of instrumentation associated with the steam generator blowdown system, including controls provided to protect temperature-sensitive elements, means to monitor the blowdown stream for radioactive contaminants, and to control flashing, liquid levels, and process flow
- preliminary safety evaluation, to include the following topics:
    - identification of unusual design conditions that could lead to plant safety problems
    - identification of coolant (secondary-side, i.e. feedwater) chemistry specification limits to demonstrate compatibility of primary-to-secondary system pressure boundary materials
- preliminary figure(s) showing the layout of the steam generator blowdown system
- preliminary figure(s) showing the simplified P&ID for the steam generator blowdown system
- preliminary figure(s) showing the process flow diagram for the steam generator blowdown system

Chapter 10 Outline

10.4.8 Steam Generator Blowdown System (cont.)

DCD The mPower standard plant steam generator blowdown system is a nonsafety-related system with the exception of the safety-related steam generator and containment isolation function. The steam generator blowdown system is used to maintain acceptable steam generator secondary-side coolant (i.e. feedwater) chemistry during plant heat-up, start-up and shut-down operating modes. This is accomplished by controlled liquid purge flow from the low point of the steam generator secondary-side feedwater annulus in order to remove impurities concentrated in the steam generator. DCD Section 10.4.8 provides a description of the steam generator blowdown system. Specific aspects of the system included in the DCD are provided below:

- description of design basis, including ability of the system to maintain optimum secondary-side water chemistry during all plant operating modes and anticipate operating occurrences (main condenser in-leakage and primary-to-secondary leakage)
- description of the bases for the selected chemistry limits, as pertaining to compatibility with the primary-to-secondary system pressure boundary material
- description of the steam generator blowdown system, including interfaces with other systems, operating modes, operating procedures and flow paths for all operating modes, expected and design flows for all operating modes, process design parameters, equipment design capacities, expected temperature variations, the steam generator blowdown sampling program, and provisions to re-route blowdown to the plant liquid radwaste treatment system in the event of secondary-side radioactive contamination
- pre-operational and in-service inspection and testing requirements and acceptance criteria
- description of seismic design criteria and bases for the chosen criteria, along with seismic and quality group classifications
- description of instrumentation associated with the steam generator blowdown system, including controls provided to protect temperature-sensitive elements, means to monitor the blowdown stream for radioactive contaminants, and to control flashing, liquid levels, and process flow
- safety evaluation, to include the following topics:
    - identification of unusual design conditions that could lead to plant safety problems
    - description of how the plant complies with the requirements of GDC 1, 2,13, and 14
- figure(s) showing the layout of the steam generator blowdown system and the general arrangement of the system equipment
- figure(s) showing the simplified P&ID for the steam generator blowdown system

Chapter 10 Outline

10.4.8 Steam Generator Blowdown System (cont.)

DCD (cont.)
- figure(s) showing the process flow diagram for the steam generator blowdown system
- table(s) showing feedwater chemistry specification limits

FSAR Same contents as mPower standard plant DCD Section 10.4.8.

Chapter 10 Outline

10.4.9 Auxiliary Condenser System

PSAR The Clinch River SMR Plant auxiliary condenser system is a nonsafety-related system with the exception of the safety-related containment isolation function. The auxiliary condenser system is used in conjunction with portions of the main steam and feedwater systems to remove RCS decay heat during high-pressure shutdown operation modes when the normal steam generator secondary side cooling mode (i.e. normal cycle operation with feedwater supplied to the steam generator via the feedwater pump and steam flowing back to either the turbine or bypassed directly to the condenser) is unavailable. PSAR Section 10.4.9 provides a description of the auxiliary condenser system. Specific aspects of the system included in the PSAR are provided below:

- preliminary system description and design bases for the system, including applicable design codes
- preliminary performance requirements, including requirements for startup, operation, and shutdown
- proposed seismic criteria and quality group classifications for system components
- proposed description of regulatory treatment of nonsafety-related system (RTNSS) component requirements
- proposed material specifications and material compatibility with all anticipated fluid and environmental conditions
- preliminary safety evaluation to include the following topics:
    - anticipated inventory of radioactive contaminants during power operation and shutdown
    - potential for hydrogen buildup
    - potential for flooding following a failure of the auxiliary condenser
- discussion of proposed accident analyses demonstrating adequacy of auxiliary condenser to perform its intended function
- preliminary instrumentation applications for each feature of the system
- proposed inspection and testing requirements, including those for preoperational and startup tests
- preliminary table(s) listing major equipment design parameters
- preliminary figure(s) showing a simplified P&ID for the auxiliary condenser system

Chapter 10 Outline

10.4.9 Auxiliary Condenser System (cont.)

DCD The mPower standard plant auxiliary condenser system is a nonsafety-related system with the exception of the safety-related containment isolation function. The auxiliary condenser system is used in conjunction with portions of the main steam and feedwater systems to remove RCS decay heat during high-pressure shutdown operation modes when the normal steam generator secondary side cooling mode (i.e. normal cycle operation with feedwater supplied to the steam generator via the feedwater pump and steam flowing back to either the turbine or bypassed directly to the condenser) is unavailable. DCD Section 10.4.9 provides a description of the auxiliary condenser system. Specific aspects of the system included in the DCD are provided below:

- description of the system, including design bases and applicable design codes
- description of postulated accident scenarios and conditions for which the auxiliary condenser system is required
- description of performance requirements, including requirements for startup, operation, and shutdown
- description of seismic criteria and quality group classifications for system components
- description of RTNSS component requirements
- description describing the results of the fault mode effects analysis (FMEA)
- description of material specifications and material compatibility with all anticipated fluid and environmental conditions
- description of safety evaluation to include the following topics:
    - anticipated inventory of radioactive contaminants during power operation and shutdown
    - potential for hydrogen buildup
    - potential for flooding following a failure of the auxiliary condenser
- description of accident analyses performed to demonstrate adequacy of condenser to perform its intended function
- description of the extent that the auxiliary condenser is required for operation of other systems, and the extent to which portions of other systems are required for auxiliary condenser operation, including priority, conditions, and limitations on operation or maintenance
- description of instrumentation applications for each feature of the system
- description of instrumentation provisions for the various auxiliary condenser actuation methods, including locations and conditions requiring system actuation
- description of inspection and testing requirements, including those for preoperational and startup tests
- table(s) listing major equipment design parameters
- figure(s) showing a simplified P&ID for the auxiliary condenser system

Chapter 10 Outline

10.4.9 Auxiliary Condenser System (cont.)

FSAR Same contents as mPower standard plant DCD Section 10.4.9.

Chapter 10 Outline

10.4.10 Auxiliary Steam Supply System

PSAR The Clinch River SMR Plant auxiliary steam supply system is a nonsafety-related system that supplies auxiliary steam required for the plant during startup and shutdown operating modes. PSAR Section 10.4.10 provides a description of the auxiliary steam supply system. Specific aspects of the system included in the PSAR are provided below:

- preliminary system description and design bases for the system, including applicable design codes
- preliminary performance requirements, including requirements for startup, operation, and shutdown
- proposed seismic criteria and quality group classifications for main system components
- preliminary instrumentation applications for each subsystem or feature of the auxiliary steam supply system
- proposed inspection and testing requirements, including those for preoperational and startup tests
- preliminary table(s) listing major equipment design parameters
- preliminary figure(s) showing simplified P&ID for the auxiliary steam supply system

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DCD The mPower standard plant auxiliary steam supply system is a nonsafety-related system that provides auxiliary steam required for the plant during startup and shutdown operating modes. DCD Section 10.4.10 provides a description of the auxiliary steam supply system. Specific aspects of the system included in the DCD are provided below:

- description of the system, including design bases and applicable design codes
- description of performance requirements, including requirements for startup, operation, and shutdown
- description of system seismic criteria and quality group classifications for main system components
- description of instrumentation applications for each subsystem or feature of the auxiliary steam supply system
- description of inspection and testing requirements, including those for preoperational and startup tests
- table(s) listing major equipment design parameters
- figure(s) showing simplified P&ID for the auxiliary steam supply system

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FSAR Same contents as mPower standard plant DCD Section 10.4.10.

Chapter 10 Outline

10.4.11 Condensate and Feedwater Chemistry Control

PSAR The Clinch River SMR Plant condensate and feedwater chemistry control system is a nonsafety-related system that provides injection of steam generator secondary side treatment chemicals into the condensate and feedwater systems in order to maintain appropriate water chemistry. PSAR Section 10.4.11 provides a description of the condensate and feedwater chemistry control system. Specific aspects of the system included in the PSAR are provided below:

- preliminary system description and design bases for the system, including applicable design codes
- preliminary performance requirements, including requirements for startup and normal operation
- proposed seismic criteria and quality group classifications for main system components
- preliminary instrumentation applications for each subsystem or feature of the auxiliary steam supply system
- proposed inspection and testing requirements, including those for preoperational and startup tests
- preliminary table(s) listing secondary side water chemistry parameters
- preliminary figure(s) showing simplified P&ID for the condensate and feedwater chemistry control system

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DCD The mPower standard plant condensate and feedwater chemistry control system is a nonsafety-related system that provides injection of steam generator secondary side treatment chemicals into the condensate and feedwater systems in order to maintain appropriate water chemistry. DCD Section 10.4.11 provides a description of the condensate and feedwater chemistry control system. Specific aspects of the system included in the DCD are provided below:

- description of system, including design bases and applicable design codes
- description of performance requirements, including requirements for startup and normal operation
- description of system seismic criteria and quality group classifications for main system components
- description of instrumentation applications for each subsystem or feature of the condensate and feedwater chemistry control system
- description of inspection and testing requirements, including those for preoperational and startup tests
- table(s) listing major equipment design parameters
- figure(s) showing simplified P&ID for the condensate and feedwater chemistry control system

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Chapter 10 Outline

10.4.11 Condensate and Feedwater Chemistry Control (cont.)

FSAR Same contents as mPower standard plant DCD Section 10.4.11.

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Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to Standard Plant Design	Key Issues	Related Sections
15.0 Introduction - Transient and Accident Analyses	PSAR	10 CFR 20 10 CFR 50, App. A, GDC 2, 4, 5, 10, 13,15, 17,19, 20, 25, 26, 27, 28, 29, 31, 34, 35, 55, 60 and 61 10 CFR 50.46 10 CFR 50.62 10 CFR 100	No	RG 1.70, RG 1.206	15.0	SECY-77-439	ANSI/ANS 51.1-1983 (Withdrawn 1998) ASME, Section III, Article NB-7000	No	No	None	15.0.3
	DCD	10 CFR 20 10 CFR 50, App. A, GDC 2, 4, 5, 10, 13,15, 17,19, 20, 25, 26, 27, 28, 29, 31, 34, 35, 55, 60 and 61 10 CFR 50.46 10 CFR 50.62 10 CFR 100	No	RG 1.206	15.0	SECY-77-439	ANSI/ANS 51.1-1983 (Withdrawn 1998) ASME, Section III, Article NB-7000	N/A	N/A	None	None
	FSAR	10 CFR 20 10 CFR 50, App. A, GDC 2, 4, 5, 10, 13,15, 17,19, 20, 25, 26, 27, 28, 29, 31, 34, 35, 55, 60 and 61 10 CFR 50.46 10 CFR 50.62 10 CFR 100	No	RG 1.206	15.0	SECY-77-439	ANSI/ANS 51.1-1983 (Withdrawn 1998) ASME, Section III, Article NB-7000	N/A	No	None	None
15.0.1 Radiological Consequence Analyses Using Alternative Source Terms	PSAR	Radiological consequences analyses applicable to Clinch River SMR Plant are addressed in Section 15.0.3.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None	N/A
	DCD										
	FSAR										

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior tto the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to Standard Plant Design	Key Issues	Related Sections
15 0.2 Review of Transient and Accident Analysis Methods	PSAR	10 CFR 50 34 10 CFR 50.46 10 CFR 50 App B 10 CFR 50 App K	No	RG 1.70, RG 1 206	15.0.2	RG 1.157 RG 1 203 NUREG/CR-5249 NUREG-1230	B.E. Boyack, et al., "Quantifying Reactor Safety Margins," six papers in Nuclear Engineering and Design, Vol. 119, No. 1, May 1990 "Separate Effects Test Matrix for Thermal-Hydraulic Code Validation," Committee on the Safety of Nuclear Installations, NEA/CSNI/R(93)14, September 1993 "Integral Test Facility Validation Matrix for the Assessment of Thermal-Hydraulic Codes for LWR LOCA and Transients," Committee on the Safety of Nuclear Installations, NEA/CSNI/R(96)17, July 1996 "CSNI Code Validation Matrix of Thermo-Hydraulic Codes for LWR LOCA and Transients," Committee on the Safety of Nuclear Installations, CSNI Report 132, March 1987	No	No	None	None
	DCD	10 CFR 50 34 10 CFR 50.46 10 CFR 50 App B 10 CFR 50 App K	No	RG 1 206	15 0.2	RG 1.157 RG 1.203 NUREG/CR-5249 NUREG-1230 NUREG-0933	B E. Boyack, et al., "Quantifying Reactor Safety Margins," six papers in Nuclear Engineering and Design, Vol 119, No 1, May 1990 "Separate Effects Test Matrix for Thermal-Hydraulic Code Validation," Committee on the Safety of Nuclear Installations, NEA/CSNI/R(93)14, September 1993 "Integral Test Facility Validation Matrix for the Assessment of Thermal-Hydraulic Codes for LWR LOCA and Transients," Committee on the Safety of Nuclear Installations, NEA/CSNI/R(96)17, July 1996 "CSNI Code Validation Matrix of Thermo-Hydraulic Codes for LWR LOCA and Transients," Committee on the Safety of Nuclear Installations, CSNI Report 132, March 1987	N/A	N/A	None	None
	FSAR	10 CFR 50.34 10 CFR 50.46 10 CFR 50 App B 10 CFR 50 App K	No	RG 1 206	15 0.2	RG 1 157 RG 1.203 NUREG/CR-5249 NUREG-1230	B.E. Boyack, et al., "Quantifying Reactor Safety Margins," six papers in Nuclear Engineering and Design, Vol 119, No. 1, May 1990 "Separate Effects Test Matrix for Thermal-Hydraulic Code Validation," Committee on the Safety of Nuclear Installations, NEA/CSNI/R(93)14, September 1993 "Integral Test Facility Validation Matrix for the Assessment of Thermal-Hydraulic Codes for LWR LOCA and Transients," Committee on the Safety of Nuclear Installations, NEA/CSNI/R(96)17, July 1996 "CSNI Code Validation Matrix of Thermo-Hydraulic Codes for LWR LOCA and Transients," Committee on the Safety of Nuclear Installations, CSNI Report 132, March 1987	N/A	No	None	None

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior tto the PSAR submittal.

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Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to Standard Plant Design	Key Issues	Related Sections
15.0.3 Design Basis Accident Radiological Consequence Analyses for Advanced Light Water Reactors	PSAR	10 CFR 50.34(a)(1) 10 CFR 50, App. A, GDC 19 10 CFR 50, App. E, Paragraph IV.E.8 10 CFR 100	No	RG 1.70, RG 1.206	15.0.3	RG 1.183 NUREG-1465 SECY-98-154	None	No	No	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	2.0, 6.4, 6.5, 11.1, 15.1, 15.3, 15.4, 15.6, 15.7
	DCD	10 CFR 50.34(a)(1) 10 CFR 50, App. A, GDC 19 10 CFR 50, App. E, Paragraph IV.E.8 10 CFR 100	No	RG 1.206	15.0.3	RG 1.183 NUREG-1465 SECY-98-154	None	N/A	N/A	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	2.0, 6.4, 6.5, 11.1, 15.1, 15.3, 15.4, 15.6, 15.7
	FSAR	10 CFR 50.34(a)(1) 10 CFR 50, App. A, GDC 19 10 CFR 50, App. E, Paragraph IV.E.8 10 CFR 100	No	RG 1.206	15.0.3	RG 1.183 NUREG-1465 SECY-98-154	None	N/A	No	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	2.0, 6.4, 6.5, 11.1, 15.1, 15.3, 15.4, 15.6, 15.7
15.1.1 - 15.1.4 Decrease in Feedwater Temperature, Increase in Feedwater Flow, Increase in Steam Flow, and Inadvertent Opening of a Steam Generator Relief or Safety Valve	PSAR	10 CFR 50, App. A, GDC 10, 13, 15, 20, and 26	No	RG 1.70, RG 1.206	15.1.1 - 15.1.4	RG 1.53, RG 1.105	ASME, Section III, Article NB-7000	No	No	None	15.0, 15.0.3, 7.2, 7.3, 7.4, 7.5
	DCD	10 CFR 50, App. A, GDC 10, 13, 15, 20, and 26	No	RG 1.206	15.1.1 - 15.1.4	RG 1.53, RG 1.105	ASME, Section III, Article NB-7000	N/A	N/A	None	15.0, 15.0.3, 7.2, 7.3, 7.4, 7.5
	FSAR	10 CFR 50, App. A, GDC 10, 13, 15, 20, and 26	No	RG 1.206	15.1.1 - 15.1.4	RG 1.53, RG 1.105	ASME, Section III, Article NB-7000	N/A	No	None	15.0, 15.0.3, 7.2, 7.3, 7.4, 7.5

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior tto the PSAR submittal.

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to Standard Plant Design	Key Issues	Related Sections
15 1.5 Main Steam Line Failures	PSAR	10 CFR 50, App. A, GDC 13, 17, 27, 28, 31, and 35 10 CFR 50.34(f)(ii) 10 CFR 50.34(f)(2)(xii) 10 CFR 50.34(f)(1)(ii)	No	RG 1.70, RG 1.206	15.0.3 15.1.5	BTP 3-3 and 3-4	None	No	No	None	15.0, 15.0.3, 3.6, 3.9, 4.2, 4.3, 4.4, 5.2, 5.3, 6.2, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 10.4
	DCD	10 CFR 50, App. A, GDC 13, 17, 27, 28, 31, and 35 10 CFR 50.34(f)(ii) 10 CFR 50.34(f)(2)(xii) 10 CFR 50.34(f)(1)(ii)	No	RG 1.206	15.0.3 15.1.5	BTP 3-3 and 3-4	None	N/A	N/A	None	15.0, 15.0.3, 3.6, 3.9, 4.2, 4.3, 4.4, 5.2, 5.3, 6.2, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 10.4
	FSAR	10 CFR 50, App. A, GDC 13, 17, 27, 28, 31, and 35 10 CFR 50.34(f)(ii) 10 CFR 50.34(f)(2)(xii) 10 CFR 50.34(f)(1)(ii)	No	RG 1.206	15.0.3 15.1.5	BTP 3-3 and 3-4	None	N/A	No	None	15.0, 15.0.3, 3.6, 3.9, 4.2, 4.3, 4.4, 5.2, 5.3, 6.2, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 10.4
15.2.1–15.2.5 Loss of External Load; Turbine Trip; Loss of Condenser Vacuum, Closure of Main Steam Isolation Valve and Steam Pressure Regulator Failure (Closed)	PSAR	10 CFR 50, App. A, GDC 10, 13, 15, 17, and 26	No	RG 1.70, RG 1.206	15.2.1 - 15.2.5	RG 1.53 RG 1.105 SECY-77-439 SECY 94-084	ANSI/ANS-51.1-1983 (withdrawn 1998) ASME, Section III, Article NB-7000, NUREG-0718	No	No	None	15.0,15.0.3, 7.2, 7.3, 7.4, 7.5, 10.3, 10.4
	DCD	10 CFR 50, App. A, GDC 10, 13, 15, 17, and 26	No	RG 1.206	15.2.1 - 15.2.5	RG 1.53 RG 1.105 SECY-77-439 SECY 94-084	ANSI/ANS-51.1-1983 ASME, Section III, Article NB-7000, NUREG-0718	N/A	N/A	None	15.0,15.0.3, 7.2, 7.3, 7.4, 7.5, 10.3, 10.4
	FSAR	10 CFR 50, App. A, GDC 10, 13, 15, 17, and 26	No	RG 1.206	15.2.1 - 15.2.5	RG 1.53 RG 1.105 SECY 77-439 SECY 94-084	ANSI/ANS-51.1-1983 ASME, Section III, Article NB-7000, NUREG-0718,	N/A	No	None	15.0,15.0.3, 7.2, 7.3, 7.4, 7.5, 10.3, 10.4
15.2.6 Loss of Non-Emergency AC Power to the Station Auxiliaries	PSAR	10 CFR 50, App. A, GDC 10, 13, 15, 26	No	RG 1.70, RG 1.206	15.2.6	RG 1.53 NUREG-0718	ANSI N18.2	No	No	None	15.0,15.0.3, 4.2, 4.3, 4.4, 7 (all), 10.4
	DCD	10 CFR 50, App. A, GDC 10, 13, 15, 26	No	RG 1.206	15.2.6	RG 1.53 NUREG-0718	ANSI N18.2	N/A	N/A	None	15.0,15.0.3, 4.2, 4.3, 4.4, 7 (all), 10.4
	FSAR	10 CFR 50, App. A, GDC 10, 13, 15, 26	No	RG 1.206	15.2.6	RG 1.53 NUREG-0718	ANSI N18.2	N/A	No	None	15.0,15.0.3, 4.2, 4.3, 4.4, 7 (all), 10.4
15.2.7 Loss of Normal Feedwater Flow	PSAR	10 CFR 50, App. A, GDCs 10, 13, 15, 17, and 26 10 CFR 50.34(f)(1)(ii) 10 CFR 50.34(f)(2)(xii)	No	RG 1.70, RG 1.206	15.2.7	RG 1.53 RG 1.105 SECY 77-439 SECY 94-084 NUREG-0718	ANSI/ANS 51.1-1983, ASME, Section III, Article NB-7000	No	No	None	15.0, 15.0.3.1, 4.2, 4.3, 4.4, 7.2, 7.3, 7.4, 7.5, 10.4
	DCD	10 CFR 50, App. A, GDCs 10, 13, 15, 17, and 26 10 CFR 50.34(f)(1)(ii) 10 CFR 50.34(f)(2)(xii)	No	RG 1.206	15.2.7	RG 1.53 RG 1.105 SECY 77-439 SECY 94-084 NUREG-0718	ANSI/ANS 51.1-1983, ASME, Section III, Article NB-7000	N/A	N/A	None	15.0, 15.0.3.1, 4.2, 4.3, 4.4, 7.2, 7.3, 7.4, 7.5, 10.4
	FSAR	10 CFR 50, App. A, GDCs 10, 13, 15, 17, and 26 10 CFR 50.34(f)(1)(ii) 10 CFR 50.34(f)(2)(xii)	No	RG 1.206	15.2.7	RG 1.53 RG 1.105 SECY 77-439 SECY 94-084 NUREG-0718	ANSI/ANS 51.1-1983, ASME, Section III, Article NB-7000	N/A	No	None	15.0, 15.0.3.1, 4.2, 4.3, 4.4, 7.2, 7.3, 7.4, 7.5, 10.4
15.2.8 Feedwater System Pipe Break Inside and Outside Containment (PWR)	PSAR	10 CFR 50, App. A, GDC 13, 17, 25, 27, 28, 31, and 35 10 CFR 50.34(f)(1)(ii) 10 CFR 50.34(f)(1)(iii) 10 CFR 50.34(f)(2)(xii) 10 CFR 100	No	RG 1.70, RG 1.206	15.2.8	BTP 3-3 and 3-4	ASME, Section III, Article NB-7000	No	No	None	15.0, 15.0.3, 3.6, 3.9, 4.2, 4.3, 4.4, 5.2, 5.3, 6.2, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 10.4, 15.6
	DCD	10 CFR 50, App. A, GDC 13, 17, 25, 27, 28, 31, and 35 10 CFR 50.34(f)(1)(ii) 10 CFR 50.34(f)(1)(iii) 10 CFR 50.34(f)(2)(xii) 10 CFR 100	No	RG 1.206	15.2.8	BTP 3-3 and 3-4	ASME, Section III, Article NB-7000	N/A	N/A	None	15.0, 15.0.3, 3.6, 3.9, 4.2, 4.3, 4.4, 5.2, 5.3, 6.2, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 10.4, 15.6
	FSAR	10 CFR 50, App. A, GDC 13, 17, 25, 27, 28, 31, and 35 10 CFR 50.34(f)(1)(ii) 10 CFR 50.34(f)(1)(iii) 10 CFR 50.34(f)(2)(xii) 10 CFR 100	No	RG 1.206	15.2.8	BTP 3-3 and 3-4	ASME, Section III, Article NB-7000	N/A	No	None	15.0, 15.0.3, 3.6, 3.9, 4.2, 4.3, 4.4, 5.2, 5.3, 6.2, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 10.4, 15.6

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15.3.1 - 15.3.2 Loss of Forced Reactor Coolant Flow Including Trip of Pump Motor and Flow Controller Malfunctions	PSAR	10 CFR 50, App A, GDC 10, 20, 13, 15, 17 and 26	No	RG 1.70, RG 1.206	15.3.1 - 15.3.2	RG 1.53 RG 1.105 SECY 77-439 SECY 94-084	ASME, Section III, Article NB-7000 ANSI/ANS-51.1-1983	No	No	None	15.0, 15.0.3, 4.4, 7.2, 7.3, 7.4, 7.5
	DCD	10 CFR 50, App. A, GDC 10, 20, 13, 15, 17 and 26	No	RG 1.206	15.3.1 - 15.3.2	RG 1.53 RG 1.105 SECY 77-439 SECY 94-084	ANSI/ANS 51.1-1983 (Withdrawn 1998) ASME, Section III, Article NB-7000	N/A	N/A	None	15.0, 15.0.3, 4.4, 7.2, 7.3, 7.4, 7.5
	FSAR	10 CFR 50, App A, GDC 10, 20, 13, 15, 17 and 26	No	RG 1.206	15.3.1 - 15.3.2	RG 1.53 RG 1.105 SECY 77-439 SECY 94-084	ANSI/ANS 51.1-1983 (Withdrawn 1998) ASME, Section III, Article NB-7000	N/A	No	None	15.0, 15.0.3, 4.4, 7.2, 7.3, 7.4, 7.5
15.3.3 - 15.3.4 Reactor Coolant Pump Rotor Seizure and Reactor Coolant Pump Shaft Break	PSAR	10 CFR 50, App A, GDC 17, 27, 28, and 31 10 CFR 100	No	RG 1.70, RG 1.206	15.3.3 - 15.3.4	NUREG-1465	ASME, Section III, Article NB-7000	No	No	None	15.0, 15.0.3, 5.2, 5.3, 7.2, 7.3, 7.4, 7.5, 9.2
	DCD	10 CFR 50, App A, GDC 17, 27, 28, and 31 10 CFR 100	No	RG 1.206	15.3.3 - 15.3.4	NUREG-1465	ASME, Section III, Article NB-7000	N/A	N/A	None	15.0, 15.0.3, 5.2, 5.3, 7.2, 7.3, 7.4, 7.5, 9.2
	FSAR	10 CFR 50, App A, GDC 17, 27, 28, and 31 10 CFR 100	No	RG 1.206	15.3.3 - 15.3.4	NUREG-1465	ASME, Section III, Article NB-7000	N/A	No	None	15.0, 15.0.3, 5.2, 5.3, 7.2, 7.3, 7.4, 7.5, 9.2
15.4.1 Uncontrolled Control Rod Assembly Withdrawal From a Subcritical or Low Power Startup Condition	PSAR	10 CFR 50, App. A, GDC 10, 13, 17, 20 and 25	No	RG 1.70, RG 1.206	15.4.1	None	None	No	No	None	15.0, 15.0.3, 4.3
	DCD	10 CFR 50, App A, GDC 10, 13, 17, 20 and 25	No	RG 1.206	15.4.1	None	None	N/A	N/A	None	15.0, 15.0.3, 4.3
	FSAR	10 CFR 50, App. A, GDC 10, 13, 17, 20 and 25	No	RG 1.206	15.4.1	None	None	N/A	No	None	15.0, 15.0.3, 4.3
15.4.2 Uncontrolled Control Rod Assembly Withdrawal at Power	PSAR	10 CFR 50, App. A, GDC 10, 13, 17, 20 and 25	No	RG 1.70, RG 1.206	15.4.2	None	None	No	No	None	15.0, 15.0.3, 4.2, 4.3, 4.4
	DCD	10 CFR 50, App A, GDC 10, 13, 17, 20 and 25	No	RG 1.206	15.4.2	None	None	N/A	N/A	None	15.0, 15.0.3, 4.2, 4.3, 4.4
	FSAR	10 CFR 50, App. A, GDC 10, 13, 17, 20 and 25	No	RG 1.206	15.4.2	None	None	N/A	No	None	15.0, 15.0.3, 4.2, 4.3, 4.4
15.4.3 Control Rod Misoperation (System Malfunction or Operator Error)	PSAR	10 CFR 50, App. A, GDC 10, 13, 20 and 25	No	RG 1.70, RG 1.206	15.4.3	None	None	No	No	None	15.0,15.0.3, 4.2, 4.3, 4.4, 7.2, 7.7
	DCD	10 CFR 50, App. A, GDC 10, 13, 20 and 25	No	RG 1.206	15.4.3	None	None	N/A	N/A	None	15.0,15.0.3, 4.2, 4.3, 4.4, 7.2, 7.7
	FSAR	10 CFR 50, App A, GDC 10, 13, 20 and 25	No	RG 1.206	15.4.3	None	None	N/A	No	None	15.0,15.0.3, 4.2, 4.3, 4.4, 7.2, 7.7
15.4.4 Startup of an Inactive Loop at an Incorrect Temperature	PSAR	This event does not apply to the mPower reactor.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None	N/A
	DCD										
	FSAR										
15.4.5 Flow Controller Malfunction Causing an Increase in BWR Core Flow Rate	PSAR	This event does not apply to the mPower reactor.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None	N/A
	DCD										
	FSAR										
15.4.6 Inadvertent Decrease in Boron Concentration in the Reactor Coolant System	PSAR	This event does not apply to the mPower reactor.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None	N/A
	DCD										
	FSAR										

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15.4.7 Inadvertent Loading and Operation of a Fuel Assembly in an Improper Position	PSAR	10 CFR 50, App. A, GDC 13 10 CFR 100	No	RG 1.70, RG 1.206	15.4.7	None	None	No	No	None	15.0, 15.0.3
	DCD	10 CFR 50, App. A, GDC 13 10 CFR 100	No	RG 1.206	15.4.7	None	None	N/A	N/A	None	15.0, 15.0.3
	FSAR	10 CFR 50, App. A, GDC 13 10 CFR 100	No	RG 1.206	15.4.7	None	None	N/A	No	None	15.0, 15.0.3
15.4.8 Spectrum of Rod Ejection Accidents (PWR)	PSAR	These events do not apply to the mPower reactor.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None	N/A
	DCD										
	FSAR										
15.4.9 Spectrum of Rod Drop Accidents (BWR)	PSAR	These events do not apply to the mPower reactor.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None	N/A
	DCD										
	FSAR										
15.5.1 Inadvertent Operation of ECCS that Increases Reactor Coolant Inventory	PSAR	10 CFR 50, App. A, GDC 10, 13, 15, and 26	No	RG 1.70, RG 1.206	15.0.3 15.5.1 - 15.5.2	RIS 2005-29	ANS 51.1 ASME Section III, Article NB-7000	No	No	None	15.0, 15.0.3
	DCD	10 CFR 50, App. A, GDC 10, 13, 15, and 26	No	RG 1.206	15.0.3 15.5.1 - 15.5.2	RIS 2005-29	ANS 51.1 ASME Section III, Article NB-7000	N/A	N/A	None	15.0, 15.0.3
	FSAR	10 CFR 50, App. A, GDC 10, 13, 15, and 26	No	RG 1.206	15.0.3 15.5.1 - 15.5.2	RIS 2005-29	ANS 51.1 ASME Section III, Article NB-7000	N/A	No	None	15.0, 15.0.3
15.5.2 Reactor Coolant Inventory and Purification System Malfunction that Increases Reactor Coolant Inventory	PSAR	10 CFR 50, App. A, GDC 10, 13, 15, and 26	No	RG 1.70, RG 1.206	15.0.3 15.5.1 - 15.5.2	RIS 2005-29	ANS 51.1 ASME Section III, Article NB-7000	No	No	None	15.0, 15.0.3
	DCD	10 CFR 50, App. A, GDC 10, 13, 15, and 26	No	RG 1.206	15.0.3 15.5.1 - 15.5.2	RIS 2005-29	ANS 51.1 ASME Section III, Article NB-7000	N/A	N/A	None	15.0, 15.0.3
	FSAR	10 CFR 50, App. A, GDC 10, 13, 15 and 26	No	RG 1.206	15.0.3 15.5.1 - 15.5.2	RIS 2005-29	ANS 51.1 ASME Section III, Article NB-7000	N/A	No	None	15.0, 15.0.3
15.6.1 Inadvertent Opening of a PWR Pressurizer Pressure Relief Valve	PSAR	10 CFR 50, App. A, GDC 10, 13, 15, and 26	No	RG 1.70, RG 1.206	15.6.1	RG 1.53 RG 1.105 GL 85-12, 86-05, and 86-06 NUREG-0718	ASME, Section III, Article NB-7000	No	No	None	15.9, 15.0.3, 7 (all), 8 (all)
	DCD	10 CFR 50, App. A, GDC 10, 13, 15, and 26	No	RG 1.206	15.6.1	RG 1.53 RG 1.105 GL 85-12, 86-05, and 86-06 NUREG-0718	ASME, Section III, Article NB-7000	N/A	N/A	None	15.9, 15.0.3, 7 (all), 8 (all)
	FSAR	10 CFR 50, App. A, GDC 10, 13, 15 and 26	No	RG 1.206	15.6.1	RG 1.53 RG 1.105 GL 85-12, 86-05, and 86-06 NUREG-0718	ASME, Section III, Article NB-7000	N/A	No	None	15.9, 15.0.3, 7 (all), 8 (all)
15.6.2 Radiological Consequences of the Failure of Small Lines Carrying Primary Coolant Outside Containment	PSAR	10 CFR 50, App. A, GDC 55 10 FR 100	No	RG 1.70, RG 1.206	15.0.3 15.6.2	RG 1.11	None	No	No	None	None
	DCD	10 CFR 50, App. A, GDC 55 10 FR 100	No	RG 1.206	15.0.3 15.6.2	RG 1.11	None	N/A	N/A	None	None
	FSAR	10 CFR 50, App. A, GDC 55 10 FR 100	No	RG 1.206	15.0.3 15.6.2	RG 1.11	None	N/A	No	None	None

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15 6 3 Radiological Consequences of Steam Generator Tube Failure	PSAR	10 CFR 100	No	RG 1.70, RG 1 206	15 0.3 15 6.3	RG 1.183 NUREG-0409 NUREG-1465	W. F. Pasedag, "Iodine Spiking in BWR and PWR Coolant Systems," CONF-770708, 3 717 (1977) R. R. Bellamy, "A Regulatory Viewpoint of Iodine Spiking Durng Reactor Transients," Trans. Am. Nucl. Soc., 28 (1978)	No	No	None	None
	DCD	10 CFR 100	No	RG 1.206	15.0.3 15.6.3	RG 1.183 NUREG-0409 NUREG-1465	W. F. Pasedag, "Iodine Spiking in BWR and PWR Coolant Systems," CONF-770708, 3 717 (1977) R. R. Bellamy, "A Regulatory Viewpoint of Iodine Spiking During Reactor Transients," Trans. Am. Nucl. Soc., 28 (1978)	N/A	N/A	None	None
	FSAR	10 CFR 100	No	RG 1 206	15 0.3 15 6.3	RG 1.183 NUREG-0409 NUREG-1465	W. F. Pasedag, "Iodine Spiking in BWR and PWR Coolant Systems," CONF-770708, 3 717 (1977) R. R. Bellamy, "A Regulatory Viewpoint of Iodine Spiking During Reactor Transients," Trans. Am. Nucl. Soc., 28 (1978)	N/A	No	None	N/A
15.6 4 Radiological Consequences of Main Steam Line Failure Outside Containment (BWR)	PSAR DCD FSAR	This event does not apply to the mPower reactor.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None	N/A
15 6.5 Loss-Of-Coolant Accidents Resulting from Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary	PSAR	10 CFR 50, App. A, GDC 13 and 35 10 CFR 50 App. K 10 CFR 50 46 10 CFR 100	No	RG 1.70, RG 1.206	15 0 3 15 6 5	RG 1 157 NUREG-0609 NUREG-0718	None	No	No	None	15.0, 15 0 3, 3 6, 3 9, 4 2, 6 2, 7 2, 7 3, 8 3, 9 2
	DCD	10 CFR 50, App. A, GDC 13 and 35 10 CFR 50 App. K 10 CFR 50 46 10 CFR 100	No	RG 1 206	15.0.3 15 6.5	RG 1.157 NUREG-0609 NUREG-0718	None	N/A	N/A	None	15.0, 15 0.3, 3 6, 3 9, 4 2, 6 2, 7 2, 7 3, 8 3, 9 2
	FSAR	10 CFR 50, App. A, GDC 13 and 35 10 CFR 50 App. K 10 CFR 50.46 10 CFR 100	No	RG 1.206	15.0.3 15 6.5	RG 1.157 NUREG-0609 NUREG-0718	None	N/A	No	None	15.0, 15 0.3, 3.6, 3.9, 4 2, 6 2, 7.2, 7.3, 8 3, 9 2
15 6.6 Inadvertent Operation of the Normal Decay Heat Removal Function by the Reactor Coolant Inventory and Purification System (Unique to mPower Reactor)	PSAR	10 CFR 50	No	10 CFR 50 34	None	None	None	No	No	None	None
	DCD	10 CFR 52	No	10 CFR 52 47	None	None	None	N/A	N/A	None	None
	FSAR	10 CFR 50	No	10 CFR 50.34	None	None	None	N/A	No	None	None
15 6 7 Inadvertent Reactor Coolant System Depressurization via the Emergency Core Cooling System Low Pressure Sparger (Unique to mPower Reactor)	PSAR	10 CFR 50	No	10 CFR 50.34	None	None	None	No	No	None	None
	DCD	10 CFR 52	No	10 CFR 50 34	None	None	None	N/A	N/A	None	None
	FSAR	10 CFR 50	No	10 CFR 50 34	None	None	None	N/A	No	None	None
15.6 8 Emergency Condenser Tube Rupture (Unique to mPower Reactor)	PSAR	10 CFR 50	No	10 CFR 50.34	None	None	None	No	No	None	None
	DCD	10 CFR 52	No	10 CFR 50.34	None	None	None	N/A	N/A	None	None
	FSAR	10 CFR 50	No	10 CFR 50 34	None	None	None	N/A	No	None	None

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15 6 9 RCIPS Heat Exchanger Tube Rupture (Unique to mPower Reactor)	PSAR	10 CFR 50	No	10 CFR 50.34	None	None	None	No	No	None	None
	DCD	10 CFR 52	No	10 CFR 50.34	None	None	None	N/A	N/A	None	None
	FSAR	10 CFR 50	No	10 CFR 50.34	None	None	None	N/A	No	None	None
15.7.1 Gaseous Waste Management System Leak or Failure	PSAR	10 CFR 50	No	10 CFR 50.34	BTP 11-5	None	None	No	No	None	None
	DCD	10 CFR 52	No	10 CFR 52.47	BTP 11-5	None	None	N/A	N/A	None	None
	FSAR	10 CFR 50	No	10 CFR 50.34	BTP 11-5	None	None	N/A	No	None	None
15.7.2 Liquid Waste Management System Leak or Failure (Atmospheric Release)	PSAR	10 CFR 50	No	10 CFR 50 34	BTP 11-6	None	None	No	No	None	None
	DCD	10 CFR 52	No	10 CFR 52.47	BTP 11-6	None	None	N/A	N/A	None	None
	FSAR	10 CFR 50	No	10 CFR 50 34	BTP 11-6	None	None	No	N/A	None	None
15.7.3 Release of Radioactivity to the Environment Due to a Liquid Tank Failure	PSAR	10 CFR 20 10 CFR 50, App. A, GDC 60	No	RG 1.70, RG 1.206	BTP 11-6	NUREG-0017 NUREG-0133	None	No	No	None	None
	DCD	10 CFR 20 10 CFR 50, App. A, GDC 60	No	10 CFR 52.47	BTP 11-6	NUREG- 0017 NUREG-0133	None	N/A	N/A	None	None
	FSAR	10 CFR 20 10 CFR 50, App. A, GDC 60	No	10 CFR 50.34	BTP 11-6	NUREG- 0017 NUREG-0133	None	No	No	None	None
15 7.4 Radiological Consequences of Fuel Handling Accidents	PSAR	10 CFR 50, App A, GDC 61 10 CFR 100	No	RG 1 70, RG 1.206	15 0.3 15 7.4	RG 1.183 NUREG-1465	Industrial Ventilation / A Manual of Recommended Practice - American Conference of Governmental Industrial Hygienists	No	No	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	None
	DCD	10 CFR 50, App. A, GDC 61 10 CFR 100	No	RG 1.206	15 0.3 15 7.4	RG 1.183 NUREG-1465	Industrial Ventilation / A Manual of Recommended Practice - American Conference of Governmental Industrial Hygienists	N/A	N/A	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	None
	FSAR	10 CFR 50, App. A, GDC 61 10 CFR 100	No	RG 1.206	15 0.3 15.7.4	RG 1.183 NUREG-1465	Industrial Ventilation / A Manual of Recommended Practice - American Conference of Governmental Industrial Hygienists	No	No	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	None
15.7.5 Spent Fuel Cask Drop Accidents	PSAR	10 CFR 50, App A, GDC 61 10 CFR 100	No	RG 1.70, RG 1.206	15.0.3 15.7.5	RG 1.183 NUREG-1465	None	No	No	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	None
	DCD	10 CFR 50, App. A, GDC 61 10 CFR 100	No	RG 1 206	15 0 3 15.7.5	RG 1.183 NUREG-1465	None	N/A	N/A	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	None
	FSAR	10 CFR 50, App. A, GDC 61 10 CFR 100	No	RG 1.206	15.0.3 15.7.5	RG 1.183 NUREG-1465	None	No	No	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	None

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior tto the PSAR submittal.

Clinch River Regulatory Framework Document
NRC Version

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to Standard Plant Design	Key Issues	Related Sections
15.7.6 Emergency Core Cooling System Condenser Tube Rupture (Unique to mPower)	PSAR	10 CFR 50	No	10 CFR 50.34	None	None	None	No	No	None	None
	DCD	10 CFR 52	No	10 CFR 52.47	None	None	None	N/A	N/A	None	None
	FSAR	10 CFR 50	No	10 CFR 50.34	None	None	None	No	No	None	None
15.7.7 Reactor Coolant System Inventory and Purification System Condenser Tube Rupture (Unique to mPower Reactor)	PSAR	10 CFR 50	No	10 CFR 50.34	None	None	None	No	No	None	None
	DCD	10 CFR 52	No	10 CFR 52.47	None	None	None	N/A	N/A	None	None
	FSAR	10 CFR 50	No	10 CFR 50.34	None	None	None	No	No	None	None
15.8 Anticipated Transients Without Scram	PSAR	10 CFR 50, App. A, GDC 12, 14, 16, 35, 38 and 50 10 CFR 50.46 10 CFR 50.62	No	RG 1.70, RG 1.206	15.8	SECY 83-293 NUREG-0460, Vol 1 - 4 WASH - 1270	None	No	No	None	15.0, 15.0.3, 4.3, 7.1, 7.3, 7.8
	DCD	10 CFR 50, App. A, GDC 12, 14, 16, 35, 38 and 50 10 CFR 50.46 10 CFR 50.62	No	RG 1.206	15.8	SECY 83-293 NUREG-0460, Vol 1 - 4 WASH - 1270	None	N/A	N/A	None	15.0, 15.0.3, 4.3, 7.1, 7.3, 7.8
	FSAR	10 CFR 50, App. A, GDC 12, 14, 16, 35, 38 and 50 10 CFR 50.46 10 CFR 50.62	No	RG 1.206	15.8	SECY 83-293 NUREG-0460, Vol 1 - 4 WASH - 1270	None	No	No	None	15.0, 15.0.3, 4.3, 7.1, 7.3, 7.8
15.9 BWR Core Stability	PSAR DCD FSAR	This event does not apply to the mPower Reactor.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None	N/A
15.10 Spent Fuel Pool Criticality and Boron Dilution Analysis	PSAR DCD FSAR	This event does not apply to the mPower Reactor	N/A	N/A	N/A	N/A	N/A	N/A	N/A	None	N/A
Appendix 15A Evaluation Models and Parameters for Analysis of the Radiological Consequences of Accidents	PSAR	10 CFR 50.34(a)(1) 10 CFR 50, App. A, GDC 19 10 CFR 50, App. E, Paragraph IV.E.8 10 CFR 100	No	RG 1.70, RG 1.206	None	RG 1.183 NUREG-1465 SECY-98-154	None	No	No	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	None
	DCD	10 CFR 50.34(a)(1) 10 CFR 50, App. A, GDC 19 10 CFR 50, App. E, Paragraph IV.E.8 10 CFR 100	No	RG 1.206, Section 15.0.3	None	RG 1.183 NUREG-1465 SECY-98-154	None	N/A	N/A	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	None
	FSAR	10 CFR 50.34(a)(1) 10 CFR 50, App. A, GDC 19 10 CFR 50, App. E, Paragraph IV.E.8 10 CFR 100	No	RG 1.206, Section 15.0.3	None	RG 1.183 NUREG-1465 SECY-98-154	None	No	No	Track issuance of Draft RG DG-1199 (Proposed Revision 1 to RG 1.183)	None

Note:
RG revisions are not identified as these will be consistent with the versions in effect 6 months prior tto the PSAR submittal.

CLINCH RIVER
REGULATORY FRAMEWORK DOCUMENTS
Chapter 15 Outline

15.0 TRANSIENT AND ACCIDENT ANALYSES

PSAR PSAR Section 15.0 provides introductory information regarding the transient and accident analyses. The accident analyses are organized consistent with the format in Regulatory Guide (RG) 1.206, Appendix C.I.15-A, and RG 1.70, Table 15-1.

The evaluation of occurrences includes:

- identification and justification of accidents not applicable to the mPower design
- accidents that are unique to the mPower design
- analyses of the response of the plant to postulated disturbances in process variables and to postulated equipment malfunctions or failures
- examination of the effects of anticipated process disturbances and postulated component failures to determine their consequences and to evaluate the capability built into the plant to control or accommodate such failures and situations (or to identify the limitations of expected performance)
- anticipated operational occurrences, off-design transients that induce fuel failures above those expected from normal operational occurrences, and postulated accidents of low probability
- assessment of the consequences of an assumed fission product release that would result in potential hazards not exceeded by those from any accident considered credible

Transients and accidents are presented in a manner that:

- ensures that a broad spectrum of initiating events has been considered;
- categorizes the initiating events by type and expected frequency of occurrence so that only the limiting cases in each group need to be quantitatively analyzed
- permits the consistent application of specific acceptance criteria for each postulated initiating event

A number of disturbances of process variables and malfunctions or failures of equipment are postulated. Each postulated event is assigned to one of the following categories:

- Increase in Heat Removal by the Secondary System
- Decrease in Heat Removal by the Secondary System
- Decrease in Reactor Coolant System Flow Rate
- Reactivity and Power Distribution Anomalies
- Increase in Reactor Coolant Inventory
- Decrease in Reactor Coolant Inventory
- Radioactive Release from a Subsystem or Component
- Anticipated Transients without Scram

15.0 TRANSIENT AND ACCIDENT ANALYSES (cont.)

PSAR (cont.)

A preliminary, qualitative evaluation of each category, in conjunction with a quantitative analysis of the bounding event within each category, is performed. The evaluation of each event is discussed in Sections 15.1 through 15.8, as applicable, corresponding to one of the eight categories defined above.

A table with a summary of applicable events and their classification, applicable computer codes, and the expected frequency of occurrence for each initiating event is provided. Each event is assigned to one of the following groups:

- Incidents of moderate frequency,
- Infrequent incidents, or
- Limiting faults.

In order to reduce the number of initiating events that need to be quantitatively analyzed, initiating events for each combination of category and frequency group are evaluated to identify limiting events, recognizing that different initiating events in the same category/frequency group may be limiting when the multiplicity of consequences are considered.

A table containing a summary of plant parameters considered in the preliminary safety evaluation (for example; core power, core inlet temperature, reactor system pressure, core flow, axial and radial power distribution, fuel and moderator temperature coefficient, void coefficient, reactor kinetics parameters, available shutdown rod worth and control rod insertion characteristics) is provided.

The range of values for plant parameters that vary with fuel exposure or core reload is specified. The range is sufficiently broad to cover all expected changes predicted for the entire life of the plant.

The permitted operating band (permitted fluctuations in a given parameter and associated uncertainties) on reactor system parameters is specified, using the most adverse conditions within the operating band as the initial conditions for the transient analysis.

All protection systems function settings that are credited in the evaluation are listed along with instrument uncertainty and expected/maximum time delay.

15.0 TRANSIENT AND ACCIDENT ANALYSES (cont.)

DCD DCD Section 15.0 provides introductory information regarding the transient and accident analyses. The accident analyses are organized consistent with the format in Regulatory Guide (RG) 1.206, Appendix C.I.15-A. The analyses incorporate the operating experience insights from generic letters and bulletins issued up to 6 months before the submittal date of the application. Any alternatives to these guidance are fully justified.

The accident analysis introductory section describes the evaluation of occurrences, including:

- analyses of the response of the plant to postulated disturbances in process variables and to postulated equipment malfunctions or failures.
- examination of the effects of anticipated process disturbances and postulated component failures to determine their consequences and to evaluate the capability built into the plant to control or accommodate such failures and situations (or to identify the limitations of expected performance).
- anticipated operational occurrences, off-design transients that induce fuel failures above those expected from normal operational occurrences, and postulated accidents of low probability.
- assessment of the consequences of an assumed fission product release that would result in potential hazards not exceeded by those from any accident considered credible.

Transients and accidents are presented in a manner that:

- ensures that a broad spectrum of initiating events has been considered
- categorizes the initiating events by type and expected frequency of occurrence so that only the limiting cases in each group need to be quantitatively analyzed
- permits the consistent application of specific acceptance criteria for each postulated initiating event

A number of disturbances of process variables and malfunctions or failures of equipment are postulated. Each postulated event is assigned to one of the following categories:

- Increase in Heat Removal by the Secondary System
- Decrease in Heat Removal by the Secondary System
- Decrease in Reactor Coolant System Flow Rate
- Reactivity and Power Distribution Anomalies
- Increase in Reactor Coolant Inventory
- Decrease in Reactor Coolant Inventory
- Radioactive Release from a Subsystem or Component
- Anticipated Transients without Scram

15.0 TRANSIENT AND ACCIDENT ANALYSES (cont.)

DCD (cont.)

A quantitative evaluation of each category, in conjunction with quantitative analysis of the events within each category, is performed. The evaluation of each event is discussed in Sections 15.1 through 15.8, as applicable, corresponding to one of the eight categories defined above.

A table with a summary of applicable events and their classification, applicable computer codes, and the expected frequency of occurrence for each initiating event is provided.

Each event is assigned to one of the following groups:

- Incidents of moderate frequency,
- Infrequent incidents, or
- Limiting faults.

In order to reduce the number of initiating events that need to be quantitatively analyzed, initiating events for each combination of category and frequency group are evaluated to identify limiting events, recognizing that different initiating events in the same category/frequency group may be limiting when the multiplicity of consequences are considered.

A table containing a summary of plant parameters considered in the preliminary safety evaluation (for example; core power, core inlet temperature, reactor system pressure, core flow, axial and radial power distribution, fuel and moderator temperature coefficient, void coefficient, reactor kinetics parameters, available shutdown rod worth and control rod insertion characteristics) is provided.

The range of values for plant parameters that vary with fuel exposure or core reload is specified. The range is sufficiently broad to cover all expected changes predicted for the entire life of the plant.

The permitted operating band (permitted fluctuations in a given parameter and associated uncertainties) on reactor system parameters is specified, using the most adverse conditions within the operating band as the initial conditions for the transient analysis.

All protection systems function settings that are credited in the evaluation are listed along with instrument uncertainty and expected/maximum time delay.

FSAR

Same as the mPower standard plant DCD Section 15.0.1.

15.0.1 Radiological Consequence Analyses Using Alternative Source Terms

PSAR See Section 15.0.3 for the details of the radiological consequence analyses for the Clinch River SMR Plant.

Note that the corresponding information for this section as discussed in SRP Section 15.0.1 is focused on the application of alternative source terms to operating reactors and is not applicable to a new reactor design, such as the Clinch River SMR plant.

DCD See Section 15.0.3 for the details of the radiological consequence analyses for the mPower standard plant.

FSAR See Section 15.0.3 for the details of the radiological consequence analyses for the Clinch River SMR Plant.

15.0.2 Review of Transient and Accident Analysis Methods

PSAR Transient and accident analysis methods applicable to the mPower reactor safety analysis are identified in PSAR Section 15.0.2, including:

- computer codes used
- a summary description of the computer codes and their use for specified analyzing events
- a reference to the Section 1.6 table, which includes, in part, topical reports planned to be submitted for the Chapter 15 mPower reactor safety analysis

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DCD Transient and accident analysis methods applicable to the mPower standard plant reactor safety analysis are identified in DCD Section 15.0.2, including:

- computer codes used
- a summary description of these computer codes and how they are used for analyzing specific events
- a reference to the Section 1.6 table, which includes, in part, topical reports that have been submitted for the Chapter 15 mPower reactor safety analysis

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FSAR Same as the mPower standard plant DCD Section 15.0.2.

15.0.3 Design Basis Accident Radiological Consequence Analyses for Advanced Light Water Reactors

PSAR The methodology used for design basis accident radiological consequence analyses is described in PSAR Section 15.0.3, including the following information:

- description of the alternate source term (AST) methodology used in accordance with RG 1.183
- description of computer codes used for this methodology
- a summary description of the radiological source term results
- atmospheric dispersion factors for the Clinch River site,
- radiological dose conversion factors used to calculate radiological consequences in tabular format
- airborne radioactivity removal coefficients that are used in the mPower reactor radiological analysis
- table(s) providing the methodology used to calculate radiological doses for the exclusion area boundary and the low-population zone, and acceptance criteria
- table(s) providing results of the fission product inventories

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DCD DCD Section 15.0.3 describes the methodology used for DBA consequence analyses, including the following information:

- description of the alternate source term (AST) methodology used in accordance with RG 1.183
- description of computer codes used for this methodology
- a summary description of the radiological source term results
- atmospheric dispersion factors for a bounding site
- radiological dose conversion factors used to calculate radiological consequences in tabular format
- airborne radioactivity removal coefficients that are used in the mPower reactor radiological analysis
- table(s) providing the methodology used to calculate radiological doses for the exclusion area boundary and the low-population zone, and acceptance criteria
- table(s) providing results of the fission product inventories

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FSAR Same as mPower standard plant DCD Section 15.0.3 supplemented by site-specific low population zone dose analysis.

15.X (Event Category – General Information)

PSAR Initiating events are identified and grouped as described in Section 15.0. A qualitative evaluation of each event is provided using the following format:

15.X (Event Category – from Section 15.0.)

15.X.Y (Event Name)

15.X.Y.1 Identification of Causes and Frequency Classification

For each initiating event, the occurrences that lead to the event are described, an estimate of the probability of the event is provided, and the event is assigned to one of the three frequency groups given in Section 15.0.

15.X.Y.2 Sequence of Events and System Operation

For each initiating event, the following is discussed:

- The expected sequence of events from event initiation to a final stabilized condition on a time scale, and the required operator actions.
- The extent to which normally operating plant instrumentation and controls are assumed to function.
- The extent to which plant and reactor protection systems are required to function.
- The credit taken for the functioning of normally operating plant systems.
- The operation of required engineered safety systems.

For each initiating event, the effect of single failures and operator errors are discussed and evaluated.

15.X.Y.3 Core and System Performance

The mathematical models employed in the evaluation are discussed, including any approximations or simplifications. Digital computer programs or analog simulations used are identified and discussed. Summary descriptions of mathematical models and computer programs are provided or incorporated by reference.

Suitably conservative input parameters and initial conditions are identified, and the bases for the selection thereof are discussed. Realistic initial values for the anticipated transients without scram (ATWS) case are used.

15.X (Event Category – General Information) (cont.)

PSAR (cont.)

15.X.Y.3 Core and System Performance (cont.)

If this event is the bounding event in this category of accident, analytical results are described in appropriate detail. For all other events, qualitative results are described in appropriate detail. Key parameters as a function of time are presented. Margins between acceptable and predicted values are highlighted. Examples of parameters include:

- Neutron Power
- Thermal Power
- Heat Fluxes (Average and Maximum)
- Reactor Coolant System Pressure
- Minimum DNBR
- Reactor Coolant Conditions
- Maximum Fuel Centerline Temperature
- Reactor Coolant Inventory
- Secondary System Parameters
- ECCS Flow Rates

15.X.Y.4 Barrier Performance

The evaluation of parameters that may affect the performance of barriers, other than fuel cladding, that restrict or limit the transport of radioactive materials from the fuel to the public, is discussed.

The mathematical models used are discussed, including any approximations or simplifications used. Any differences between the models used to evaluate barrier performance and models used to evaluate core performance are identified and described. If the models used to evaluate barrier performance are significantly different from the models used to evaluate core performance, detailed descriptions of the barrier performance models are provided.

Input parameters and initial conditions relevant to the evaluation of barrier performance that were not discussed under Section 15.X.Y.3 are presented and discussed.

The results of the analyses (if applicable) are presented and described in detail. As a minimum, the following information is presented as a function of time for each transient or accident with a quantitative analysis:

- Reactor Coolant System Pressure
- Steam Line Pressure
- Containment Pressure (if applicable)
- Relief and/or Safety Valve Flow Rate
- Flow Rate from the RCS to the Containment (if applicable)

15.X (Event Category – General Information) (cont.)

PSAR (cont.)

15.X.Y.5 Radiological Consequences

Assumptions, parameters and calculational methods used to determine doses that result from limiting faults and infrequent incidents are summarized. Sufficient information, including information on input parameters, is provided to fully substantiate the analytical results and to allow an independent analysis to be performed. That is, this section includes all of the pertinent parameters that are required to calculate doses for the site exclusion boundary and LPZ, as well as locations within the exclusion boundary where significant site-related activities may occur.

If there are no radiological consequences associated with a given event, a statement is provided indicating that containment of activity is maintained and by what margin.

An analysis of each initiating event is provided, based on design basis assumptions acceptable for purposes of determining the adequacy of plant design to meet 10 CFR Part 100 criteria.

Any realistic analysis performed to help quantify margins is provided.

Assumptions and parameters used in the analysis are presented, consistent with Table 15-3 of RG 1.70, which provides a representative list of such items, and Table 15-4 of RG 1.70, which summarizes additional items to be provided when dealing with specific types of accidents.

Appendix 15A provides a diagram and explanation of the dose computational model (the "Containment Leakage Dose Model).

Assumptions and methodologies used in determining radiological consequences are supported with backup information presented herein, by reference to other SAR sections, or by reference citations, as applicable.

The results of the radiological consequence calculations identify the potential two-hour integrated whole body and thyroid doses for the site exclusion boundary, and doses for the course of the accident at the closest boundary of the LPZ and, when significant, to the control room operators. Other organ doses are presented for those cases where a release of solid fission products or transuranic elements is postulated to be released to the containment atmosphere.

15.X (Event Category – General Information) (cont.)

DCD Initiating events are identified and grouped as described in Section 15.0. An evaluation of each event is provided using the following format:

15.X (Event Category – from Section 15.0.)

15.X.Y (Event Name)

15.X.Y.1 Identification of Causes and Frequency Classification

For each initiating event, the occurrences that led to the event are described, an estimate of the probability of the event is provided, and the event is assigned to one of the three frequency groups given in Section 15.0.

15.X.Y.2 Sequence of Events and System Operation

For each initiating event, the following is discussed:

- sequence of events from event initiation to a final stabilized condition on a time scale and the required operator actions
- extent to which normally operating plant instrumentation and controls are assumed to function
- extent to which plant and reactor protection systems are required to function
- credit taken for the functioning of normally operating plant systems.
- operation of engineered safety systems
- consistency between the safety analyses and the emergency response guidelines/emergency procedure guidelines or EOP with respect to the operator response (including action time) and available instrumentation
- nonsafety-related systems or components credited in the design-basis analyses for mitigating the event consequences
- application of the definitions for active and passive failures to the analyses

For each initiating event, the effect of single failures and operator errors are discussed and evaluated.

15.X.Y.3 Core and System Performance

The mathematical models employed in the evaluation are discussed, including any approximations or simplifications. Digital computer programs or analog simulations used are identified and discussed. Detailed descriptions of mathematical models and computer programs are provided or incorporated by reference.

15.X (Event Category – General Information) (cont.)

DCD (cont.) The Section 1.6 Table includes, in part, the titles of topical reports that describe the models or computer codes used in the transient and accident analyses.

Suitably conservative input parameters and initial conditions are identified, and the bases for the selection thereof are discussed. Realistic initial values for the ATWS case are used.

Analytical results are described in appropriate detail. Key parameters as a function of time are presented. Margins between acceptable and predicted values are highlighted. Examples of parameters include:

- Neutron Power
- Thermal Power
- Heat Fluxes (Average and Maximum)
- Reactor Coolant System Pressure
- Minimum DNBR
- Reactor Coolant Conditions
- Maximum Fuel Centerline Temperature
- Reactor Coolant Inventory
- Secondary System Parameters
- ECCS Flow Rates

15.X.Y.4 Barrier Performance

The evaluation of parameters that may affect the performance of barriers, other than fuel cladding, that restrict or limit the transport of radioactive materials from the fuel to the public, is discussed.

The mathematical models used are discussed, including any approximations or simplifications used. Any differences between the models used to evaluate barrier performance and models used to evaluate core performance are identified and described. If the models used to evaluate barrier performance are significantly different from the models used to evaluate core performance, detailed descriptions of the barrier performance models are provided.

The Section 1.6 Table includes, in part, the titles of topical reports that describe the models or computer codes used in the transient and accident analyses.

Input parameters and initial conditions relevant to the evaluation of barrier performance that were not discussed under Section 15.X.Y.3 are presented and discussed.

15.X (Event Category – General Information) (cont.)

DCD (cont.) The results of the analyses are presented and described in detail. As a minimum, the following information is presented as a function of time for each transient or accident:

- Reactor Coolant System Pressure
- Steam Line Pressure
- Containment Pressure (if applicable)
- Relief and/or Safety Valve Flow Rate
- Flow Rate from the RCS to the Containment (if applicable)

15.X.Y.5 Radiological Consequences

Assumptions, parameters and calculational methods used to determine doses that result from limiting faults and infrequent incidents are summarized. Sufficient information, including input parameters, is provided to fully substantiate the analytical results and to allow an independent analysis to be performed. That is, this section includes all of the pertinent parameters that are required to calculate doses for the site exclusion boundary and LPZ, as well as locations within the exclusion boundary where significant site-related activities may occur.

If there are no radiological consequences associated with a given event, a statement is provided indicating that containment of activity is maintained and by what margin.

An analysis of each initiating event is provided, based on design basis assumptions acceptable for purposes of determining the adequacy of plant design to meet 10 CFR Part 100 criteria.

Any realistic analysis performed to help quantify margins is provided.

Assumptions and parameters used in the analysis are presented, consistent with Appendix C.I.15-C of RG 1.206, which provides a representative list of such items, and Appendix C.I.15-D of RG 1.206, which summarizes additional items to be provided when dealing with specific types of accidents.

Appendix 15A provides a diagram and explanation of the dose computational model (the "Containment Leakage Dose Model).

Assumptions and methodologies used in determining radiological consequences are supported with backup information presented herein, by reference to other DCD sections, or by reference citations, as applicable.

15.X (Event Category – General Information) (cont.)

DCD (cont.) The results of the radiological consequence calculations identify the potential two-hour integrated whole body and thyroid doses for the site exclusion boundary, and doses for the course of the accident at the closest boundary of the LPZ and, when significant, to the control room operators. Other organ doses are presented for those cases where a release of solid fission products or transuranic elements is postulated to be released to the containment atmosphere.

FSAR Same contents as mPower standard plant DCD supplemented by site-specific meteorological conditions and a listing of the SERs approving the submitted topical reports as applicable

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15.1 Increase in Heat Removal by the Secondary System

PSAR Following the "15.X.Y" format given above, PSAR Section 15.1 addresses the following events:

15.1.1 Decrease in Feedwater Temperature

15.1.2 Increase in Feedwater Flow

15.1.3 Increase in Steam Flow

15.1.4 Inadvertent Opening of a Steam Generator Relief or Safety Valve

15.1.5 Main Steam Line Failures

15.1.6 Inadvertent Operation of High Pressure Decay Heat Removal by the Auxiliary Condenser (Unique to mPower Reactor)

DCD Following the "15.X.Y" format given above, DCD Section 15.1 addresses the following events:

15.1.1 Decrease in Feedwater Temperature

15.1.2 Increase in Feedwater Flow

15.1.3 Increase in Steam Flow

15.1.4 Inadvertent Opening of a Steam Generator Relief or Safety Valve

15.1.5 Main Steam Line Failures

15.1.6 Inadvertent Operation of High Pressure Decay Heat Removal by the Auxiliary Condenser (Unique to mPower Reactor)

FSAR Same as the mPower standard plant DCD Section 15.1 supplemented by site-specific meteorological conditions as applicable.

15.2 Decrease in Heat Removal by the Secondary System

PSAR Following the "15.X.Y" format given above, PSAR Section 15.2 addresses the following events:

15.2.1 Loss of External Load

15.2.2 Turbine Trip

15.2.3 Loss of Condenser Vacuum

15.2.4 Closure of Main Steam Isolation Valve

15.2.5 Steam Pressure Regulator Failure

15.2.6 Loss of Non-Emergency AC Power to the Station Auxiliaries

15.2.7 Loss of Normal Feedwater Flow

15.2.8 Feedwater System Pipe Break Inside and Outside Containment

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DCD Following the "15.X.Y" format given above, DCD Section 15.2 addresses the following events:

15.2.1 Loss of External Load

15.2.2 Turbine Trip

15.2.3 Loss of Condenser Vacuum

15.2.4 Closure of Main Steam Isolation Valve

15.2.5 Steam Pressure Regulator Failure

15.2.6 Loss of Non-Emergency AC Power to the Station Auxiliaries

15.2.7 Loss of Normal Feedwater Flow

15.2.8 Feedwater System Pipe Break Inside and Outside Containment

---

FSAR Same as the mPower standard plant DCD Section 15.2 supplemented by site-specific meteorological conditions as applicable.

15.3 Decrease in Reactor Coolant System Flow

PSAR Following the "15.X.Y" format given above, PSAR Section 15.3 addresses the following events:

15.3.1 Loss of Forced Reactor Coolant Flow Including Trip of RCP Motor

15.3.2 Flow Controller Malfunctions

15.3.3 Reactor Coolant Pump Rotor Seizure

15.3.4 Reactor Coolant Pump Shaft Break

DCD Following the "15.X.Y" format given above, DCD Section 15.3 addresses the following events:

15.3.1 Loss of Forced Reactor Coolant Flow Including Trip of RCP Motor

15.3.2 Flow Controller Malfunctions

15.3.3 Reactor Coolant Pump Rotor Seizure

15.3.4 Reactor Coolant Pump Shaft Break

FSAR Same as the mPower standard plant DCD Section 15.3 supplemented by site-specific meteorological conditions as applicable.

15.4 Reactivity and Power Distribution Anomalies

PSAR Following the "15.X.Y" format given above, PSAR Section 15.4 addresses the following events:

15.4.1 Uncontrolled Control Rod Assembly Withdrawal from a Subcritical or Low-Power Startup Condition

15.4.2 Uncontrolled Control Rod Assembly Withdrawal at Power

15.4.3 Control Rod Misoperation (System Malfunction or Operator Error)

15.4.4 Startup of an Inactive Loop or Recirculation Loop at an Incorrect Temperature (Not applicable to mPower Reactor)

15.4.5 Flow Controller Malfunction Causing an Increase in BWR Core Flow Rate (Not applicable to mPower Reactor)

15.4.6 Inadvertent Decrease in Boron Concentration in the Reactor Coolant (Not applicable to mPower Reactor)

15.4.7 Inadvertent Loading and Operation of a Fuel Assembly in an Improper Position

15.4.8 Spectrum of Rod Ejection Accidents (PWR) (Not applicable to mPower Reactor)

15.4.9 Spectrum of Rod Drop Accidents (BWR) (Not applicable to mPower Reactor)

DCD Following the "15.X.Y" format given above, DCD Section 15.4 addresses the following events:

15.4.1 Uncontrolled Control Rod Assembly Withdrawal from a Subcritical or Low-Power Startup Condition

15.4.2 Uncontrolled Control Rod Assembly Withdrawal at Power

15.4.3 Control Rod Misoperation (System Malfunction or Operator Error)

15.4.4 Startup of an Inactive Loop or Recirculation Loop at an Incorrect Temperature (Not applicable to mPower Reactor)

15.4.5 Flow Controller Malfunction Causing an Increase in BWR Core Flow Rate (Not applicable to mPower Reactor).

15.4 Reactivity and Power Distribution Anomalies (cont.)

DCD (cont.)

15.4.6 Inadvertent Decrease in Boron Concentration in the Reactor Coolant (Not applicable to mPower Reactor)

15.4.7 Inadvertent Loading and Operation of a Fuel Assembly in an Improper Position

15.4.8 Spectrum of Rod Ejection Accidents (PWR) (Not applicable to mPower Reactor)

15.4.9 Spectrum of Rod Drop Accidents (BWR) (Not applicable to mPower Reactor)

FSAR Same as the mPower standard plant DCD Section 15.4 supplemented by site-specific meteorological conditions as applicable.

15.5 Increase in Reactor Coolant Inventory

PSAR Following the "15.X.Y" format given above, PSAR Section 15.5 addresses the following events:

15.5.1 Inadvertent Operation of Emergency Core Cooling System that Increases Reactor Coolant Inventory

15.5.2 Reactor Coolant Inventory and Purification System Malfunction that Increases Reactor Coolant Inventory

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DCD Following the "15.X.Y" format given above, DCD Section 15.5 addresses the following events:

15.5.1 Inadvertent Operation of Emergency Core Cooling System that Increases Reactor Coolant Inventory

15.5.2 Reactor Coolant Inventory and Purification System Malfunction that Increases Reactor Coolant Inventory

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FSAR Same as the mPower standard plant DCD Section 15.5 supplemented by site-specific meteorological conditions as applicable.

15.6 Decrease in Reactor Coolant Inventory

PSAR Following the "15.X.Y" format given above, PSAR Section 15.6 addresses the following events:

15.6.1 Inadvertent Opening of a PWR Pressurizer Pressure Relief Valve

15.6.2 Failure of Small Lines Carrying Primary Coolant Outside Containment

15.6.3 Steam Generator Tube Failure (PWR)

15.6.4 Main Steam Line Failure outside Containment (BWR) (Not applicable to mPower Reactor)

15.6.5 Loss-of-Coolant Accidents Resulting from Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary

15.6.6 Inadvertent Operation of the Normal Decay Heat Removal Function by the Reactor Coolant Inventory and Purification System (RCIPS) (Unique to mPower Reactor)

15.6.7 Inadvertent Reactor Coolant System Depressurization via the Emergency Core Cooling System Automatic Depressurization Valves (Unique to mPower Reactor)

15.6.8 Emergency Condenser Tube Rupture (Unique to mPower Reactor)

15.6.9 RCIPS Heat Exchanger Tube Rupture (Unique to mPower Reactor)

DCD Following the "15.X.Y" format given above, DCD Section 15.6 addresses the following events:

15.6.1 Inadvertent Opening of a PWR Pressurizer Pressure Relief Valve

15.6.2 Radiological Consequences of the Failure of Small Lines Carrying Primary Coolant Outside Containment

15.6.3 Radiological Consequences of a Steam Generator Tube Failure (PWR)

15.6.4 Radiological Consequences of Main Steam Line Failure outside Containment (BWR) (Not applicable to mPower Reactor)

15.6 Decrease in Reactor Coolant Inventory (cont.)

DCD (cont.)

15.6.5 Loss-of-Coolant Accidents Resulting from Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary

15.6.6 Inadvertent Operation of the Normal Decay Heat Removal Function by the Reactor Coolant Inventory and Purification System (Unique to mPower Reactor)

15.6.7 Inadvertent Reactor Coolant System Depressurization via the Emergency Core Cooling System Low Pressure Sparger (Unique to mPower Reactor)

15.6.8 Emergency Condenser Tube Rupture (Unique to mPower Reactor)

15.6.9 RCIPS Heat Exchanger Tube Rupture (Unique to mPower Reactor)

FSAR Same as the mPower standard plant DCD Section 15.6 supplemented by site-specific meteorological conditions as applicable.

15.7 Radioactive Release from Subsystem or Component

PSAR Following the "15.X.Y" format given above, PSAR Section 15.7 addresses the following events:

15.7.1 Gaseous Waste Management System Leak or Failure

15.7.2 Liquid Waste Management System Leak or Failure (Atmospheric Release)

15.7.3 Release of Radioactivity to the Environment Due to a Liquid Tank Failure

15.7.4 Radiological Consequences of Fuel Handling Accidents

15.7.5 Spent Fuel Cask Drop Accidents

15.7.6 Emergency Core Cooling System Condenser Tube Rupture (Unique to mPower Reactor)

15.7.7 Reactor Coolant System Inventory and Purification System Condenser Tube Rupture (Unique to mPower Reactor)

DCD Following the "15.X.Y" format given above, DCD Section 15.7 addresses the following events:

15.7.1 Gaseous Waste Management System Leak or Failure

15.7.2 Liquid Waste Management System Leak or Failure (Atmospheric Release)

15.7.3 Release of Radioactivity to the Environment Due to a Liquid Tank Failure

15.7.4 Radiological Consequences of Fuel Handling Accidents

15.7.5 Spent Fuel Cask Drop Accidents

15.7.6 Emergency Core Cooling System Condenser Tube Rupture (Unique to mPower Reactor)

15.7.7 Reactor Coolant System Inventory and Purification System Condenser Tube Rupture (Unique to mPower Reactor)

FSAR Same as the mPower standard plant DCD Section 15.7 supplemented by site-specific meteorological conditions as applicable.

15.8 Anticipated Transients without Scram

PSAR Following the general guidance given in Section 15.0, the following information is provided in PSAR Section 15.8:

15.8.1 Identification of ATWS Causes and Frequency Classification

15.8.2 ATWS Rule (10 CFR 50.62) Design Requirements

15.8.3 ATWS Design

15.8.4 Conclusions

DCD Following the general guidance given in Section 15.0, the following information is provided in DCD Section 15.8:

15.8.1 Identification of ATWS Causes and Frequency Classification

15.8.2 ATWS Rule (10 CFR 50.62) Design Requirements

15.8.3 ATWS Design

15.8.4 Conclusions

FSAR Same as the mPower standard plant DCD Section 15.8.

15.9 BWR Core Stability

PSAR	This section applies to BWRs only and is not applicable to mPower Reactor.
DCD	This section applies to BWRs only and is not applicable to mPower Reactor.
FSAR	This section applies to BWRs only and is not applicable to mPower Reactor.

15.10 Spent Fuel Pool Criticality and Boron Dilution Analysis

PSAR The mPower Reactor does not use boron in the spent fuel pool, and therefore, this section is not applicable to mPower reactor design.

DCD The mPower Reactor does not use boron in the spent fuel pool, and therefore, this section is not applicable to the mPower reactor design.

FSAR The mPower Reactor does not use boron in the spent fuel pool, and therefore, this section is not applicable to the mPower reactor design.

Appendix 15A Evaluation Models and Parameters for Analysis of the Radiological Consequences of Accidents

PSAR Appendix 15A provides a general discussion of the evaluation models and parameters used in the PSAR Chapter 15 analyses and a diagram and explanation of the dose computational model (the "Containment Leakage Dose Model.)

DCD Appendix 15A provides a detailed discussion of the evaluation models and parameters used in the DCD Chapter 15 analyses and a diagram and explanation of the dose computational model (the "Containment Leakage Dose Model.

FSAR Same as the mPower standard plant DCD Appendix 15A supplemented by site-specific meteorological conditions as applicable.

Clinch River Regulatory Framework Document
NRC Version

Section Number/Title	Submittal Document	Regulatory Requirements	Proposed Exemptions	Regulatory Basis for Section Content	NUREG-0800 (SRP) Section	Regulatory Guidance (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
16.0 Technical Specifications	PSAR	10CFR50.36 10CFR50.36a 10CFR50.36(c)(2)(ii)	None	RG 1.70, Section 16.0 - Note this section is an introductory/summary section only.	16.0	NUREG-1430 (Rev.3) NRC-Approved TSTFs (as applicable)	None	Yes - Updated TS Requirements per NUREG-1430	No	None	16.1 16.2
	DCD	10CFR50.34(b)(6)(vi) 10CFR50.36 10CFR50.36a 10CFR50.36(c)(2)(ii) 10CFR52.47(a)(11)	None	RG 1.206, Section C.I.16 - Note this section is an introductory/summary section only.	16.0	NUREG-1430 (Rev.3) NRC-Approved TSTFs (as applicable)	None	N/A	N/A	None	16.1 16.2
	FSAR	10CFR50.34(b)(6)(vi) 10CFR50.36 10CFR50.36a 10CFR50.36(c)(2)(ii)	None	RG 1.206, Section 16.0 - Note this section is an introductory/summary section only.	16.0	NUREG-1430 (Rev.3) NRC-Approved TSTFs (as applicable)	None	N/A	No	None	16.1 16.2
16.1 Technical Specifications	PSAR	10CFR50.36 10CFR50.36a 10CFR50.36(c)(2)(ii)	None	RG 1.70, Section 16.1 (Titled Preliminary Technical Specifications) Note: NUREG-1430 will be the primary guidance document for development of the Clinch River Technical Specifications and will also be informed by NUREGs-1431 through 1432, as well as the DCDs for the AP1000 and ESBWR. In addition, approved and under review Technical Specification Task Force (TSTF) Travelers will be considered in development of the Technical Specifications.	16.0 16.1	NUREG-1430 (Rev.3) NRC-Approved TSTFs (as applicable)	None	Yes - Updated TS Requirements per NUREG-1430	No	1) Need determination if exemption to 10 CFR 50.54(m) requirements is needed on minimum Control Room staffing 2) mPower currently has no plans to develop risk informed Technical Specifications; however, risk-informed analysis may be required to support new system Technical Specifications or increased surveillance intervals. 2) There is a potential that Fukushima event will result in additional requirements that will need to be incorporated into the technical specifications for new license applicants.	19.1
	DCD	10CFR50.34(b)(6)(vi) 10CFR50.36 10CFR50.36a 10CFR52.47(a)(11) 10CFR50.36(c)(2)(ii)	None	RG 1.206, Section C.I.16 Note: NUREG-1430 will be the primary guidance document for development of the generic mPower Technical Specifications, and will also be informed by NUREGs-1431 through 1432, as well as DCDs for the AP1000 and ESBWR. In addition, approved and under review Technical Specification Task Force (TSTF) Travelers will be considered in development of the generic mPower Technical Specifications.	16.0 16.1	NUREG-1430 (Rev.3) NRC-Approved TSTFs (as applicable)	None	N/A	N/A	1) Need determination if exemption to 10 CFR 50.54(m) requirements is needed on minimum Control Room staffing 2) mPower currently has no plans to develop risk informed Technical Specifications; however, risk-informed analysis may be required to support new system Technical Specifications or increased surveillance intervals. 2) There is a potential that Fukushima event will result in additional requirements that will need to be incorporated into the technical specifications for new license applicants.	19.1
	FSAR	10CFR50.34(b)(6)(vi) 10CFR50.36 10CFR50.36a 10CFR50.36(c)(2)(ii)	None	RG 1.206, Section C.I.16 Note: NUREG-1430 will be the primary guidance document for development of the Technical Specifications, and will be informed by NUREGs-1431 through 1432, as well as the DCDs for AP1000 and ESBWR. In addition, approved and under review Technical Specification Task Force (TSTF) Travelers will be considered in development of the Technical Specifications.	16.0 16.1	NUREG-1430 (Rev.3) NRC-Approved TSTFs (as applicable)	None	N/A	No	1) Need determination if exemption to 10 CFR 50.54(m) requirements is needed on minimum Control Room staffing 2) mPower currently has no plans to develop risk informed Technical Specifications; however, risk-informed analysis may be required to support new system Technical Specifications or increased surveillance intervals. 2) There is a potential that Fukushima event will result in additional requirements that will need to be incorporated into the technical specifications for new license applicants.	19.1

Note:
RG revisions are not identified as these will be consistent with the version in effect 6 months prior the PSAR submittal.

CLINCH RIVER
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Chapter 16 Outline

16 Technical Specifications

16.0 Introduction

PSAR PSAR Section 16.0 provides introductory and summary information on the Clinch River SMR Plant preliminary Technical Specifications (TS) and associated Bases, which are consistent with the format and content of NUREG-1430, "Standard Technical Specifications Babcock and Wilcox Plants," and applicable approved changes provided in Technical Specification Task Force (TSTF) Travelers. The introduction describes:

- development of the TS based on preliminary numerical values, graphs, tables, and other data
- approach used for development of the TS Bases that references applicable PSAR sections and clarifying details for each specification
- justification for proposed deletions from or additions to the Standard Technical Specifications (STS) provided in NUREG-1430 or approved TSTF Travelers

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DCD DCD Section 16.0 provides introductory and summary information on the mPower standard plant generic TS and associated Bases, which are consistent with the format and content of NUREG-1430, "Standard Technical Specifications Babcock and Wilcox Plants," and applicable approved changes provided in TSTF Travelers. The introduction describes:

- development of the TS based on relevant numerical values, graphs, tables, and other data
- approach used for development of the TS Bases that references applicable DCD sections and clarifying details for each specification
- discussion on the use of brackets to identify preliminary information to be provided by a Combined License (COL) applicant that is pending completion of design details, equipment selection, or other efforts not sufficiently complete to finalize the information required in TS
- justification for information provided that replaces information bracketed in the STS or approved TSTF Travelers
- justification for proposed deletions from or additions to the Standard Technical Specifications (STS) provided in NUREG-1430 or approved TSTF Travelers

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Chapter 16 Outline

16.0 Introduction (cont.)

FSAR Same contents as mPower standard plant DCD Section 16.0 with updated plant-specific information as needed

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Chapter 16 Outline

16.1 Technical Specifications

PSAR PSAR Section 16.1 provides the preliminary technical specifications (TS) and associated TS Bases consistent with the format and content of NUREG-1430, "Standard Technical Specifications Babcock and Wilcox Plants," and applicable approved changes provided in TSTF Travelers. As outlined in Table 1 below, the preliminary TS include the following categories of information as required by 10 CFR 50.36 and 10 CFR 50.36a:

- Safety Limits
- Limiting Safety System Settings
- Limiting Conditions for Operation (LCOs) and associated remedial actions
- Surveillance Requirements
- Design Features
- Administrative Controls, including requirements on effluents containing radioactive material

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DCD DCD Section 16.1 provides the mPower standard plant generic TS and associated Bases consistent with the content and format of NUREG-1430 and applicable approved TSTF Travelers. As outlined in Table 1 below, the generic TS include the following categories of information as required by 10 CFR 50.36 and 10 CFR 50.36a:

- Safety Limits
- Limiting Safety System Settings
- Limiting Conditions for Operation (LCOs) and associated remedial actions
- Surveillance Requirements
- Design Features
- Administrative Controls, including requirements on effluents containing radioactive material

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Chapter 16 Outline

16.1 Technical Specifications (cont.)

FSAR Same contents of mPower standard plant DCD Section 16.1 with plant-specific supplemental information as needed, including:

- plant-specific values to replace bracketed information in generic TS based on updated numerical values, graphs, tables, and other data to reflect final refinements in design, results of tests or experiments, and expected method of operation
- information required for plant-specific adoption of topical reports listed in the mPower standard plant generic TS bases
- as applicable, justifications for any deviation from referenced topical reports or the required information

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CLINCH RIVER
REGULATORY FRAMEWORK DOCUMENTS

Chapter 16 Outline

Table 1

Technical Specification Outline
Applicable to PSAR/DCD/FSAR

TS Section
1.0 Use and Application
2.0 Safety Limits
3.0 LCO Applicability
3.0 Surveillance Requirement(SR) Applicability
3.1 Reactivity Control Systems
3.2 Power Distribution Limits
3.3 Instrumentation
3.4 Reactor Coolant System (RCS)
3.5 Emergency Core Cooling System (ECCS)
3.6 Containment Systems
3.7 Plant Systems
3.8 Electrical Power Systems
3.9 Refueling Operations
4.0 Design Features
5.0 Administrative Controls
BASES

Note: Outline based on NUREG-0800, Section 16.0