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

October 14, 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
SECOND REGULATORY FRAMEWORK WORKSHOP**

Reference: TVA letter to NRC dated August 24, 2011, "Clinch River Construction Permit (CRCP) Project, First 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 Chapter 1, PSAR Sections 3.1-3.2, 3.3, 3.5, 3.6, 3.10, 3.11, and 3.12-3.13, PSAR Sections 9.2, 9.3, 9.5.2, 9.5.3, 9.5.4, and Chapter 11

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 3, 2011 public meeting. Please contact Thomas Spink at (423) 751-7062 if you have questions.

Sincerely,

Andrea L. Sterdis
Senior Manager, Strategic Nuclear Expansion
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Attachment
cc: See Page 2

D104
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cc: w/Attachment

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U.S Nuclear Regulatory Commission
October 14, 2011

Attachment

Regulatory Framework Documents and Section Outlines
Chapter 1
Section 3.1-3.2
Section 3.3
Section 3.5
Section 3.6
Section 3.10
Section 3.11
Section 3.12-3.13
Section 9.2
Section 9.3
Sections 9.5.2, 9.5.3, 9.5.4
Chapter 11

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
1.0 Introduction and General Description of the Plant	PSAR	10 CFR 2.390 10 CFR 21 10 CFR 50.33 10 CFR 50.34 10 CFR 50.43	None	RG 1.70 and SRP Chapter 1	1.0	Division 1 RGs, as applicable Division 4 RGs, as applicable Division 5 RGs, as applicable Division 8 RGs, as applicable BLs and GLs issued after latest applicable SRP revision and 6 months before application submittal ISGs, as applicable NUREG-0933 RIS 2005-26 SECY-04-191 SECY-93-087	None	Yes - Chapter 1 will also include information on hazards related to construction activities at multi-unit sites, TMI and other GSIs applicability (NUREG-0933), operational Experience, and Advanced and Evolutionary LWR issues consistent with latest version of SRP Chapter 1.0	No	Track NRC issuance of final versions of draft RGs/SRP Sections and new RG/SRP Sections, GLs, Bulletins, etc.	This section incorporates general information from each area of the PSAR.
	DCD	10 CFR 2.390 10 CFR 21 10 CFR 50.33 10 CFR 50.34 10 CFR 50.43 10 CFR 52.46 10 CFR 52.47	None	RG 1.206 and SRP Chapter 1	1.0	Division 1 RGs, as applicable Division 4 RGs, as applicable Division 5 RGs, as applicable Division 8 RGs, as applicable BLs and GLs issued after latest applicable SRP revision and 6 months before application submittal ISGs, as applicable NUREG-0933 RIS 2005-26 SECY-04-191 SECY-93-087	None	N/A	N/A	Track NRC issuance of final versions of draft RGs/SRP Sections and new RG/SRP Sections, GLs, Bulletins, etc.	This section incorporates general information from each area of the DCD.

Clinch River Regulatory Framework Document
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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
1.0 Introduction and General Description of the Plant	FSAR	10 CFR 2.390 10 CFR 21 10 CFR 50.33 10 CFR 50.34 10 CFR 50.43	None	RG 1.206 and SRP Chapter 1	1.0	Division 1 RGs, as applicable Division 4 RGs, as applicable Division 5 RGs, as applicable Division 8 RGs, as applicable BLs and GLs issued after latest applicable SRP revision and 6 months before application submittal ISGs, as applicable NUREG-0933 RIS 2005-26 SECY-04-191 SECY-93-087	None	N/A	No	Track NRC issuance of final versions of draft RGs/SRP Sections and new RG/SRP Sections, GLs, Bulletins, etc.	This section incorporates general information from each area of the FSAR.

Notes:
(1) 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 1 Outline

1.0 Introduction and General Description of the Plant

PSAR PSAR Chapter 1 provides an introduction to the Clinch River Construction Permit Application (CPA), including a general description of the plant and the principal aspects of the overall application. Specific information provided in Chapter 1 is outlined below:

- Introduction
  - brief discussion of the principal aspects of the CPA, including type of license requested; number of plant units; plant location; type of nuclear steam supply system (NSSS) and containment structure and its associated designers; core thermal power levels; net electrical output; anticipated construction, startup, and date of commercial operation for each unit; and information on the format and content of the CPA

- General Plant Description
  - preliminary description of the principal design criteria, operating characteristics, NSSS safety characteristics, engineered safety features (ESFs) and emergency systems, instrumentation and control (I&C) and electrical systems, power conversion system, fuel handling and storage, water and auxiliary systems, and radwaste management systems
  - general arrangement of major structures and equipment
  - features of special interest as they relate to safety

- Comparison with Other Facilities
  - table(s) comparing reactor design parameters, ESFs, containment concepts, electrical and I&C (EI&C) systems, radwaste systems, and other principal systems with similar designs of comparable power level

- Identification of Agents and Contractors
  - identification of the primary agents or contractors, including principal consultants and outside service organizations, involved with the design, construction, and operation of the Clinch River SMR Plant
  - delineation of the division of responsibility among the reactor designer, architect-engineer, constructor, and plant operator

- Requirement for Additional Technical Information
  - description, and discussion on safety features or components requiring further technical information in support of a construction permit
  - description of the performance of new safety features

- Material Referenced
  - table(s) of information filed separately with the NRC in support of the CPA, including a listing of information on other dockets to be referenced
  - non-proprietary summary of references submitted under 10 CFR 2.390

Chapter 1 Outline

1.0 Introduction and General Description of the Plant (cont.)

PSAR (cont.)

- Drawings and Other Detailed Information
  - table(s) of proprietary and non-proprietary instrumentation and control (I&C) drawings and electrical single-line diagrams, including legends for electrical power, instrumentation and control, lighting, and communication drawings
  - table(s) of piping and instrumentation drawings (P&IDs)

- Conformance with Regulatory Criteria
  - table(s) indicating the extent of compliance to applicable NRC regulatory guides in Divisions 1, 4, 5, and 8 (including the revision number) in effect 6 months prior to the CPA submittal
  - table(s) indicating extent of compliance with the SRP in effect 6 months prior to the CPA submittal
  - description of deviations from RGs and SRP guidance and justification for any alternative approaches used to establish compliance, including use of Interim Staff Guidance (ISG) documents
  - table(s) providing proposed technical resolutions of unresolved safety issues (USIs) and medium- and high-priority GSIs and TMI Action Plan Items identified in the version of NUREG-0933 issued up to 6 months prior to the CPA
  - table(s) describing how operational experience has been incorporated in the plant design based on reviews of generic letters and bulletins; 10 CFR 21 notifications; and licensing and policy issues documented in applicable SECY papers and associated Staff Requirements Memoranda (SRMs) for advanced and evolutionary light-water reactor designs
  - identified deviations from RGs and SRP guidance, and justification for any alternative approaches used to establish compliance

- Nuclear Power Plants to be Operated on Multi-Unit Sites
  - evaluations of potential hazards to SSCs important to safety of operating units resulting from construction activities
  - identification of managerial and administrative controls to ensure limiting conditions for operations are not exceeded on operating units during construction

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DCD

Chapter 1 of the mPower standard plant DCD presents an introduction to the Design Certification Application (DCA), including a general description of the plant and the principal aspects of the overall application. Specific information provided in Chapter 1 is outlined below:

- Introduction
  - type of license requested, number of plant units, type of nuclear steam supply system (NSSS) and containment structure, core thermal power levels, net electrical output and information on the format and content of the DCA

Chapter 1 Outline

1.0 Introduction and General Description of the Plant (cont.)

DCD (cont.)

- identification of COL Information Items for an applicant to provide plant location information, scheduled completion date, and estimated commercial operation date

- General Plant Description
  - principal design criteria, operating characteristics, NSSS safety characteristics, engineered safety features (ESFs) and emergency systems, instrumentation and control (I&C) and electrical systems, power conversion system, fuel handling and storage, water systems, radwaste management systems
  - general arrangement of major structures and equipment
  - features of special interest as they relate to safety

- Comparison with Other Facilities
  - table(s) comparing reactor design parameters, ESFs, containment concepts, electrical and I&C (EI&C) systems, radwaste systems, and other principal systems with similar designs of comparable power level

- Identification of Agents and Contractors
  - identification of the primary agents or contractors, including principal consultants and outside service organizations, involved with the mPower standard plant design and division of responsibilities
  - identification of a COL Information Item for an applicant to identify the major agents, contractors, and participants for the COL application development, construction, and operation along with the division of responsibilities

- Requirements for Additional Technical Information
  - identification and description of safety features or components requiring further technical information in support of COL applicants
  - performance of new safety features

- Material Referenced
  - table of information filed separately with the NRC in support of the application, including a listing of information on other dockets to be referenced
  - non-proprietary summary descriptions of references submitted under 10 CFR 2.390

- Drawings and Other Detailed Information
  - list of proprietary and non-proprietary EI&C drawings
  - piping and instrumentation drawings (P&IDs)
  - information on computer codes used and detailed geologic, seismologic, and foundation engineering information

Chapter 1 Outline

1.0 Introduction and General Description of the Plant (cont.)

DCD (cont.)

- Interfaces
  - description of interfaces between the mPower standard plant design and an application submitted under 10 CFR 52 that references the mPower standard plant design
  - information on design features that are outside the scope of the standard plant design and a representative conceptual design for those portions of the plant for which the application does not seek certification

- Conformance with Regulatory Criteria
  - table(s) indicating the extent of compliance to applicable NRC regulatory guides in Divisions 1, 4, 5, and 8 (including the revision number) in effect 6 months prior to the DCA submittal
  - table(s) indicating extent of compliance with the SRP in effect 6 months prior to the DCA submittal
  - description of deviations from RGs and SRP guidance and justification for any alternative approaches used to establish compliance, including use of Interim Staff Guidance (ISG) documents
  - table(s) providing proposed technical resolutions of unresolved safety issues (USIs) and medium- and high-priority GSIs and TMI Action Plan Items identified in the version of NUREG-0933 issued up to 6 months prior to the DCA
  - table(s) describing how operational experience have been incorporated in the mPower standard plant design based on reviews of generic letters and bulletins; 10 CFR 21 notifications; and licensing and policy issues documented in applicable SECY papers and associated SRMs for advanced and evolutionary light-water reactor designs
  - identified deviations from RGs and SRP guidance, and justification for any alternative approaches used to establish compliance

- Nuclear Power Plants to be Operated on Multi-Unit Sites
  - identification of COL Information Item for an applicant to evaluate: a) potential hazards to SSCs important to safety of operating units resulting from construction activities of the mPower standard plant design, and b) description of managerial and administrative controls to ensure limiting conditions for operations are not exceeded on operating units as a result of construction activities at multi-unit sites

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FSAR Same contents as PSAR and mPower standard plant DCD Chapter 1 with the following supplemental information:

- identification of significant changes that have been made to the plant since submittal of the PSAR, including interfaces and exceptions to the mPower standard plant design

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Chapter 1 Outline

1.0 Introduction and General Description of the Plant (cont.)

FSAR (cont.)

- identification of special technical information developed to establish the final design or to demonstrate conservatism in the design
- discussion on any programs to be conducted during operations to demonstrate acceptability of contemplated future changes in design or modes of operation
- results of tests and analyses referenced and summarized in the appropriate section(s) of the FSAR

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
3.1 Conformance with U.S. Nuclear Regulatory Commission General Design Criteria	PSAR	10 CFR Part 50 App. A	Yes - GDC 17	RG 1.70	N/A	None	None	No	No	None	Chapters 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 18
	DCD	10 CFR Part 50 App. A	Yes - GDC 17	RG 1.206	N/A	None	None	N/A	N/A	None	Chapters 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 18
	FSAR	10 CFR Part 50 App. A	Yes - GDC 17	RG 1.206	N/A	None	None	N/A	No	None	Chapters 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 18
3.2.1 Seismic Classification	PSAR	10 CFR Part 50 App. A, GDC 1, 2, 61 10 CFR Part 100, App A 10 CFR Part 50, App B 10 CFR Part 50, App S 10 CFR 50.34(a)(12)	No	RG 1.70 Note: PSAR Section 3.2.1 also addresses seismic classification guidelines provided in RGs 1.143, 1.151, and 1.189. In addition, PSAR Section 3.2.1 defines the OBE load as one-third of SSE in accordance with 10 CFR 50, Appendix S.	3.2.1	RGs 1.29, 1.143, 1.151, 1.189	None	Yes Seismic classifications also based on RGs 1.143, 1.151, and 1.189.	No	1) The SSC classification tables may need to reflect risk categories to support risk-informed reviews per SECY-11-0024 2) Fukushima Lessons Learned may have impact on seismic classifications	Sections 3.2, 3.8, 3.9, 3.10, 3.11, 9.5, 11.2, 11.3, 11.4, 17.5
	DCD	10 CFR Part 50 App. A, GDC 1, 2, 61, 10 CFR Part 100 App. A 10 CFR Part 50, App. B 10 CFR Part 50, App. S 10 CFR 52.47(b)(1)	No	RG 1.206	3.2.1	RGs 1.29, 1.143, 1.151, 1.189	None	N/A	N/A	1) The SSC classification tables may need to reflect risk categories to support risk-informed reviews per SECY-11-0024 2) Fukushima Lessons Learned may have impact on seismic classifications	Sections 3.2, 3.8, 3.9, 3.10, 3.11, 9.5, 11.2, 11.3, 11.4, 17.5
	FSAR	10 CFR Part 50 App. A, GDC 1, 2, 61, 10 CFR Part 100 App. A 10 CFR Part 50, App. B 10 CFR Part 50, App. S 10 CFR 50.34(b)(10)	No	RG 1.206	3.2.1	RGs 1.29, 1.143, 1.151, 1.189	None	N/A	No	1) The SSC classification tables may need to reflect risk categories to support risk-informed reviews per SECY-11-0024 2) Fukushima Lessons Learned may have impact on seismic classifications	Sections 3.2, 3.8, 3.9, 3.10, 3.11, 9.5, 11.2, 11.3, 11.4, 17.5

Clinch River Regulatory Framework Document
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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
3.2.2 System Quality Group Classification	PSAR	10 CFR 50.55a 10 CFR Part 50, Appendix A GDC 1 10 CFR Part 50, Appendix B 10 CFR 50.69	No	RG 1.70 Note: PSAR Section 3.2.2 also addresses system quality group classifications based on RGs 1.143, 1.151, and 1.189.	3.2.2	RGs 1.26, 1.84, 1.143, 1.151, 1.189, 1.201 SECY 93-087	ANSI/ASME B16.34, 2009 ANSI/ASME B31.1, 2007 API Standard 620, 2010 API Standard 650, 2009 ASME BPVC Section III, Div I, 2007 (2008 Addenda) ASME BPVC Section VIII, Div 1, 2007 (2008 Addenda) AWWA D100, 2011 Other Codes and standards as defined in system calculations and design bases	Yes System Quality Group Classifications also based on RGs 1.143, 1.151, and 1.189.	No	1) The SSC classification tables may need to reflect risk categories to support risk-informed reviews per SECY-11-0024 2) Fukushima Lessons Learned may have impact on system quality group classifications	Sections 3.2, 3.9, 3.10, 3.11, 5.2, 6.6, 17.5
	DCD	10 CFR 50.55a 10 CFR Part 50, Appendix A GDC 1 10 CFR Part 50, Appendix B 10 CFR 50.69 10 CFR 52.47(b)(1)	No	RG 1.206	3.2.2	RGs 1.26, 1.84, 1.143, 1.151, 1.189, 1.201 SECY 93-087	ANSI/ASME B16.34, 2009 ANSI/ASME B31.1, 2007 API Standard 620, 2010 API Standard 650, 2009 ASME BPVC Section III, Div I, 2007 (2008 Addenda) ASME BPVC Section VIII, Div 1, 2007 (2008 Addenda) AWWA D100, 2011 Other Codes and standards as defined in system calculations and design bases	N/A	N/A	1) The SSC classification tables may need to reflect risk categories to support risk-informed reviews per SECY-11-0024 2) Fukushima Lessons Learned may have impact on system quality group classifications	Sections 3.2, 3.9, 3.10, 3.11, 5.2, 6.6, 17.5
	FSAR	10 CFR 50.55a 10 CFR Part 50, Appendix A GDC 1 10 CFR Part 50, Appendix B 10 CFR 50.69	No	RG 1.206	3.2.2	RGs 1.26, 1.84, 1.143, 1.151, 1.189, 1.201 SECY 93-087	ANSI/ASME B16.34, 2009 ANSI/ASME B31.1, 2007 API Standard 620, 2010 API Standard 650, 2009 ASME BPVC Section III, Div I, 2007 (2008 Addenda) ASME BPVC Section VIII, Div 1, 2007 (2008 Addenda) AWWA D100, 2011 Other Codes and standards as defined in system calculations and design bases	N/A	No	1) The SSC classification tables may need to reflect risk categories to support risk-informed reviews per SECY-11-0024 2) Fukushima Lessons Learned may have impact on system quality group classifications	Sections 3.2, 3.9, 3.10, 3.11, 5.2, 6.6, 17.5
		Notes: (1) RG revisions are not identified as these will be consistent with the version in effect 6 months prior to the PSAR submittal.									

Sections 3.1 and 3.2 Outline

3.1 Conformance with U.S. Nuclear Regulatory Commission General Design Criteria

PSAR Conformance with 10 CFR 50, Appendix A, General Design Criteria (GDC) for the Clinch River SMR Plant is demonstrated based on the following information:

- description of extent to which standard plant and site-specific structures, systems, and components (SSCs) important to safety meet the GDC requirements specified in 10 CFR 50, Appendix A
- summary description of how the principal plant design features of the Clinch River SMR plant design meet each of the GDCs
- justification for any identified exceptions to the GDCs
- references to applicable PSAR sections where additional details are provided to demonstrate compliance with or exceptions to the GDCs

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DCD Conformance with 10 CFR 50, Appendix A, GDC is demonstrated for the mPower standard plant design based on the following information:

- description of extent to which standard plant SSCs important to safety meet the GDC requirements specified in 10 CFR 50, Appendix A
- summary description of how the principal plant design features of the mPower standard plant design meet each of the GDCs
- justification for any identified exceptions to the GDCs
- references to applicable DCD sections where additional details are provided to demonstrate compliance with or exceptions to the GDCs

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FSAR Same contents as mPower Standard Plant DCD Section 3.1 with supplemental information for site-specific SSCs

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Sections 3.1 and 3.2 Outline

3.2.1 Seismic Classification

PSAR PSAR Section 3.2.1 includes the following information regarding the seismic classification of the Clinch River SMR Plant SSCs:

- description of the seismic classification categories, regulatory basis used for determining the seismic classifications, and any exceptions to identified regulatory guidance
- identification of Seismic Category I SSCs that are designed to remain functional in the event of a safe shutdown earthquake (SSE) based on RG 1.29
- identification of those portions of SSCs not required to remain functional following an earthquake, but whose failure could impact the function of a Seismic Category I safety feature or result in incapacitating injury to control room occupants
- identification of the radioactive waste management SSCs that require seismic design considerations based on RG 1.143
- identification of instrument sensing lines that require seismic design considerations based on RG 1.151
- definition of operating basis earthquake (OBE) as one-third of the SSE in accordance with 10 CFR 50, Appendix S
- identification of portions of fire protection SSCs requiring some level of seismic design considerations based on RG 1.189

DCD DCD Section 3.2.1 includes the following information regarding the seismic classification the mPower standard plant SSCs:

- description of the seismic classification categories, regulatory basis used for determining the seismic classifications, and any exceptions to identified regulatory guidance
- identification of Seismic Category I SSCs that are designed to remain functional in the event of an SSE based on RG 1.29
- identification of those portions of SSCs not required to remain functional following an earthquake, but whose failure could impact the function of a Seismic Category I safety feature or result in incapacitating injury to control room occupants
- description of the radioactive waste management SSCs that require seismic design considerations based on RG 1.143
- identification of instrument sensing lines that require seismic design considerations based on RG 1.151
- definition of OBE as one-third of the SSE in accordance with 10 CFR 50, Appendix S
- identification of portions of fire protection SSCs requiring some level of seismic design consideration based on RG 1.189

Sections 3.1 and 3.2 Outline

3.2.1 Seismic Classification (cont.)

FSAR Same contents as mPower standard plant DCD Section 3.2.1 with supplemental information for site-specific SSCs

Sections 3.1 and 3.2 Outline

3.2.2 System Quality Group Classification

PSAR PSAR Section 3.2.2 includes the following information regarding the system quality group classifications for the Clinch River SMR Plant fluid systems and components:

- description of the system quality group classification categories, regulatory basis used for determining these classifications, and any exceptions to regulatory guidelines
- justification for each quality group classification in terms of the system's safety function and approach used for identification of the quality group classification boundaries for each safety-related system
- tables including the following information:
  - identification of those fluid systems, or portions, that are important to safety and the industry codes and standards applicable to each pressure-retaining component
  - identification of the system quality group classifications based on RG 1.26
  - description of the radioactive waste management system quality group classifications based on RG 1.143
  - description of the instrument sensing line quality group classifications based on RG 1.151
  - description of the quality group classification for fire protection SSCs based on RG 1.189

DCD DCD Section 3.2.2 includes the following information regarding the system quality group classifications for the mPower standard plant SSCs:

- description of the system quality group classification categories, regulatory basis used for determining these classifications, and any exceptions to regulatory guidelines
- justification for each quality group classification in terms of the system's safety function and approach used for identification of the quality group classification boundaries for each safety-related system
- tables including the following information:
  - identification of those fluid systems, or portions, that are important to safety and the industry codes and standards applicable to each pressure-retaining component
  - identification of the system quality group classifications based on RG 1.26
  - description of the radioactive waste management system quality group classifications based on RG 1.143
  - description of the instrument sensing line quality group classifications based on RG 1.151
  - description of the quality group classification for fire protection SSCs based on RG 1.189

Sections 3.1 and 3.2 Outline

3.2.2 System Quality Group Classification (cont.)

FSAR Same contents as mPower standard plant DCD Section 3.2.2 with supplemental information for site-specific SSCs

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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	Content Consistent with Previous PSARs	Changes to the Standard Plant Design	Key Issues	Related Sections
3.3.1 Wind Loadings	PSAR	10 CFR 50, App. A, GDC 2	No	RG 1.70 Note PSAR Section 3.3.1 will also address hurricane wind loads based on new draft RG, DG-1247	3.3.1	RG 1.76 DG-1247, "Design-Bases Hurricane and Hurricane Missiles for Nuclear Power Plants" Draft NUREG/CR-7005	ASCE/SEI 7-05	Yes - Also address hurricane wind loads per DG-1247	Yes	No	Track NRC issuance of final RG for DG-1247 and final version of NUREG/CR-7005	2.0, 2.3
	DCD	10 CFR 50, App. A, GDC 2 10 CFR 52.47(b)(1)	No	RG 1.206	3.3.1	RG 1.76 DG-1247 Draft NUREG/CR-7005	ASCE/SEI 7-05	N/A	N/A	N/A	Track NRC issuance of final RG for DG-1247 and final version of NUREG/CR-7005	2.0, 2.3
	FSAR	10 CFR 50, App. A, GDC 2	No	RG 1.206	3.3.1	RG 1.76 DG-1247 Draft NUREG/CR-7005	ASCE/SEI 7-05	N/A	N/A	No	Track NRC issuance of final RG for DG-1247 and final version of NUREG/CR-7005	2.0, 2.3

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	Content Consistent with Previous PSARs	Changes to the Standard Plant Design	Key Issues	Related Sections
3.3.2 Tornado and Hurricane Loadings	PSAR	10 CFR 50, App. A, GDC 2	No	RG 1.70 Note: PSAR Section 3 3 2 will also address hurricane loads based on new draft RG, DG-1247	3.3.2	RG 1.76 DG-1247 Draft NUREG/CR-7005	ASCE/SEI 7-05	Yes - Also address hurricane loads per DG-1247	Yes	No	Track NRC issuance of final RG for DG-1247 and final version of NUREG/CR-7005	2.0, 2.3, 3.5.1.4, 3.5.3
	DCD	10 CFR 50, App. A, GDC 2 10 CFR 52.47(b)(1)	No	RG 1.206 Note: DCD Section 3 3 2 will also address hurricane loads based on new draft RG, DG-1247	3.3.2	RG 1.76 DG-1247 Draft NUREG/CR-7005	ASCE/SEI 7-05	N/A	N/A	N/A	Track NRC issuance of final RG for DG-1247 and final version of NUREG/CR-7005	2.0, 2.3, 3.5.1.4
	FSAR	10 CFR 50, App. A, GDC 2	No	RG 1.206 Note: FSAR Section 3 3 2 will also address hurricane loads based on new draft RG, DG-1247	3.3.2	RG 1.76 DG-1247 Draft NUREG/CR-7005	ASCE/SEI 7-05	N/A	N/A	No	Track NRC issuance of final RG for DG-1247 and final version of NUREG/CR-7005	2.0, 2.3, 3.5.1.4, 3.5.3

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

Section 3.3 Outline

3.3.1 Wind Loadings

PSAR The design-basis wind loads of structures that must withstand the effects of the specified design-basis wind speed at the Clinch River site are defined to demonstrate conformance with 10 CFR 50, Appendix A, GDC 2. PSAR Section 3.3.1 addresses the following information:

- definition of the design-basis wind load characteristics, including:
  - basic wind speed
  - associated recurrence interval
  - exposure category
  - importance factor
  - general wind pressure coefficients
- description of procedures used to transform wind velocity into the effective loads on structures, including:
  - structure-specific wind pressure distributions, including any variation with height
  - structure-specific wind pressure coefficients, including gust factors
- description of approach to ensure that failures of structures or components not designed for the design-basis wind loads will not affect the ability of other structures and components to perform their intended safety functions

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DCD The design-basis wind loads that the mPower standard plant structures must withstand are defined to demonstrate conformance with 10 CFR 50, Appendix A, GDC 2. DCD Section 3.3.1 provides the following information:

- design-basis wind load site parameters for Seismic Category I structures, including design wind velocity, recurrence interval, vertical velocity profiles, importance factor, exposure category and wind gust factors
- methods used to transform wind velocities into the effective pressures applied to structures, including wind force distribution and shape coefficients along with references and assumptions
- description of approach to ensure that failures of structures or components not designed for the design basis wind loads do not affect the ability of other structures and components to perform their intended safety functions

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FSAR Same contents as PSAR Section 3.3.1 with the following supplemental information:

- comparison of Clinch River site design-basis wind characteristics with the mPower standard plant design-basis wind site parameters

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Section 3.3 Outline

3.3.2 Tornado and Hurricane Loadings

PSAR The design-basis tornado and hurricane loadings of structures that must withstand the effects of the specified design-basis tornado and hurricane at the Clinch River site are defined to demonstrate conformance with 10 CFR 50, Appendix A, GDC 2. PSAR Section 3.3.2 addresses the following information:

- definition of the design-basis tornado characteristics, including:
  - maximum wind speed
  - maximum rotational speed
  - maximum translational speed
  - maximum pressure drop
  - rate of pressure drop
  - characterization of tornado-generated missiles
- definition of the design-basis hurricane characteristics
- description of procedures used to transform tornado and hurricane characteristics into effective loads on structures, including:
  - wind pressure coefficients
  - wind and differential pressure distributions
  - venting effects (if used)
  - tornado- and hurricane-generated missiles
- identification of the various combinations of the loading factors that produce the most adverse total tornado and hurricane effect on structures
- description of approach to ensure that failures of structures or components not designed for the design-basis tornado and hurricane loads will not affect the ability of other structures and components to perform their intended safety functions

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DCD The design-basis tornado and hurricane loadings that the mPower standard plant structures must withstand are defined to demonstrate conformance with 10 CFR 50, Appendix A, GDC 2. DCD Section 3.3.2 addresses the following:

- definition the design-basis tornado site parameters, including relative velocity, pressure differential and associated time interval, and spectrum and pertinent characteristics of tornado generated missiles
- definition the design-basis hurricane site parameters
- description of procedures used to transform tornado and hurricane site parameters into effective loads on structures, including shape coefficients, pressure distributions, venting effects (if used), and tornado-and hurricane-generated missile loads
- identify the various combinations of the loading factors that produce the most adverse total tornado and hurricane effect on the mPower standard plant structures

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Section 3.3 Outline

3.3.2 Tornado and Hurricane Loadings (cont.)

DCD (cont.)

- describe the approach to ensure that failures of structures or components not designed for tornados or hurricanes do not affect the ability of other structures and components to perform their intended safety functions

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FSAR

Same contents as PSAR Section 3.3.2 with the following supplemental information:

- comparison of Clinch River site design-basis tornado and hurricane characteristics with those of mPower standard plant design-basis tornado and hurricane site parameters

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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
3.5.1.1 Internally-Generated Missiles (Outside Containment)	PSAR	10 CFR 50, App. A, GDC 4	No	RG 1.70 Note: PSAR Section 3.5.1.1 will also provide the evaluation approach for protection against low trajectory turbine missiles per RG 1.115.	3.5.1.1	RG 1.115 NUREG/CR-3551	None	Yes - Consistent with RG 1.206 also address information on low trajectory turbine missiles per RG 1.115	No	Determine need to risk-inform the missile analysis per DG-1217 (Proposed Rev. 2 of RG 1.115)	3.2 3.5.3 3.6.2 3.5.1.3
	DCD	10 CFR 50, App. A, GDC 4 10 CFR 52.47(b)(1)	No	RG 1.206	3.5.1.1	RG 1.115 NUREG/CR-3551	None	N/A	N/A	Determine need to risk-inform the missile analysis per DG-1217 (Proposed Rev. 2 of RG 1.115)	3.2 3.5.3 3.6.2 3.5.1.3
	FSAR	10 CFR 50, App. A, GDC 4	No	RG 1.206	3.5.1.1	RG 1.115 NUREG/CR-3551	None	N/A	No	Determine need to risk-inform the missile analysis per DG-1217 (Proposed Rev. 2 of RG 1.115)	3.2 3.5.3 3.6.2 3.5.1.3
3.5.1.2 Internally-Generated Missiles (Inside Containment)	PSAR	10 CFR 50, App. A, GDC 4	No	RG 1.70	3.5.1.2	None	None	No	No	None	3.5.3 3.6.2
	DCD	10 CFR 50, App. A, GDC 4 10 CFR 52.47(b)(1)	No	RG 1.206	3.5.1.2	None	None	N/A	N/A	None	3.5.3 3.6.2
	FSAR	10 CFR 50, App. A, GDC 4	No	RG 1.206	3.5.1.2	None	None	N/A	No	None	3.5.3 3.6.2
3.5.1.3 Turbine Missiles	PSAR	10 CFR 50, App. A, GDC 4 10 CFR 100	No	RG 1.70 Note: PSAR Section 3.5.1.3 will also provide the evaluation approach for protection against low trajectory turbine missiles per RG 1.115.	3.5.1.3	RG 1.115 RG 1.117	None	Yes - Consistent with RG 1.206 also address information on low trajectory turbine missiles per RG 1.115.	No	Determine need to risk-inform the missile analysis per DG-1217 (Proposed Rev. 2 of RG 1.115)	3.5.2 3.5.3 3.9.6 10.2
	DCD	10 CFR 50 App. A, GDC 4 10 CFR 100 10 CFR 52.47(b)(1)	No	RG 1.206	3.5.1.3	RG 1.115 RG 1.117	None	N/A	N/A	Determine need to risk-inform the missile analysis per DG-1217 (Proposed Rev. 2 of RG 1.115)	3.5.2 3.5.3 3.9.6 10.2
	FSAR	10 CFR 50 App. A, GDC 4 10 CFR 100	No	RG 1.206	3.5.1.3	RG 1.115 RG 1.117	None	N/A	No	Determine need to risk-inform the missile analysis per DG-1217 (Proposed Rev. 2 of RG 1.115)	3.5.2 3.5.3 3.9.6 10.2

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
3.5.1.4 Missiles Generated By Tornadoes and Extreme Winds	PSAR	10 CFR 50, App. A, GDC 2 10 CFR 50, App. A, GDC 4	No	RG 1.70 Note. Consistent with RG 1.206, missile selection will be based on RG 1.76. PSAR Section 3.5.1.4 will include a description of postulated missiles generated by natural phenomena. Structures and/or barriers used for missile protection is addressed in Section 3.5.3	3.5.1.4	RG 1.76 DG-1247 Draft NUREG/CR-7004	None	Yes - Missile selection will be based on RG 1.76 and DG-1247	No	None	2.2 2.3 3.5.2 3.5.3
	DCD	10 CFR 50, App. A, GDC 2 10 CFR 50, App. A, GDC 4 10 CFR 52.47(b)(1)	No	RG 1.206	3.5.1.4	RG 1.76 DG-1247 Draft NUREG/CR-7004	None	N/A	N/A	None	2.2 2.3 3.5.2 3.5.3
	FSAR	10 CFR 50, App. A, GDC 2 10 CFR 50, App. A, GDC 4	No	RG 1.206	3.5.1.4	RG 1.76 DG-1247 Draft NUREG/CR-7004	None	N/A	No	None	2.2,3 2.3.1 3.5.2 3.5.3
3.5.1.5 Site Proximity Missiles (Except Aircraft)	PSAR	10 CFR 50, App. A, GDC 4 10 CFR 50.34(a)(1)(ii) 10 CFR 100 10 CFR 100.20 10 CFR 100.21	No	RG 1.70	3.5.1.5	RG 1.117 RG 1.91	None	RG 1.206 includes the following additional requirement: Identify SSCs that have the potential for unacceptable missile damage and estimate the total probability of the missiles striking a vulnerable critical area of the plant.	No	None	2.2 3.5.2 3.5.3
	DCD	10 CFR 50, App. A, GDC 4 10 CFR 50.34(a)(1)(ii) 10 CFR 100 10 CFR 100.20 10 CFR 100.21 10 CFR 52.47(b)(1)	No	RG 1.206	3.5.1.5	RG 1.117 RG 1.91	None	N/A	N/A	None	2.2 3.5.2 3.5.3

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
3.5.1.6 Aircraft Hazards	FSAR	10 CFR 50, App. A, GDC 4 10 CFR 100 10 CFR 100.20 10 CFR 100.21	No	RG 1.206	3.5.1.5	RG 1.117 RG 1.91	None	N/A	No	None	2.2 3.5.2 3.5.3
	PSAR	10 CFR 50, App. A, GDC 3 10 CFR 50.34(a)(1)(ii) 10 CFR 100 10 CFR 100.20 10 CFR 100.21	No	RG 1.70	3.5.1.6	RG 1.117	None	No	No	None	2.2 3.5.2 3.5.3 9.5.1
	DCD	10 CFR 50, App. A, GDC 3 10 CFR 100 10 CFR 100.20 10 CFR 100.21 10 CFR 52.47(a) 10 CFR 52.47(b)(1)	No	RG 1.206	3.5.1.6	RG 1.117	None	N/A	N/A	None	2.2 3.5.2 3.5.3 9.5.1
	FSAR	10 CFR 100 10 CFR 100.20 10 CFR 100.21	No	RG 1.206	3.5.1.6	RG 1.117	None	N/A	No	None	2.2 3.5.2 3.5.3 9.5.1

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
3.5.2 SSCs to be Protected from Externally Generated Missiles	PSAR	10 CFR 50, App. A, GDC 2 10 CFR 50, App. A, GDC 4	No	RG 1.70 Note: PSAR Section 3.5.2 will also address SSCs categorized as RTNSS	3.5.2	RG 1.13 RG 1.27 RG 1.115 RG 1.117	None	Yes - Will address SSCs categorized as RTNSS	No	Determine need to risk-inform the missile analysis per DG-1217 (Proposed Rev. 2 of RG 1.115)	3.5.1.4 3.5.1.5 3.5.1.6 3.5.3
	DCD	10 CFR 50, App. A, GDC 2 10 CFR 50, App. A, GDC 4 10 CFR 52.47(b)(1)	No	RG 1.206	3.5.2	RG 1.13 RG 1.27 RG 1.115 RG 1.117	None	N/A	N/A	Determine need to risk-inform the missile analysis per DG-1217 (Proposed Rev. 2 of RG 1.115)	3.5.1.4 3.5.1.5 3.5.1.6 3.5.3
	FSAR	10 CFR 50, App. A, GDC 2 10 CFR 50, App. A, GDC 4	No	RG 1.206	3.5.2	RG 1.13 RG 1.27 RG 1.115 RG 1.117	None	N/A	No	Determine need to risk-inform the missile analysis per DG-1217 (Proposed Rev. 2 of RG 1.115)	3.5.1.4 3.5.1.5 3.5.1.6 3.5.3
3.5.3 Barrier Design Procedures	PSAR	10 CFR 50, App. A, GDC 2 10 CFR 50, App. A, GDC 4	No	RG 1.70	3.5.3	RG 1.76 RG 1.142	ANSI/AISC N690, 2006 ACI 349, 2006 "A Review of Procedures for the Analysis and Design of Concrete Structures to Resist Missile Impact Effects," R.P. Kennedy, 1976 ASCE Manuals and Reports on Engineering Practice No. 58, "Structural Analysis and Design on Nuclear Plant Facilities", 1980 Bechtel Power Corp. Topical Report, BC-TOP-9A, "Design of Structures for Missile Impact," Rev. 2, 1974 "Impact Effect of Fragments Striking Structural Elements," by R.A. Williamson and R.R. Alvy, 1973	No	No	None	3.5.1 3.5.2
3.5.3 Barrier Design Procedures	DCD	10 CFR 50, App. A, GDC 2 10 CFR 50, App. A, GDC 4 10 CFR 52.47(b)(1)	No	RG 1.206	3.5.3	RG 1.76 RG 1.142	ANSI/AISC N690, 2006 ACI 349, 2006 "A Review of Procedures for the Analysis and Design of Concrete Structures to Resist Missile Impact Effects," R.P. Kennedy, 1976 ASCE Manuals and Reports on Engineering Practice No. 58, "Structural Analysis and Design on Nuclear Plant Facilities", 1980 Bechtel Power Corp. Topical Report, BC-TOP-9A, "Design of Structures for Missile Impact," Rev. 2, 1974 "Impact Effect of Fragments Striking Structural Elements," by R.A. Williamson and R.R. Alvy, 1973	N/A	N/A	None	3.5.1 3.5.2

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
	FSAR	10 CFR 50, App. A, GDC 2 10 CFR 50, App. A, GDC 4	No	RG 1.206	3.5.3	RG 1.76 RG 1.142	ANSI/AISC N690, 2006 ACI 349, 2006 "A Review of Procedures for the Analysis and Design of Concrete Structures to Resist Missile Impact Effects," R.P. Kennedy, 1976 ASCE Manuals and Reports on Engineenng Practice No. 58, "Structural Analysis and Design on Nuclear Plant Facilities", 1980 Bechtel Power Corp. Topcal Report, BC-TOP-9A, "Design of Structures for Missile Impact, " Rev. 2. 1974 "Impact Effect of Fragments Striking Structural Elements," by R A. Williamson and R.R. Alvy, 1973	N/A	No	None	3.5.1 3.5.2

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 3.5 Outline

3.5.1.1 Missile Protection – Internally-Generated Missiles (Outside Containment)

PSAR PSAR Section 3.5.1.1 includes the following information regarding protection of the Clinch River SMR Plant structures, systems and components (SSCs) from internally-generated missiles (outside containment):

- preliminary description of SSCs to be protected against damage from internally-generated missiles and their design bases
- description of the safety-related SSCs outside containment that require protection from internally-generated missiles including:
  - locations of SSCs
  - applicable seismic category and quality group classifications (referenced from PSAR Section 3.2)
  - references to PSAR sections where SSCs are described, including applicable schematic representations
- preliminary identification of proposed missiles to be protected against, their source, and the bases for selection, including secondary and gravitational missiles (e.g., falling objects resulting from a nonseismically designed SSC during a seismic event)
- description of proposed missile protection provided
- proposed evaluation approach for the ability of SSCs to withstand the effects of selected internally-generated missiles
- proposed evaluation approach for internally generated missile effects on nonsafety-related SSCs in areas with safety-related SSCs should the failure of the nonsafety-related SSCs affect an intended safety function of the safety-related SSCs

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DCD DCD Section 3.5.1.1 includes the following information regarding protection of the mPower standard plant SSCs from internally-generated missiles (outside containment):

- description of the SSCs that are to be protected against damage from internally-generated missiles and their design bases
- description of the safety-related SSCs outside containment that require protection from internally-generated missiles including:
  - locations of SSCs
  - applicable seismic category and quality group classifications (referenced from DCD Section 3.2)
  - references to DCD sections where SSCs are described, including applicable drawings or P&IDs
- identification of missiles to be protected against, their source, and the bases for selection, including secondary and gravitational missiles (e.g., falling objects resulting from a nonseismically designed SSC during a seismic event)
- description of missile protection provided

Section 3.5 Outline

3.5.1.1 Missile Protection – Internally-Generated Missiles (Outside Containment) (cont.)

DCD (cont)

- evaluation approach for the ability of SSCs to withstand the effects of selected internally-generated missiles
- evaluation approach for internally generated missile effects on nonsafety-related SSCs in areas with safety-related SSCs should the failure of the nonsafety-related SSCs affect an intended safety function of the safety-related SSCs

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FSAR Same contents as mPower standard plant DCD Section 3.5.1.1 with the following site-specific supplemental information:

- description of plant procedures in place prior to fuel load that specify control of unsecured equipment, including portable pressurized gas cylinders located outside containment.

Section 3.5 Outline

3.5.1.2 Missile Protection – Internally-Generated Missiles (Inside Containment)

PSAR PSAR Section 3.5.1.2 includes the following information regarding protection of the Clinch River SRM Plant SSCs from internally-generated missiles (inside containment):

- preliminary identification of SSCs inside containment that should be protected from internally-generated missiles
- proposed demonstration of separation and independence of those SSCs protected by redundancy rather than physical barriers against very low probability missile strikes
- identification of SSCs protected by physical barriers
- identification of missiles associated with overspeed failures of rotating components, with primary and secondary failures of high-pressure system components, and those due to gravitational effects
- description of the safety-related SSCs inside containment that require protection from internally-generated missiles including:
  - proposed location of SSCs
  - missiles to be protected against, their sources, and the bases for their selection for analysis
  - description of missile protection provided and barrier evaluation approach for each identified missile

---

DCD DCD Section 3.5.1.2 includes the following information regarding protection of the mPower standard plant SSCs from internally-generated missiles (inside containment):

- identification of plant SSCs inside containment that should be protected from internally-generated missiles
- demonstration of separation and independence of those SSCs protected by redundancy rather than physical barriers against very low probability missile strikes
- identification of SSCs protected by physical barriers
- identification of missiles associated with overspeed failures of rotating components, with primary and secondary failures of high-pressure system components, and those due to gravitational effects
- description of the safety-related SSCs inside containment that require protection from internally-generated missiles including:
  - locations of SSCs
  - missiles to be protected against, their sources, and the bases for their selection for analysis
  - description of missile protection provided and barrier evaluation approach for each identified missile

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Section 3.5 Outline

3.5.1.2 Missile Protection – Internally-Generated Missiles (Inside Containment) (cont.)

FSAR Same contents as mPower standard plant DCD Section 3.5.1.2 with the following site-specific supplemental information:

- description of plant procedures in place prior to fuel load that specify control of unsecured equipment, including portable pressurized gas cylinders located inside containment

---

Section 3.5 Outline

3.5.1.3 Missile Protection – Turbine Missiles

PSAR PSAR Section 3.5.1.3 includes the following information regarding protection of the Clinch River SMR Plant SSCs from turbine missiles:

- preliminary description of proposed turbine placement and orientation, including indication of whether the turbine orientation is favorable or unfavorable relative to the placement of the containment and other SSCs important to safety
- preliminary identification of SSCs important to safety within the hazard zone
- preliminary description of postulated turbine missiles, including missile properties and mathematical models and assumptions used in the analysis of such items as missile selection, turbine casing penetration, and missile trajectories
- preliminary probability analysis of low and high-trajectory turbine missiles including analysis methods, assumptions, and results
- reference to PSAR Section 10.2 for preliminary approach for the analysis of destructive overspeed
- reference to PSAR Section 10.2 for preliminary descriptions of the turbine overspeed protection system, proposed turbine valve testing (parameters pertinent to overspeed protection), plans for in-service inspection and testing program used to maintain an acceptably low probability of missile generation, and turbine characteristics pertinent to the evaluation of its failure characteristics (rotor materials and properties, operation, transient, startup, trips, and overspeed parameters)
- preliminary figure(s) showing turbine placement, orientation within the plant layout, and identification of target areas (SSCs important to safety)
- analysis of the potential for a turbine missile from one mPower plant impacting another plant at a multi-unit Clinch River site
- preliminary evaluation of turbine missiles from other on-site sources, if applicable

---

DCD DCD Section 3.5.1.3 includes the following information regarding protection of the mPower standard plant SSCs from turbine missiles:

- description of turbine placement and orientation, including indication of whether the turbine orientation is favorable or unfavorable relative to the placement of the containment and other SSCs important to safety
- identification of SSCs important to safety within the hazard zone
- description of postulated turbine missiles, including missile properties and mathematical models and assumptions used in the analysis of such items as missile selection, turbine casing penetration, and missile trajectories
- probability analysis of low and high-trajectory turbine missiles, including analysis methods, assumptions, and results

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Section 3.5 Outline

3.5.1.3 Missile Protection – Turbine Missiles (cont.)

DCD (cont.)

- reference to DCD Section 10.2 for approach for the analysis of destructive overspeed
- reference to DCD Section 10.2 for preliminary descriptions of the turbine overspeed protection system, proposed turbine valve testing (parameters pertinent to overspeed protection), plans for in-service inspection and testing program used to maintain an acceptably low probability of missile generation, and turbine characteristics pertinent to the evaluation of its failure characteristics (rotor materials and properties, operation, transient, startup, trips, and overspeed parameters)
- a COL applicant item to address the potential for a turbine missile from one mPower plant impacting another plant at a multi unit site or provide evaluation of a turbine missile from other on-site sources, if applicable
- figure(s) showing turbine placement, orientation within the plant layout, and identification of target areas (SSCs important to safety)

FSAR Same contents as mPower standard plant DCD Section 3.5.1.3 with the following site-specific supplemental information:

- analysis of the potential for a turbine missile from one mPower plant impacting another plant at a multi unit Clinch River site
- evaluation of turbine missiles from other on-site sources, if applicable

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Section 3.5 Outline

3.5.1.4 Missile Protection – Missiles Generated by Tornadoes and Extreme Winds

PSAR PSAR Section 3.5.1.4 includes the following information on missiles generated by tornadoes and extreme winds at the Clinch River site:

- description of postulated missiles generated as a result of high-speed winds such as tornadoes, hurricanes, and any other extreme winds, including the origin, dimensions, mass, energy, velocity, trajectory, and other parameters required to determine missile penetration

---

DCD DCD Section 3.5.1.4 includes the following information regarding missiles generated by tornadoes and extreme winds for the mPower standard plant:

- description of postulated missiles generated as a result of high-speed winds produced by the design-basis tornado and design-basis hurricane including the origin, dimensions, mass, energy, velocity, trajectory, and other parameters required to determine missile penetration

---

FSAR Same contents as mPower standard plant DCD Section 3.5.1.4 with the following site-specific supplemental information:

- description of site-specific postulated missiles if site conditions exceed the DCD design basis spectrum of tornado and hurricane missiles

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Section 3.5 Outline

3.5.1.5 Missile Protection – Site Proximity Missiles (Except Aircraft)

PSAR PSAR Section 3.5.1.5 includes the following information regarding site proximity missiles at the Clinch River site:

- identification of anticipated missile sources resulting from accidental explosions in the vicinity of the site, based on the nature and extent of nearby industrial, transportation, and military facilities (other than aircraft) as identified in PSAR Sections 2.2.1-2.2.3
- estimate of probability that a site proximity missile would strike a vulnerable critical area of the plant
- characterization of missile sources in terms of dimensions, mass, energy, velocity, trajectory, and energy density; missile sources include train explosions (including rocket effects), truck explosions, ship or barge explosions, industrial facilities (where different types of materials are processed, stored, used, or transported), pipeline explosions, and military facilities (if the total probability of missile strike is greater than an order of magnitude of 10^{-7} per year)

DCD DCD Section 3.5.1.5 includes the following information regarding site proximity missiles:

- reference to a COL item for Section 2.2 for the COL Applicant to conduct a site-specific evaluation of potential hazards from missiles in the vicinity of the site

---

FSAR Same contents PSAR Section 3.5.1.5 with supplemental information (as needed) regarding site-specific missiles

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Section 3.5 Outline

3.5.1.6 Missile Protection – Aircraft Hazards

PSAR PSAR Section 3.5.1.6 includes the following information regarding aircraft hazards at the Clinch River site:

- evaluation of aircraft hazards based on probability of an aircraft accident as described in PSAR Section 2.2
- identification of parameters used in the aircraft accident evaluation analyses (if needed), including justification for all assumptions and data
- information related to the aircraft selected as design basis impact event, including dimensions, mass (e.g., variations along the length of the aircraft), energy, velocity, trajectory, and energy density (if aircraft accident evaluation is required)

DCD DCD Section 3.5.1.6 includes the following information regarding aircraft hazards for the mPower standard plant:

- reference to COL Item in DCD Section 2.2 for the COL applicant to verify the site parameters with respect to aircraft crashes and air transportation accidents are bounded.

FSAR Same contents as PSAR Section 3.5.1.6 with supplemental information (if needed) for updated information on aircraft hazards

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Section 3.5 Outline

3.5.2 Structures, Systems, and Components to be Protected from Externally Generated Missiles

PSAR PSAR Section 3.5.2 includes the following information regarding SSCs to be protected from externally generated missiles at the Clinch River site:

- preliminary identification of SSCs necessary for safe shutdown of the reactor facility and those whose failure could result in a significant release of radioactivity
- proposed approach to demonstrate that safety-related SSCs are adequately protected against very low probability missile strikes by physical barriers or protective structures
- preliminary identification of any RTNSS systems which need adequate separation from safety-related SSCs to prevent any failure of a non-safety-related SSC from preventing a safety-related SSC from performing its intended function

---

DCD DCD Section 3.5.2 includes the following information regarding SSCs to be protected from externally generated missiles for the mPower standard plant:

- identification of SSCs necessary for safe shutdown of the reactor facility and those whose failure could result in a significant release of radioactivity.
- description of approach to demonstrate that safety-related SSCs are adequately protected against very low probability missile strikes by physical barriers or protective structures
- description of any important to safety systems which need adequate separation from safety-related SSCs to prevent any failure of a non-safety-related SSC from preventing a safety-related SSC from performing its intended function

---

FSAR Same contents as mPower standard plant DCD Section 3.5.2 with the following site-specific supplemental information as needed:

- evaluation of site-specific postulated missiles if site conditions exceed the DCD design basis spectrum of tornado and hurricane missiles

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Section 3.5 Outline

3.5.3 Barrier Design Procedures

PSAR PSAR Section 3.5.3 includes the following information regarding barrier design procedures at the Clinch River site:

- preliminary description of the procedures by which each structure or barrier will be designed to resist the missile hazards previously identified including:
  - proposed methods used to predict local damage in the impact area, including depth of penetration
  - proposed methods used to estimate barrier thickness required to prevent perforation
  - proposed methods used to predict concrete barrier potential for generating secondary missiles by spalling and scabbing effects
  - proposed methods used to predict the overall response of the barrier and portions thereof to missile impact, including assumptions on acceptable ductility ratios and estimates of forces, moments, and shears induced in the barrier by the impact force of the missile
  - preliminary resultant loading curves on structures are defined if an accidental aircraft evaluation is required

---

DCD DCD Section 3.5.3 includes the following information regarding barrier design procedures for the mPower standard plant:

- description of the procedures by which each structure or barrier will be designed to resist the missile hazards previously identified including:
  - methods used to determine local damage in the impact area, including depth of penetration
  - methods used to determine barrier thickness required to prevent perforation
  - methods used to determine concrete barrier potential for generating secondary missiles by spalling and scabbing effects
  - methods used to determine the overall response of the barrier and portions thereof to missile impact, including ductility ratios and forces, moments, and shears induced in the barrier by the impact force of the missile, including results of barrier analyses

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FSAR Same contents as mPower standard plant DCD Section 3.5.3 with the following site-specific supplemental information as needed:

- description of any site-specific barriers required
- resultant loading curves on structures are defined if an accidental aircraft evaluation is 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
3.6.1 Plant Design for Protection against Postulated Piping Failures in Fluid Systems Outside of Containment	PSAR	10 CFR Part 50, App. A, GDC 2, 4	No	RG 1.70	3.6.1 BTP 3-3 BTP 3-4	RG 1.29 RG 1.11	ASME Section III, 2007 w/ 2008 Addenda ASME B31.1, 2007 ASME Section XI, 2007 w/ 2008 Addenda	No	No	None	3.2, 3.4, 3.6.2, 3.6.3, 3.8.4, 3.11, 6.2.1, 6.6
	DCD	10 CFR Part 50, App. A, GDC 2, 4 10 CFR 52.47(b)(1)	No	RG 1.206	3.6.1 BTP 3-3 BTP 3-4	RG 1.29 RG 1.11	ASME Section III, 2007 w/ 2008 Addenda ASME B31.1, 2007 ASME Section XI, 2007 w/ 2008 Addenda	N/A	N/A	None	3.2, 3.4, 3.6.2, 3.6.3, 3.8.4, 3.11, 6.2.1, 6.6
	FSAR	10 CFR Part 50, App. A, GDC 2, 4	No	RG 1.206	3.6.1 BTP 3-3 BTP 3-4	RG 1.29 RG 1.11	ASME Section III, 2007 w/ 2008 Addenda ASME B31.1, 2007 ASME Section XI, 2007 w/ 2008 Addenda	N/A	N/A	None	3.2, 3.4, 3.6.2, 3.6.3, 3.8.4, 3.11, 6.2.1, 6.6
3.6.2 Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping	PSAR	10 CFR Part 50, App. A, GDC 4 10 CFR 100	No	RG 1.70 and SRP Section 3.6.2, Item II.1.A	3.6.2 BTP 3-3 BTP 3-4	NUREG-0609 RG 1.29 RG 1.11	ANSI/ANS 58.2, 1998 ASME B31.1, 2007 ASME Section III, 2007 w/ 2008 Addenda ASME Section XI, 2007 w/ 2008 Addenda	No	No	None	3.6.1, 3.6.3, 3.8.3, 3.8.4, 3.11, 5.2.4, 6.2.4, 6.3, 6.6
	DCD	10 CFR Part 50, App. A, GDC 4 10 CFR 52.47(b)(1) 10 CFR 100	No	RG 1.206	3.6.2 BTP 3-3 BTP 3-4	NUREG-0609 RG 1.29 RG 1.11	ANSI/ANS 58.2, 1998 ASME B31.1, 2007 ASME Section III, 2007 w/ 2008 Addenda ASME Section XI, 2007 w/ 2008 Addenda	N/A	N/A	None	3.6.1, 3.6.3, 3.8.3, 3.8.4, 3.11, 5.2.4, 6.2.4, 6.3, 6.6
	FSAR	10 CFR Part 50, App. A, GDC 4 10 CFR 100	No	RG 1.206	3.6.2 BTP 3-3 BTP 3-4	NUREG-0609 RG 1.29 RG 1.11	ANSI/ANS 58.2, 1998 ASME B31.1, 2007 ASME Section III, 2007 w/ 2008 Addenda ASME Section XI, 2007 w/ 2008 Addenda	N/A	N/A	None	3.6.1, 3.6.3, 3.8.3, 3.8.4, 3.11, 5.2.4, 6.2.4, 6.3, 6.6
3.6.3 Leak-before-Break Evaluation Procedures	PSAR	10 CFR Part 50, App. A, GDC 4	No	Leak-before-Break will not be applied to the Clinch River design.	N/A	N/A	N/A	No	N/A	None	N/A
	DCD	10 CFR Part 50, App. A, GDC 4		Leak-before-Break will not be applied to the Generation mPower design.				N/A			
	FSAR	10 CFR Part 50, App. A, GDC 4		Leak-before-Break will not be applied to the Clinch River design				N/A			
		Notes									
		(1) RG revisions are not identified as these will be consistent with the version in effect 6 months prior to the PSAR submittal									

Section 3.6 Outline

3.6.1 Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment

PSAR The Clinch River SMR Plant PSAR Section 3.6.1 includes the following information regarding protection against postulated piping failures in fluid systems outside containment:

- description and preliminary table(s) identifying those structures, systems, and components (SSCs) outside of containment which are important to plant safety or shutdown that are located near high- or moderate-energy piping systems and are susceptible to the consequences of failure of these piping systems, including their relation to predetermined piping failure locations in accordance with PSAR Section 3.6.2, the limiting conditions under which each SSC may still operate, and the design approach taken to protect each SSC
- preliminary figure(s) showing typical piping runs with failure locations identified for postulated piping failures in fluid systems outside containment

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DCD The mPower standard plant DCD Section 3.6.1 includes the following information regarding protection against postulated piping failures in fluid systems outside containment:

- description and the results of failure mode and effects analysis (FMEA) to verify that the consequences of failures of high- or moderate-energy lines do not affect the ability to shutdown the plant, including the following:
  - identification of the locations and types of failures considered (e.g., circumferential or longitudinal pipe breaks, through-wall cracks, leakage cracks) and the dynamic effects associated with the failures (e.g., pipe whip, jet impingement). The potential effects of secondary missiles are also considered
  - explanation of the assumptions made in the analyses
  - description of the effects of piping failures in systems not designed to seismic Category I standards on essential systems and components, assuming concurrent failure of a single active component and a loss of offsite power (LOOP)
  - description of the environmental effects of pipe rupture (e.g., temperature, humidity, pressure, spray-wetting, flooding), including potential transport of the steam environment to other rooms or compartments, and the subsequent effects on the functional performance of essential electrical equipment and instrumentation
  - description of the effects of postulated failures on habitability of the control room and access to areas important to safe control of post accident operations

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Section 3.6 Outline

3.6.1 Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment (cont.)

DCD (cont.)

- table(s) identifying those SSCs outside of containment which are important to plant safety or shutdown that are located near high- or moderate-energy piping systems and are susceptible to the consequences of failure of these piping systems, including their relation to predetermined piping failure locations in accordance with DCD Section 3.6.2, the limiting conditions under which each SSC may still operate, and a description of the design approach taken to protect each SSC
- table(s) listing high- and moderate-energy lines outside containment which run in proximity to SSCs important to safety, including a description of the layout of all piping systems where physical separation of the piping systems provides the required protection, a description of the design basis of structures and compartments used where protection of safety-related SSCs is provided by enclosing in protective structures, and a description of the arrangements to ensure the operability of safety features where neither separation nor protective enclosures are practical
- figure(s) showing typical piping runs with failure locations identified for postulated piping failures in fluid systems outside containment

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FSAR Same contents as mPower standard plant DCD Section 3.6.1.

Section 3.6 Outline

3.6.2 Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping

PSAR The Clinch River SMR Plant PSAR Section 3.6.2 includes the following information regarding determination of rupture locations and dynamic effects associated with the postulated rupture of piping:

- description of proposed criteria used to define postulated break and crack locations in high- and moderate-energy piping systems for which separation or enclosure cannot be achieved for piping inside and outside of containment, as well as the configuration for each break/crack. For containment penetration cases, include identification of process pipe welds, access for in-service inspection of welds, points of fixity, and points of geometric discontinuity
- identification of any proposed exceptions to be taken to the referenced pipe break location and configuration criteria and a description of the justification
- description of proposed design criteria for containment penetration guard pipe assemblies, including purpose (extension of containment, overpressure prevention, etc.) and description of moment-limiting pipe restraints (criteria for design of the internal process pipe, design criteria for flued head and bellows expansion joints, design criteria applicable to the guard pipe, and description for method of access for in-service inspections)
- description of proposed analytical methods to be used to define forcing functions and response models to be used for the pipe whip dynamic response analyses, including:
    - definitions of direction, thrust coefficients, rise time, magnitude, duration, and initial conditions that adequately represent the jet stream dynamics and the system pressure differences
    - indication of whether pipe restraint rebound effects are included
    - justification of dynamic amplification factors used in the dynamic response mathematical models
    - implementation of the methods used for the pipe whip dynamic analyses to demonstrate the acceptability of the analysis results, including the jet thrust and impingement functions and the pipe whip dynamic effects
- description of dynamic amplification factors used for pipe whip dynamic response analyses
- description of proposed criteria, methods, and procedures to be used for the dynamic analyses to verify the integrity and operability of impacted structures, systems, or components (SSCs) under postulated pipe rupture loads
- figure(s) showing typical mathematical models for pipe whip dynamic response analyses
- describe protective assemblies or guard pipes to be used for piping penetrations

Section 3.6 Outline

3.6.2 Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping (cont.)

DCD The mPower standard plant DCD Section 3.6.2 includes the following information regarding determination of rupture locations and dynamic effects associated with the postulated rupture of piping:

- description of criteria used to define postulated break and crack locations in high- and moderate-energy piping systems for which separation or enclosure cannot be achieved for piping inside and outside of containment, as well as the configuration for each break/crack. For containment penetration cases, include identification of process pipe welds, access for in-service inspection of welds, points of fixity, and points of geometric discontinuity
- description of design criteria for containment penetration guard pipe or protective assemblies, including purpose (extension of containment, overpressure prevention, etc.), identification of where moment limiting pipe restraints are used at the extremities or within the protective assembly, descriptions of design criteria for the internal process pipe, flued head and bellows expansion joints, design criteria applicable to the guard pipe, and description for method of access for in-service inspections
- description of analytical methods to define forcing functions and response models to be used for the pipe whip dynamic response analyses, including:
  - definitions of direction, thrust coefficients, rise time, magnitude, duration, and initial conditions that adequately represent the jet stream dynamics and the system pressure differences
  - indication of whether pipe restraint rebound effects are included
  - justification of dynamic amplification factors used in the dynamic response mathematical models
  - implementation of the methods used for the pipe whip dynamic analyses to demonstrate the acceptability of the analysis results, including the jet thrust and impingement functions and the pipe whip dynamic effects
- description of dynamic analysis methods, including the details of jet expansion modeling, used to evaluate the jet impingement effects and loading effects applicable to nearby SSCs resulting from postulated pipe breaks and cracks, including:
  - description of analytical methods used to verify the integrity and operability of impacted SSCs under postulated pipe rupture loads
  - identification of loading combinations and design criteria for pipe whip restraints and a description of the typical restraint configuration to be used, if applicable
  - description of implementation of the dynamic analysis methods used to verify the integrity and operability of the impacted SSCs and demonstration of the design adequacy of the SSCs to ensure that pipe whip or jet impingement loading will not impair their design-intended functions to an unacceptable level of integrity or operability

Section 3.6 Outline

3.6.2 Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping (cont.)

DCD (cont.)

- description of implementation of criteria dealing with special features, including augmented ISI programs and use of special protective devices such as pipe whip restraints
- table(s) identifying the number and location of design-basis breaks and cracks, including the postulated rupture orientation (circumferential and/or longitudinal break) for each postulated design-basis break location
- table(s) summarizing the data developed to select postulated break locations, including, for each point, the calculated stress intensity, the calculated cumulative usage factor, and the calculated primary plus secondary stress range as delineated in A. Giambusso letter of December 1972 and J.F. O-Leary letter of July 12, 1973 and BTP 3-4
- figure(s) showing the locations of the resulting postulated pipe rupture cases, including identification of longitudinal and circumferential breaks
- figure(s) identifying structural barriers and pipe whip restraint locations(including the constrained directions in each restraint) in each piping system
- figure(s) showing typical mathematical models for pipe whip dynamic response analyses

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FSAR Same contents as mPower standard plant DCD Section 3.6.2.

Section 3.6 Outline

3.6.3 Leak-before-Break Evaluation Procedures

PSAR PSAR Section 3.6.3 includes a statement that the Clinch River SMR Plant does not utilize a Leak-before-Break analysis approach for evaluation of the piping systems.

DCD DCD Section 3.6.3 includes a statement that the mPower standard plant does not utilize a Leak-before-Break analysis approach for evaluation of the piping systems.

FSAR FSAR Section 3.6.3 includes a statement that the Clinch River SMR Plant does not utilize a Leak-before-Break analysis approach for evaluation of the piping systems.

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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
3.10 Seismic & Dynamic Qualification of Mechanical & Electrical Equipment	PSAR	10 CFR 50, App A, GDC 1, 2, 4, 14, & 30 10 CFR 50, App B 10 CFR 50, App S	No	SRP 3.10, Section II, SRP Acceptance Criteria, Item 6.A	3.10	RGs 1.61, 1.63, 1.89, 1.92, 1.97, 1.100, 1.122, 1.148 DC/COL-ISG-1 DC/COL-ISG-20 SECY-93-087	ANSI B.16.41-1983, ANSI N41.6-1972 ANSI/ASME N278.1-1975 ASME QME-1-2007 IEEE 317-1983 IEEE 323-1974 IEEE 323-2003 IEEE 344-1987 IEEE 344-2004 IEEE 334-2006 IEEE 382-2006 IEEE 535-1986 IEEE 535-2006 IEEE 572-2006 IEEE 628-2001 IEEE 638-1992 IEEE 649-2006 IEEE 650-2006 IEEE 693-2005 IEEE C37.82-1987	Yes - Section 3.10 will be based on latest regulatory guidance and industry standards for seismic/dynamic qualification	No	In response to the events at Fukushima, additional seismic requirements and guidance may have an impact on this section.	3.2, 3.6, 3.7, 3.9, 3.11, 3.13
	DCD	10 CFR 50, App A, GDC 1, 2, 4, 14, & 30 10 CFR 50, App B 10 CFR 50, App S 10 CFR 52.47(b)(1)	No	RG 1.206	3.10	RGs 1.61, 1.63, 1.89, 1.92, 1.97, 1.100, 1.122, 1.148 DC/COL-ISG-1 DC/COL-ISG-20 SECY-93-087	ANSI B.16.41-1983, ANSI N41.6-1972 ANSI/ASME N278.1-1975 ASME QME-1-2007 IEEE 317-1983 IEEE 323-1974 IEEE 323-2003 IEEE 344-1987 IEEE 344-2004 IEEE 334-2006 IEEE 382-2006 IEEE 535-1986 IEEE 535-2006 IEEE 572-2006 IEEE 628-2001 IEEE 638-1992 IEEE 649-2006 IEEE 650-2006 IEEE 693-2005 IEEE C37.82-1987	N/A	N/A	In response to the events at Fukushima, additional seismic requirements and guidance may have an impact on this section.	3.2, 3.6, 3.7, 3.9, 3.11, 3.13, 14.3
	FSAR	10 CFR 50, App A, GDC 1, 2, 4, 14, & 30 10 CFR 50, App B 10 CFR 50, App S	No	RG 1.206 and SRP 3.10, Section II, SRP Acceptance Criteria, Item 6.B	3.10	RGs 1.61, 1.63, 1.89, 1.92, 1.97, 1.100, 1.122, 1.148 DC/COL-ISG-1 DC/COL-ISG-20 SECY-93-087	ANSI B.16.41-1983, ANSI N41.6-1972 ANSI/ASME N278.1-1975 ASME QME-1-2007 IEEE 317-1983 IEEE 323-1974 IEEE 323-2003 IEEE 344-1987 IEEE 344-2004 IEEE 334-2006 IEEE 382-2006 IEEE 535-1986 IEEE 535-2006 IEEE 572-2006 IEEE 628-2001 IEEE 638-1992 IEEE 649-2006 IEEE 650-2006 IEEE 693-2005 IEEE C37.82-1987	N/A	No	In response to the events at Fukushima, additional seismic requirements and guidance may have an impact on this section.	3.2, 3.6, 3.7, 3.9, 3.11, 3.13

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

Section 3.10 Outline

3.10 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment

PSAR PSAR Section 3.10 provides the following information regarding the seismic and dynamic qualification of mechanical and electrical equipment for the Clinch River Plant:

- identification of proposed qualification methods, criteria, implementation methods, and procedures, including relevant test or analysis information, used to ensure structural integrity and functionality of the Seismic Category I instrumentation, electrical equipment, and mechanical components (including their supports) subject to the defined load conditions
- identification of compliance with regulatory requirements for qualifying equipment under 10 CFR 50, Appendix A, GDC 1, 2, 4, 14, and 30; 10 CFR 50, Appendix B; 10 CFR 50, Appendix S; and Regulatory Guide (RG) 1.100
- proposed approach for confirmation that equipment will remain functional during and after the prescribed cycles of earthquake effects, in combination with other relevant static and dynamic loads, based on guidelines provided in RG 1.100 and SECY 93-087
- preliminary information regarding administrative control of component qualification, including a description of the equipment qualification file, the handling of documentation, internal acceptance review procedures, and the procedures for interchange of information between various equipment vendors and testing laboratories
- preliminary table(s) identifying all Seismic Category I instrumentation, electrical equipment, and mechanical components (including their supports) that are designed to withstand the effects of earthquakes and the full range of normal and accident loadings

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DCD DCD Section 3.10 addresses the following information regarding the seismic and dynamic qualification of mechanical and electrical equipment for the mPower standard plant design:

- criteria used for seismic qualification, including the decision criteria for selecting particular tests or methods of analysis, the considerations defining the seismic and other relevant dynamic load input motion, and the process to demonstrate the adequacy of the seismic qualification program
- description of the extent to which RG 1.100 is satisfied and justification for any exceptions
- methods and procedures, including test and analysis results, as available, used to ensure the structural integrity and functionality of mechanical and electrical equipment for operation in the event of an SSE
- methods and procedures, and results, as available, used to analyze and test the supports for such equipment, and the verification process used to account for possible amplification of vibratory motion under seismic and dynamic conditions

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Section 3.10 Outline

3.10 Seismic and Dynamic Qualification of Mechanical and Electrical Equipment (cont.)

DCD (cont.)

- description of seismic and dynamic qualification testing implementation program
- table(s) identifying all Seismic Category I instrumentation, electrical equipment, and mechanical equipment (other than pipes), including their supports, designed to withstand the effects of earthquakes and the full range of normal and accident loadings

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FSAR Same contents as the DCD Section 3.10 with the following supplemental and site-specific information:

- description of the results of the seismic and dynamic qualification testing implementation program which will be used to confirm the qualification of any item of equipment
- description of the seismic qualification reports for in-scope equipment made available for inspection/review
- updated table(s) listing components required to perform functions that are essential to emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal or are otherwise essential in preventing significant release of radioactive material to the environment

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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
3.11 Environmental Qualification of Mechanical and Electrical Equipment	PSAR	10 CFR 50 49 10 CFR 50 65 10 CFR 50, App. A, GDC 1, 2, 4, & 23 10 CFR 50, App. B, Criterion III, XI, XVII	None	SRP 3.11, Sections I.3 and III 1	3 11	RGs 1.40, 1.63, 1.73, 1.89, 1.97, 1.153, 1.156, 1.158, 1.160, 1.180, 1.183, 1.209, 1.210, 1.211 & 1.213 NUREG-1465 NUREG-1793, Sect 3.11.3.2.1 IN 89-63 NUREG/CR-6431 NUREG/CR-6479 GL 07-01 IN 2010-26 IN 2011-12	IEEE 7-4.3.2-2003 IEEE 317-1983 IEEE 323-1974 IEEE 323-2003 IEEE 334-2006 IEEE 382-2006 IEEE 383-2003 IEEE 420-2001 IEEE 497-2002 IEEE 535-2006 IEEE 535, Int. 1, 2009 IEEE 572-2006 IEEE 572, Errata, 2011 IEEE 603-1991 IEEE 627-2010 IEEE 628-2001 IEEE 634-2004 IEEE 638-1992 IEEE 649-2006 IEEE 650-2006 IEEE 1202-2006 IEEE 1205-2000 IEEE 1290-1996 IEEE C37.82-1987 IEEE C37.105-2010	Yes - Section will address current regulatory requirements and guidance, and updated industry codes on environmental qualification	No	1) In response to the events at Fukushima, additional EQ requirements and guidance may result from Lessons Learned that have an impact on this section. 2) Track issuance of draft RGs DG-1199, DG-1240, and DG-1254	3.2, 3.3, 3.4.1, 3.5.1, 3 5 2, 3 9 5, 3.9.6, 3.10, 5 4, 6.2, 6.3, 6 5, 7, 8, 9 4 5, 13.4, 14.3, 15, 17
	DCD	10 CFR 50 49 10 CFR 50.65 10 CFR 52.47(b)(1) 10 CFR 50, App. A, GDC 1, 2, 4, & 23; 10 CFR 50, App. B, Criterion III, XI, & XVII	None	RG 1.206	3.11	RGs 1.40, 1.63, 1.73, 1 89, 1.97, 1.153, 1 156, 1 158, 1.160, 1.180, 1.183, 1.209, 1.210, 1.211 & 1.213 NUREG-1465 NUREG-1793, Sect 3.11.3.2.1 IN 89-63 SECY-05-0197 IMC-2504 NUREG/CR-6431 NUREG/CR-6479 GL 07-01 IN 2010-26 IN 2011-12	IEEE 7-4.3.2-2003 IEEE 317-1983 IEEE 323-1974 IEEE 323-2003 IEEE 334-2006 IEEE 382-2006 IEEE 383-2003 IEEE 420-2001 IEEE 497-2002 IEEE 535-2006 IEEE 535, Int. 1, 2009 IEEE 572-2006 IEEE 572, Errata, 2011 IEEE 603-1991 IEEE 627-2010 IEEE 628-2001 IEEE 634-2004 IEEE 638-1992 IEEE 649-2006 IEEE 650-2006 IEEE 1202-2006 IEEE 1205-2000 IEEE 1290-1996 IEEE C37.82-1987 IEEE C37.105-2010	N/A	No	1) In response to the events at Fukushima, additional EQ requirements and guidance may result from Lessons Learned that have an impact on this section. 2) RTNSS may add seismic qualification to some non-safety related equipment. 3) Finding Suppliers today with qualified programs	3.2, 3 3, 3.4.1, 3.5.1, 3 5 2, 3.9.5, 3.9.6, 3.10, 5.4, 6.2, 6.3, 6.5, 7, 8, 9.4 5, 13.4, 14 3, 15, 17

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
3.11 Environmental Qualification of Mechanical and Electrical Equipment	FSAR	10 CFR 50.49 10 CFR 50.65 10 CFR 50, App. A, GDC 1, 2, 4, & 23 10 CFR 50, App. B, Criterion III, XI, & XVII	None	RG 1.206	3.11	RGs 1.40, 1.63, 1.73, 1.89, 1.97, 1.153, 1.156, 1.158, 1.160, 1.180, 1.183, 1.209, 1.210, 1.211 & 1.213 NUREG-1465 NUREG-1793, Sect 3.11.3.2.1 IN 88-63 NUREG/CR-6431 NUREG/CR-6479 GL 07-01 IN 2010-26 IN 2011-12	IEEE 7-4.3.2-2003 IEEE 317-1983 IEEE 323-1974 IEEE 323-2003 IEEE 334-2006 IEEE 382-2006 IEEE 383-2003 IEEE 420-2001 IEEE 497-2002 IEEE 535-2006 IEEE 535, Int. 1, 2009 IEEE 572-2006 IEEE 572, Errata, 2011 IEEE 603-1991 IEEE 627-2010 IEEE 628-2001 IEEE 634-2004 IEEE 638-1992 IEEE 649-2006 IEEE 650-2006 IEEE 1202-2006 IEEE 1205-2000 IEEE 1290-1996 IEEE C37.82-1987 IEEE C37.105-2010	N/A	No	1) In response to the events at Fukushima, additional EQ requirements and guidance may result from Lessons Learned that have an impact on this section. 2) RTNSS may add seismic qualification to some non-safety related equipment. 3) Finding Suppliers today with qualified programs 2) Track issuance of draft RGs DG-1199, DG-1240, and DG-1254	3.2, 3.3, 3.4.1, 3.5.1, 3.5.2, 3.9.5, 3.9.6, 3.10, 5.4, 6.2, 6.3, 6.5.7, 8, 9.4.5, 13.4, 14.3, 15, 17

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

Section 3.11 Outline

3.11 Environmental Qualification of Mechanical and Electrical Equipment

PSAR PSAR Section 3.11 provides a description of the conceptual approach for the environmental qualification of mechanical and electrical equipment (including certain instrumentation) for the Clinch River SMR Plant as summarized below:

- preliminary list of mechanical, electrical, and instrumentation & control (I&C) systems and components, within the scope of 10 CFR 50.49 required to perform safety functions related to emergency reactor shutdown, containment isolation, reactor core cooling, and containment / reactor heat removal, prevention of significant release of radioactive material to the environment, and certain post-accident monitoring (PAM) equipment
- identification of the preliminary environmental design bases for the equipment identified, including the definition of anticipated operational occurrences and normal, accident, and post-accident environments; required operating time; temperature, pressure, humidity and chemical, submergence, aging (thermal and radiation), non-seismic vibration, synergistic effects and margin considerations
- preliminary documentation requirements for qualification tests and analyses planned to be performed
- preliminary description of approach for demonstrating the adequacy of the environmental design and qualification requirements, including acceptance criteria for test results
- preliminary description of implementation schedule and milestones for Environmental Qualification Program
- preliminary description of electromagnetic interference/radio-frequency interference (EMI/RFI) program and identification of levels of EMI/RFI that require mitigation, including mitigation measures

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DCD DCD Section 3.11 provides a detailed description regarding the environmental qualification of mechanical and electrical equipment (including certain instrumentation) for the mPower standard plant, including the following information:

- identification of all mechanical, electrical, and instrumentation & control (I&C) components, within the scope of 10 CFR 50.49 required to perform safety functions related to emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal, prevention of significant release of radioactive material to the environment, and certain post-accident monitoring (PAM) equipment
- definition of normal, abnormal, accident, and post-accident environmental conditions and design bases for the identified mechanical, electrical, and I&C equipment; including temperature, pressure, aging, operating time, humidity, radiation, chemicals, submergence, non-seismic vibration, margin considerations, and potential synergistic effects of combined conditions

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Section 3.11 Outline

3.11 Environmental Qualification of Mechanical and Electrical Equipment (cont.)

DCD (cont.)

- identification of environmental conditions as a function of time and the length of time each equipment is required to operate in the accident environment
- description of equipment qualification tests and analysis to be performed description of compliance with applicable regulatory requirements and guidance
- description of how loss of normal environmental control systems (e.g., heat tracing and HVAC) will not adversely affect the operability of identified equipment based on "worst case" environmental conditions
- determination of radiation and chemical environmental conditions for identified equipment during both normal operation and design basis accidents, including analysis assumptions
- description of process for determining the suitability of environmentally sensitive mechanical equipment used for safety-related functions and process for verifying the equipment design is adequate
- tables providing listing of environmentally qualified mechanical, electrical, and I&C equipment, including equipment location, function, environmental conditions, operating time, and qualification process
- description of approach for demonstrating the adequacy of the environmental design and qualification requirements, including acceptance criteria for test results
- description of EMI/RFI program and identify the levels of EMI/RFI that require mitigation, including mitigation measures
- compliance with applicable regulatory criteria, GDCs (1, 2, 4 & 23), and guidance
- identification of COL Information Item for an applicant to provide an implementation schedule and milestones for the Environmental Qualification Program

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FSAR Same contents as the PSAR/DCD Section 3.11 with the following supplemental information related to implementation of an Environmental Qualification Program, including:

- updated information on site-specific equipment within the scope of 10 CFR 50.49, including equipment locations and environmental conditions, and qualification process used
- documentation of environmental qualification test results and qualification status for the mPower standard plant and Clinch River site-specific equipment
- description of how the qualification test results are recorded in an auditable file in accordance with requirements of 10 CFR 50.49(j)
- description of periodic tests, calibrations, and inspections to be performed during the life of the plant, which verify the identified equipment remains capable of fulfilling its intended function

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Section 3.11 Outline

3.11 Environmental Qualification of Mechanical and Electrical Equipment (cont.)

FSAR (cont.) - results of EMI/RFI testing program and actions taken to mitigate EMI/RFI sources and protect equipment susceptible to EMI/RFI emissions

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
3.12 ASME Code Class 1, 2, and 3 Piping Systems, Piping Components and their Associated Supports	PSAR	10 CFR 50, App. A, GDC 1, 2, 4, 14, 15 10 CFR 50, App. B 10 CFR 50, App. S 10 CFR 50.55a	None	RG 1.206 Note: PSAR Section 3.12 will address ASME Code Class 1, 2, and 3 piping systems, piping components, and their associated supports consistent with RG 1.206, which provides updated, consolidated guidance on the design of piping systems.	3.12	RGs 1.26, 1.29, 1.60, 1.61, 1.84, 1.92, 1.122, 1.124, 1.130, 1.207 Bulletins 79-02, Rev. 2, 79-13, Rev. 2, 88-08, 88-11 NUREG-0484, Rev. 1 NUREG-0609 NUREG-1367 NUREG-1061, NUREG-1503 NUREG/CR-3074 NUREG/CR-5416, 1980 SECY-90-016 SECY-93-087	ASME Section III, Division 1, and Appendices N and O, 2007 w/ 2008 Addenda ASME Code Cases N-318-5 (2003), N-391-2 (2004), N-392-3 (2004) ASME B31.1, 2007 ASCE Standard 4-98, WRC-300 (1984) WRC-316 (1986), WRC-353 (1995) WRC-107 (2002), WRC-285 (1983) WRC-297 (1987) AISC (13TH Edition), AISC-N690-06 ACI 349-06, ACI 355.2-07 MSSP-58 (2009), MSS SP-69 (2003) MSS SP-89 (2003) IBC-2009 ASCE/SEI 7-05	Yes - RG 1.70 did not contain a Section 3.12. Further details on ASME Class 1, 2 and 3 piping systems, components, and supports provided consistent with RG 1.206	No	None	3.2, 3.6, 3.7, 3.8, 3.9, 3.10, 3.13, 5.2, 5.4, 6.1, 6.2, 6.3, 10.3
	DCD	10 CFR 50, App. A, GDC 1, 2, 4, 14, 15 10 CFR 50, App. B 10 CFR 50, App. S 10 CFR 50.55a 10 CFR 52.47(b)(1)	None	RG 1.206	3.12	RGs 1.26, 1.29, 1.60, 1.61, 1.84, 1.92, 1.122, 1.124, 1.130, 1.207 Bulletins 79-02, Rev. 2, 79-13, Rev. 2, 88-08, 88-11 NUREG-0484, Rev. 1 NUREG-0609 NUREG-1367 NUREG-1061, NUREG-1503 NUREG/CR-3074 NUREG/CR-5416, 1980 SECY-90-016 SECY-93-087	ASME Section III, Division 1, and Appendices N and O, 2007 w/ 2008 Addenda ASME Code Cases N-318-5 (2003), N-391-2 (2004), N-392-3 (2004) ASME B31.1, 2007 ASCE Standard 4-98, WRC-300 (1984) WRC-316 (1986), WRC-353 (1995) WRC-107 (2002), WRC-285 (1983) WRC-297 (1987) AISC (13TH Edition), AISC-N690-06 ACI 349-06, ACI 355.2-07 MSSP-58 (2009), MSS SP-69 (2003) MSS SP-89 (2003) IBC-2009 ASCE/SEI 7-05	N/A	N/A	None	3.2, 3.6, 3.7, 3.8, 3.9, 3.10, 3.13, 5.2, 5.4, 6.1, 6.2, 6.3, 10.3, 14.3
	FSAR	10 CFR 50, App. A, GDC 1, 2, 4, 14, 15 10 CFR 50, App. B 10 CFR 50, App. S 10 CFR 50.55a	None	RG 1.206	3.12	RGs 1.26, 1.29, 1.60, 1.61, 1.84, 1.92, 1.122, 1.124, 1.130, 1.207 Bulletins 79-02, Rev. 2, 79-13, Rev. 2, 88-08, 88-11 NUREG-0484, Rev. 1 NUREG-0609 NUREG-1367 NUREG-1061, NUREG-1503 NUREG/CR-3074 NUREG/CR-5416, 1980 SECY-90-016 SECY-93-087	ASME Section III, Division 1, and Appendices N and O, 2007 w/ 2008 Addenda ASME Code Cases N-318-5 (2003), N-391-2 (2004), N-392-3 (2004) ASME B31.1, 2007 ASCE Standard 4-98, WRC-300 (1984) WRC-316 (1986), WRC-353 (1995) WRC-107 (2002), WRC-285 (1983) WRC-297 (1987) AISC (13TH Edition), AISC-N690-06 ACI 349-06, ACI 355.2-07 MSSP-58 (2009), MSS SP-69 (2003) MSS SP-89 (2003) IBC-2009 ASCE/SEI 7-05	N/A	No	None	3.2, 3.6, 3.7, 3.8, 3.9, 3.10, 3.13, 5.2, 5.4, 6.1, 6.2, 6.3, 10.3

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
3.13 Threaded Fasteners - ASME Code Class 1, 2, and 3	PSAR	10 CFR 50, App. A, GDC 1, 4, 14, 30, 31 10 CFR 50, App. B 10 CFR 50, App. G 10 CFR 50.55a	None	RG 1.206 Note: PSAR Section 3.13 will address threaded fasteners on piping systems and the associated supports consistent with RG 1.206, which provides updated, consolidated guidance on the design of threaded fasteners	3.13	RGs 1.37, 1.65, 1.84, GL 91-17 NUREG-1339 Bulletin 79-02	ASME Code Sections II, III, XI, 2007 w/ 2008 Addenda EPRI 1015336, 2007 EPRI NP-5769 Vol 1 and 2, 1988 AISC (13TH Edition) AISC-N690-06 ACI 349-06, ACI 355.2-07 MSSP-58 (2009), MSS SP-69 (2003) MSS SP-89 (2003) IBC-2009 ASCE/SEI 7-05	Yes - RG 1.70 did not contain a Section 3.13. Further details on threaded fasteners for ASME Class 1, 2 and 3 systems provided consistent with RG 1.206.	No	None	3.8, 5.3, 13.5, 17.5
	DCD	10 CFR 50, App. A, GDC 1, 4, 14, 30, 31 10 CFR 50, App. B 10 CFR 50, App. G 10 CFR 50.55a 10 CFR 52.47(b)(1)	None	RG 1.206	3.13	RGs 1.37, 1.65, 1.84, GL 91-17 NUREG-1339 Bulletin 79-02	ASME Code Sections II, III, XI, 2007 w/ 2008 Addenda EPRI 1015336, 2007 EPRI NP-5769 Vol 1 and 2, 1988 AISC (13TH Edition) AISC-N690-06 ACI 349-06, ACI 355.2-07 MSSP-58 (2009), MSS SP-69 (2003) MSS SP-89 (2003) IBC-2009 ASCE/SEI 7-05	N/A	N/A	None	3.8, 5.3, 13.5, 14.3, 17.5
	FSAR	10 CFR 50, App. A, GDC 1, 4, 14, 30, 31 10 CFR 50, App. B 10 CFR 50, App. G 10 CFR 50.55a	None	RG 1.206	3.13	RGs 1.37, 1.65, 1.84, GL 91-17 NUREG-1339 Bulletin 79-02	ASME Code Sections II, III, XI, 2007 w/ 2008 Addenda EPRI 1015336, 2007 EPRI NP-5769 Vol 1 and 2, 1988 AISC (13TH Edition) AISC-N690-06 ACI 349-06, ACI 355.2-07 MSSP-58 (2009), MSS SP-69 (2003) MSS SP-89 (2003) IBC-2009 ASCE/SEI 7-05	N/A	No	None	3.8, 5.3, 13.5, 17.5

Notes:
(1) RG revisions are not identified as these will be consistent with the version in effect 6 months prior to the

Sections 3.12 and 3.13 Outline

3.12 ASME Code Class 1, 2 and 3 Piping Systems, Piping Components and their Associated Supports

PSAR PSAR Section 3.12 provides the following information related to the design of piping systems and components and associated piping supports for Seismic Category I, Category II and nonsafety systems, and addresses issues related to the structural integrity and functional capability of these systems to perform their safety-related functions under all postulated combinations of normal operating conditions, system transients, pipe breaks, and seismic events. Specific aspects of the piping system design are described below:

- preliminary information related to the design codes, industry standards, specifications, regulations, and other guidance planned to be used in the piping and pipe support design
- piping classification and analysis requirements.
- seismic classification (Seismic Category I, Seismic Category II, non-seismic)
- hot vs cold piping
- large vs small bore piping
- non-analyzed piping vs analyzed piping
- reference to PSAR Section 3.6.1 and 3.6.2 for discussion of high and moderate energy fluid systems and design basis pipe breaks
- applicable loads (pressure, thermal, dead weight, seismic, wind, safety relief thrust, system operating transient (SOT), water and steam hammer, thermal stratification, loss of coolant accident (LOCA), design basis pipe breaks including main steam and feed water pipe breaks, building settlement

<u>Piping Analysis Methods</u>
- proposed piping analysis methods, including seismic analysis methods for Seismic Category I and non-seismic Category I piping systems and piping supports
- proposed description of the manner in which seismic dynamic analysis considers maximum relative displacement among supports, and indication of other significant effects accounted for in the analysis
- proposed procedural approach for analytical modeling, such as number of earthquake cycles, frequencies, damping criteria, combination of modal responses, small bore piping analyses, and interaction of Seismic Category II systems with Seismic Category I systems

<u>Piping Modeling Technique</u>
- preliminary procedures for modeling that are applicable to Seismic Category I and non-ASME Code piping systems, including criteria and bases used to determine whether the piping system and piping support are being analyzed as part of a system analysis or independently as a subsystem
- proposed criteria and procedures for modeling piping systems, including the dynamic piping model, model boundaries used for the Seismic Category I piping systems and decoupling criteria, and support and anchor stiffness

Sections 3.12 and 3.13 Outline

3.12 ASME Code Class 1, 2 and 3 Piping Systems, Piping Components and their Associated Supports (cont.)

PSAR (cont.)

- preliminary list of computer codes to be used for dynamic and static analyses, including information on NRC benchmark problems appropriate for these analytical methods

Piping Stress Analysis Criteria

- description of piping stress analysis criteria, including site-specific response spectra, design transients, applicable loadings and load combinations, and damping values
- description of proposed methodology for addressing such issues as response spectrum methods, time history methods, combining modal responses, high frequency modes, fatigue evaluations, thermal oscillations, thermal stratification, fluid transients, seismic anchor motion (SAM), wind loads, LOCA, relief valve thrust load
- preliminary design information related to pressure relief devices and welded attachments
- simplified method of analyses for non-analyzed piping

Piping Support Design Criteria

- description of pipe support design criteria, including applicable codes, jurisdictional boundaries, loads and load combinations, baseplate and anchor bolt design, use of energy absorbers and limit stops, snubber design, pipe support stiffness values, friction forces, and pipe deflection limits
- description of design criteria for instrumentation line supports, including loads and load combinations for safety-related instrumentation supports

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DCD

DCD Section 3.12 provides the following information related to the design of piping systems and components and associated piping supports for Seismic Category I, Category II and nonsafety systems, and addresses issues related to the structural integrity and functional capability of these systems to perform their safety-related functions under all postulated combinations of normal operating conditions, system transients, pipe breaks, and seismic events. Specific aspects of the piping system design are described below:

- detailed listing of design codes, industry standards, specifications, regulations, and other guidance used in the piping design, including specific edition, date, or addenda of each document

Piping Analysis Methods

- description of piping analysis methods, including procedures used for analytical modeling, use of experimental stress analyses, modal response spectrum method, response spectra method (or independent support motion

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Sections 3.12 and 3.13 Outline

3.12 ASME Code Class 1, 2 and 3 Piping Systems, Piping Components and their Associated Supports (cont.)

DCD (cont)

method), time history method, inelastic analyses method, small-bore piping method, nonseismic/seismic interaction (II/I), and Seismic Category I buried piping analysis, as applicable

- criteria and procedures used for piping modeling techniques
- list of computer codes used in dynamic and static analyses, including information on NRC benchmark problems appropriate for these analytical methods
- criteria used to decouple smaller piping systems from larger piping systems

Piping Stress Analysis Criteria

- piping stress analysis criteria, including design information related to:
  - generic design response spectra
  - design transients used in the design
  - loading and load combinations
  - damping values used for Seismic Category I piping systems
  - combination of modal responses related to evaluating seismic response
  - high frequency modes
  - fatigue evaluation of ASME Code Class 1, 2, and 3 piping
  - thermal oscillations and thermal stratification
  - safety relief valve design, installation, and testing
  - functional capability of piping systems essential for safe shutdown
  - combination of inertial and seismic anchor motion effects
  - welded attachments
  - modal damping for composite structures
  - minimum temperature for thermal analyses
  - design features to address intersystem loss-of-coolant accident (LOCA)
  - effects of environment on fatigue design

Piping Support Design Criteria

- detailed piping support design criteria associated with ASME Code Class 1, 2, and 3 piping supports, including information on the following topics:
  - applicable design codes, standards, specifications, regulations, general design criteria (GDC), regulatory guides (RGs), and other industry standards
  - jurisdictional boundaries
  - loads and load combinations
  - pipe support baseplate and anchor bolt design
  - use of energy absorbers, limit stops and snubbers, as applicable
  - pipe support stiffness values
  - service limits for pipe support loads
  - use of structural steel as pipe supports
  - consideration of friction forces

Sections 3.12 and 3.13 Outline

3.12 ASME Code Class 1, 2 and 3 Piping Systems, Piping Components and their Associated Supports (cont.)

DCD (cont)

- pipe support gaps and clearances
- instrumentation line support criteria
- pipe deflection limits

FSAR Same contents as mPower standard plant DCD Section 3.12 including the following site-specific supplemental information:

- updated information on the design of site-specific piping systems and components and associated piping supports for Seismic Category I, Category II and nonsafety systems

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Sections 3.12 and 3.13 Outline

3.13 Threaded Fasteners (ASME Code Class 1, 2, and 3)

PSAR PSAR Section 3.13 provides the criteria used to select materials to fabricate threaded fasteners (e.g., threaded bolts, studs) in ASME Code Class 1, 2, or 3 systems as well as the criteria to fabricate, design, test, and inspect the threaded fasteners in these systems, both before initial service and during service. Specific details to be included in PSAR Section 3.13 are summarized below:

- preliminary design information related to the selection of materials and mechanical material testing special process and control requirement of threaded fasteners, including conformance with applicable codes or standards
- proposed plans to establish the fracture toughness requirement of threaded fasteners made from ferritic steels, if applicable
- preliminary information pertaining to the fabrication inspection of threaded fasteners, including fabrication practices or special processes and any environmental considerations used for material selection - preliminary information on use of lubricants and/or surface treatments in mechanical connections secured by threaded fasteners
- preliminary plans for the fracture toughness tests to be performed on threaded fasteners in ASME Code Class 1 systems fabricated from ferritic steel and plans to demonstrate compliance with applicable acceptance criteria set forth in Appendix G to 10 CFR Part 50
- preliminary plans to demonstrate compliance with the pre service and inservice inspection (ISI) requirements of 10 CFR 50.55a and Section XI of the ASME Code, Division 1, as well as proposed implementation plan for ISI for threaded fasteners

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DCD The mPower standard plant DCD Section 3.13 provides the criteria used to select materials to fabricate threaded fasteners (e.g., threaded bolts, studs) in ASME Code Class 1, 2, or 3 systems as well as the criteria to fabricate, design, test, and inspect the threaded fasteners in these systems, both before initial service and during service. Specific details to be included in DCD Section 3.13 are summarized below:

- design information pertaining to the selection of materials and material testing-evaluation of material conformance with applicable codes and standards
- description of material testing used to establish fracture toughness for threaded fasteners in ASME Code Class 1 systems made from ferritic steels
- design information pertaining to threaded fastener fabrication, including special fabrication practices or processes used to mitigate the occurrence of stress-corrosion cracking or other forms of material degradation during service
- description of environmental considerations related to the selection of materials used to fabricate threaded fasteners

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Sections 3.12 and 3.13 Outline

3.13 Threaded Fasteners (ASME Code Class 1, 2, and 3) (cont.)

DCD (cont.)

- discussion on the use of lubricants and/or surface treatments in mechanical connections secured by threaded fasteners
- description of the fracture toughness tests to be performed on threaded fasteners fabricated from ferritic steel and compliance with applicable acceptance criteria set forth in Appendix G to 10 CFR Part 50
- description of preservice inspection requirements for the threaded fasteners
- description of inservice inspection (ISI) requirements for the threaded fasteners consistent with 10 CFR 50.55a and Section XI of the ASME Code, Division 1
- identification of a COL Information Item for an applicant to describe the ISI program for threaded fasteners, including milestones and completion dates

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FSAR Same contents as mPower standard plant DCD Section 3.13 with the following supplemental information:

- updated design information on site-specific threaded fasteners, as applicable
- certified material test reports, including material fabrication results and material property test results, pursuant to Section III of the ASME Code, Division 1
- description of the implementation program for ISI of threaded fasteners

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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
9.2.1 Service Water System	PSAR DCD FSAR	N/A	N/A	A separate service water system is not required; the Nuclear Island component cooling water heat sink functions are performed by the chilled water system as discussed in Section 9.2.7	N/A	N/A	N/A	N/A	N/A	None	N/A
9.2.2 Component Cooling Water System	PSAR	10 CFR Part 50 App. A, GDC 2, 4, 44, 45, 46, 56, 57	No	RG 1.70	9.2.2 BTP 3-3	RG 1.29, 1.153, 1.155 NUREG-0927, Rev. 1 GL 96-06	IEEE 603, 1991 ANSI/HI 1.6, 2000 ASME Section III, 2007 with 2008 Addenda ASME/ANSI B31.1, 2007 EPRI 1007820, Rev. 1	No	No	None	3.2, 3.3, 3.5, 6.6, 9.2.7, 16
	DCD	10 CFR Part 50 App. A, GDC 2, 4, 44, 45, 46, 56, 57 10 CFR 52.47(b)(1)	No	RG 1.206	9.2.2 BTP 3-3	RG 1.29, 1.153, 1.155 NUREG-0927, Rev. 1 GL 96-06	IEEE 603, 1991 ANSI/HI 1.6, 2000 ASME Section III, 2007 with 2008 Addenda ASME/ANSI B31.1, 2007 EPRI 1007820, Rev. 1	N/A	N/A	None	3.2, 3.3, 3.5, 6.6, 9.2.7, 16
	FSAR	10 CFR Part 50 App. A, GDC 2, 4, 44, 45, 46, 56, 57	No	RG 1.206	9.2.2 BTP 3-3	RG 1.29, 1.153, 1.155 NUREG-0927, Rev. 1 GL 96-06	IEEE 603, 1991 ANSI/HI 1.6, 2000 ASME Section III, 2007 with 2008 Addenda ASME/ANSI B31.1, 2007 EPRI 1007820, Rev. 1	N/A	No	None	3.2, 3.3, 3.5, 6.6, 9.2.7, 16

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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
9.2.3 Demineralized Water System	PSAR	10 CFR 50, App. A GDC 2, 4, 5, 54, 55, 56, 57	No	RG 1.70 NOTE: The content for the nonsafety-related demineralized water system are consistent with those provided in RG 1.70, Sections 9.2.2 and 9.2.6.	9.2.2, 9.2.6 (as appropriate) Note: RG 1.70 reserved Section 9.2.3 for the Demineralized Water System. Per NRC memo dated December 18, 2006, the NRC withdrew SRP Section 9.2.3, since the demineralized water system typically is not credited for performing a safety function.	N/A	EPRI Technical Report TR-105714-V1R4, TR-105714-V2R4, and TR-1008224	No	No	None	3.2, 9.2.6, 9.2.9
	DCD	10 CFR 50, App. A GDC 2, 4, 5, 54, 55, 56, 57 10 CFR 52.47(b)(1)	No	NOTE: The content for the nonsafety-related demineralized water system are consistent with those provided in RG 1.206, Sections 9.2.2 and 9.2.6.	9.2.2, 9.2.6 (as appropriate) Note: Per NRC memo dated December 18, 2006, the NRC withdrew SRP Section 9.2.3, since the demineralized water system typically is not credited for performing a safety function.	N/A	EPRI Technical Report TR-105714-V1R4, TR-105714-V2R4, and TR-1008224	N/A	N/A	None	3.2, 9.2.6, 9.2.9
	FSAR	10 CFR 50, App. A GDC 2, 4, 5, 54, 55, 56, 57	No	NOTE: The content for the nonsafety-related demineralized water system are consistent with those provided in RG 1.206, Sections 9.2.2 and 9.2.6.	9.2.2, 9.2.6 (as appropriate) Note: Per NRC memo dated December 18, 2006, the NRC withdrew SRP Section 9.2.3, since the demineralized water system typically is not credited for performing a safety function.	N/A	EPRI Technical Report TR-105714-V1R4, TR-105714-V2R4, and TR-1008224	N/A	No	None	3.2, 9.2.6, 9.2.9

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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
9.2.4 Potable and Sanitary Water Systems	PSAR	10 CFR Part 50 App. A, GDC 5, 60	No	RG 1.70	9.2.4	N/A	National Sanitation Foundation, National Standard Plumbing Code	No	No	None	3.2
	DCD	10 CFR Part 50 App. A, GDC 5, 60 10 CFR 52.47(b)(1)	No	RG 1.206	9.2.4	N/A	National Sanitation Foundation, National Standard Plumbing Code	N/A	N/A	None	3.2
	FSAR	10 CFR Part 50 App. A, GDC 5, 60	No	RG 1.206	9.2.4	N/A	National Sanitation Foundation, National Standard Plumbing Code	N/A	No	None	3.2
9.2.5 Ultimate Heat Sink	PSAR	See RFD for Section 6.2	No	RG 1.70 Note: The UHS is a component within the containment system; as such the design bases, safety evaluation, instrumentation requirements, and inspection & testing requirements are addressed in PSAR Section 6.2	9.2.5	See RFD for Section 6.2	See RFD for Section 6.2	See RFD for Section 6.2	No	None	6.2
	DCD			RG 1.206 Note: The UHS is a component within the containment system; as such the design bases, safety evaluation, instrumentation requirements, and inspection & testing requirements are addressed in DCD Section 6.2					N/A		
	FSAR			RG 1.206 Note: The UHS is a component within the containment system; as such the design bases, safety evaluation, instrumentation requirements, and inspection & testing requirements are addressed in FSAR Section 6.2					No		

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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
9.2.6 Condensate Storage Facility	PSAR	10 CFR Part 50 App. A, GDC 2, 5, 44, 45, 46, 60 10 CFR 50.63	No	RG 1.70 Note: PSAR Section 9.2.6 will also address the adequacy of stored inventory for coping with both safe shutdown and SBO consistent with guidance in RG 1.206, Section 9.2.6	9.2.6	RG 1.29, 1.143, 1.155	N/A	Yes - Section 9.2.6 will also address adequacy of stored inventory under SBO conditions	No	None	3.2, 3.5, 6.1, 6.3, 9.2.3, 11, 12, 16
	DCD	10 CFR Part 50 App. A, GDC 2, 5, 44, 45, 46, 60	No	RG 1.206	9.2.6	RG 1.29, 1.143, 1.155	N/A	N/A	N/A	None	3.2, 3.5, 6.1, 6.3, 9.2.3, 11, 12, 16
	FSAR	10 CFR Part 50 App. A, GDC 2, 5, 44, 45, 46, 60 10 CFR 50.63	No	RG 1.206	9.2.6	RG 1.29, 1.143, 1.155	N/A	N/A	No	None	3.2, 3.5, 6.1, 6.3, 9.2.3, 11, 12, 16
9.2.7 Chilled Water System	PSAR	10 CFR Part 50 App. A, GDC 2, 4, 44, 45, 46	No	Note: The chilled water system will serve the same function as a service water system for the Nuclear Island component cooling water heat sink. The section contents in 9.2.7 will be consistent with the general guidelines from RG 1.70 Section 9.2.1.	9.2.1 (as appropriate)	RG 1.29, GL 96-06 (and Supplement 1) NUREG-0927, Rev. 1 NUREG-1461	N/A	No	No	None	3.2, 9.2.2
	DCD	10 CFR Part 50 App. A, GDC 2, 4, 44, 45, 46 10 CFR 52.47(b)(1)	No	Note: The chilled water system will serve the same function as a service water system for the Nuclear Island component cooling water heat sink. The section contents in 9.2.7 will be consistent with the general guidelines from RG 1.206, Section 9.2.1.	9.2.1 (as appropriate)	RG 1.29, GL 96-06 (and Supplement 1) NUREG-0927, Rev. 1 NUREG-1461	N/A	N/A	N/A	None	3.2, 9.2.2
	FSAR	10 CFR Part 50 App. A, GDC 2, 4, 44, 45, 46	No	Note: The chilled water system will serve the same function as a service water system for the nuclear island component cooling water heat sink. The section content in 9.2.7 will be consistent with the general guidelines from RG 1.206, Section 9.2.1.	9.2.1 (as appropriate)	RG 1.29, GL 96-06 (and Supplement 1) NUREG-0927, Rev. 1 NUREG-1461	N/A	N/A	No	None	3.2, 9.2.2

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
9.2.8 Turbine Building Closed Cooling Water System	PSAR	10 CFR 50.34(a)	No	Note: The section contents are consistent with the general guidelines of RG 1.70, Section 9.2 based on the specific system function	N/A	RG 1.29	N/A	No	No	None	3.2, 10.4.5
	DCD	10 CFR 52.47(a)	No	Note: The section contents are consistent with the general guidelines of RG 1.206, Section 9.2 based on the specific system function	N/A	RG 1.29	N/A	N/A	N/A	None	3.2, 10.4.5
	FSAR	10 CFR 50.34(b)	No	Note: The section contents are consistent with the general guidelines of RG 1.206, Section 9.2 based on the specific system function	N/A	RG 1.29	N/A	N/A	No	None	3.2, 10.4.5
9.2.9 Raw Water and Pre-Treatment System	PSAR	10 CFR 50.34(a), GDC 5	No	Note: The section contents are consistent with the general guidelines of RG 1.70, Section 9.2 based on the specific system function.	N/A	RG 1.29	N/A	No	No	None	3.2, 9.2.3
	DCD	10 CFR 52.47(a), GDC 5	No	Note: The section contents are consistent with the general guidelines of RG 1.206, Section 9.2 based on the specific system function.	N/A	RG 1.29	N/A	N/A	N/A	None	3.2, 9.2.3
	FSAR	10 CFR 50.34(b), GDC 5	No	Note: The section contents are consistent with the general guidelines of RG 1.206, Section 9.2 based on the specific system function.	N/A	RG 1.29	N/A	N/A	No	None	3.2, 9.2.3

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

Section 9.2 Outline

9.2.1 Service Water System

PSAR The Clinch River Small Modular Reactor (SMR) Plant does not require a separate service water system in order to provide essential cooling to safety-related equipment (and nonsafety-related auxiliary components). The functions of the service water system are performed by the chilled water system, which is air cooled, as described in PSAR Section 9.2.7.

DCD The mPower standard plant does not require a separate service water system in order to provide essential cooling to safety-related equipment (and nonsafety-related auxiliary components). The functions of the service water system are performed by the chilled water system, which is air cooled, as described in DCD Section 9.2.7.

FSAR Same contents as mPower standard plant DCD Section 9.2.1.

Section 9.2 Outline

9.2.2 Component Cooling Water System

PSAR The Clinch River SMR Plant component cooling water (Nuclear Island) system is a closed loop cooling system that transfers heat from various Nuclear Island plant components to the chilled water system during normal modes of operation. The system removes heat from various components needed for plant operation, removes core decay heat and sensible heat during reactor shutdown and cool-down, and after certain design basis accidents. The system is nonsafety-related, with the exception of the safety-related containment isolation safety function. Specific aspects of the system are provided below:

- description and preliminary design bases of the component cooling water system
- proposed design criteria for prevention of connections to systems having the potential for containing radioactive material
- proposed approach to demonstrate how the system will function as part of the residual heat removal philosophy of the plant following design basis events
- proposed approach to providing necessary protection for nonsafety-related systems that are required to function following design basis events
- proposed approach to demonstrate how the system functions without compromising the safe operation of the plant under both normal operating or transient situations
- preliminary safety evaluation of the component cooling water system identifying containment isolation function
- proposed provisions to detect, prevent, or contain leakage of radioactive material to the outside environment
- proposed plans to address long-term corrosion that may degrade system performance
- proposed testing, inspection, and instrumentation requirements
- reference to PSAR Section 6.2 for capability description for containment isolation valves
- preliminary figure(s) showing simplified piping and instrumentation diagrams (P&IDs) of the component cooling water system, including the components cooled by the system and interfaces with the heat sink (chilled water system)

DCD The mPower standard plant component cooling water (Nuclear Island) system is a closed loop cooling system that transfers heat from various Nuclear Island plant components to the chilled water system during normal modes of operation. The system removes heat from various components needed for plant operation, removes core decay heat and sensible heat during reactor shutdown and cool-down, and after certain design basis accidents. The system is nonsafety-related, with the exception of the safety-related containment isolation safety function. Specific aspects of the system are provided below:

Section 9.2 Outline

9.2.2 Component Cooling Water System (cont.)

DCD (cont.)

- detailed description of the component cooling water system, including design bases, listing of components, modes of operation, flow paths, and system instrumentation, controls, and alarms
- design criteria for prevention of connections to systems having the potential for containing radioactive material
- description of approach to demonstrate how the system will function as part of the residual heat removal philosophy of the plant following design basis events
- description of approach to demonstrate how the system functions without compromising the safe operation of the plant under both normal operating or transient conditions
- description of plans for detection, prevention or leakage containment, and monitoring of radioactive leaks into the system
- description of protection measures for nonsafety-related systems required to function following design basis events
- description of safety evaluation of the component cooling water system identifying containment isolation function
- plans to address long-term corrosion that may degrade system performance
- system testing and inspection requirements
- reference to PSAR Section 6.2 for capability description for containment isolation valves
- table(s) showing the cooling requirements for the component cooling water system under each operating mode
- figure(s) showing simplified P&IDs of the component cooling water system, including the components cooled by the system, interfaces with the heat sink (chilled water system), and instrumentation and alarms

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FSAR Same contents as mPower standard plant DCD Section 9.2.2.

Section 9.2 Outline

9.2.3 Demineralized Water System

PSAR The Clinch River SMR Plant demineralized water system is a nonsafety-related system, with the exception of a safety-related containment isolation function which receives water from the raw water and pre-treatment system, processes this water to remove ionic impurities, provides demineralized water storage capacity, and forwards demineralized water to various plant users. Specific aspects of the system are provided below:

- description and preliminary design bases of the demineralized water system
- proposed design criteria for prevention of connections to systems having the potential for containing radioactive material
- proposed approach to demonstrate how the system functions without compromising safe plant operation under both normal operating or transient situations, including impacts of sharing between modules (units)
- preliminary safety evaluation of the chilled water system identifying containment isolation function
- proposed plans to address long-term corrosion that may degrade system performance
- proposed testing, inspection, and instrumentation requirements
- preliminary figure(s) showing simplified P&IDs of the demineralized water system

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DCD The mPower standard plant demineralized water system is a nonsafety-related system, with the exception of a safety-related containment isolation function which receives water from the raw water and pre-treatment system, processes this water to remove ionic impurities, provides storage capacity for the demineralized water, and transfers the water to other plant water systems. Specific aspects of the system are provided below:

- detailed description of the demineralized water system, including design bases, listing of components, modes of operation, flow paths, and instrumentation, controls, and alarms
- description of plan for prevention of backflow of potentially radioactive streams into the system
- description of how the system functions without compromising safe plant operation under both normal operating or transient situations, including impacts of sharing between modules (units)
- description of safety evaluation of the chilled water system showing containment isolation function
- description of plan to address long-term corrosion that may degrade system performance
- system testing and inspection requirements

Section 9.2 Outline

9.2.3 Demineralized Water System (cont.)

DCD (cont.)
- table(s) showing the demineralized water system component data
- figure(s) showing simplified P&IDs of the demineralized water system, including all major components, interfaces with other systems, and instrumentation and alarms

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FSAR Same contents as mPower standard plant DCD Section 9.2.3.

Section 9.2 Outline

9.2.4 Potable and Sanitary Water System

PSAR The Clinch River SMR Plant potable and sanitary water system is a nonsafety-related system which receives raw water from the raw water and pre-treatment system, processes this water to bacterial and chemical quality levels suitable for domestic use and human consumption, provides storage capacity for the potable water, and forwards this water to various plant users. Specific aspects of the system are provided below:

- description and preliminary design bases of the potable and sanitary water system
- proposed design criteria for prevention of connections to systems having the potential for containing radioactive material and demonstration that the potable water system will not compromise the safe operation of the plant under both normal operating or transient situations, including impacts of sharing between modules (units)
- proposed testing, inspection, and instrumentation requirements
- preliminary figure(s) showing simplified P&IDs of the potable and sanitary water system

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DCD The mPower standard plant potable and sanitary water system is a nonsafety-related system which receives raw water from the raw water and pre-treatment system, processes this water to bacterial and chemical quality levels suitable for domestic use and human consumption, provides storage capacity for the potable water, and forwards this water to various plant users. Specific aspects of the system are provided below:

- description and design bases of the potable and sanitary water system, including modes of operation, flow paths, and instrumentation, controls, and alarms
- description of design criteria for prevention of backflow of potentially radioactive streams into the system
- description of design criteria for prevention of connections to systems having the potential for containing radioactive material and demonstration of how the system functions without compromising safe plant operation under both normal operating or transient situations, including impacts of sharing between modules (units)
- system testing, inspection, and instrumentation requirements
- table(s) showing the potable and sanitary water component data
- figure(s) showing simplified P&IDs of the potable and sanitary water system, including instrumentation

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FSAR Same contents as mPower standard plant DCD Section 9.2.4.

Section 9.2 Outline

9.2.5 Ultimate Heat Sink

PSAR The Clinch River SMP Plant ultimate heat sink (UHS) is the safety-related ultimate heat sink tank(s) within the containment system as described in PSAR Section 6.2.

DCD The mPower standard plant ultimate heat sink (UHS) is the safety-related ultimate heat sink tank(s) within the containment system as described in DCD Section 6.2.

FSAR Same contents as mPower standard plant DCD Section 9.2.5.

Section 9.2 Outline

9.2.6 Condensate Storage Facility

PSAR The Clinch River SMR Plant condensate storage and transfer system is comprised of a condensate storage tank, forwarding pumps, and a piping distribution system. This nonsafety-related system receives water from the demineralized water system, chemically treats this water to be compatible with the steam generator secondary side chemistry guidelines, provides storage capacity for condensate quality water, and transfers this water to other plant systems. The potential for radioactivity contamination exists due to mechanisms such as primary-to-secondary leakage and contaminated demineralized water transfer to the condensate system. Specific aspects of the system are provided below:

- description and preliminary design bases of the condensate storage and transfer system
- proposed design criteria for prevention of connections to systems having the potential for containing radioactive material
- proposed approach to demonstrate how the system functions without compromising the safe plant operations under both normal operating or transient conditions, including impacts of sharing between modules (units)
- description of environmental design considerations
- proposed requirements for leakage control (including mitigation of environmental effects)
- proposed limits for radioactivity concentration
- proposed material compatibility and corrosion control features
- address adequacy of stored inventory for coping with both safe shutdown and station blackout conditions
- reference to applicable sections in PSAR Chapters 11 and 12 that describe radiological considerations for normal operation
- proposed testing, inspection, and instrumentation requirements
- preliminary figure(s) showing simplified P&IDs of the condensate storage and transfer system

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DCD The mPower standard plant condensate storage and transfer system is comprised of a condensate storage tank, forwarding pumps, and a piping distribution system. This nonsafety-related system receives water from the demineralized water system, chemically treats this water to be compatible with the steam generator secondary side water chemistry guidelines, provides storage capacity for condensate quality water, and transfers this water to other plant systems. The potential for radioactivity contamination exists due to mechanisms such as primary-to-secondary leakage and contaminated demineralized water transfer into the system. Specific aspects of the system are provided below:

Section 9.2 Outline

9.2.6 Condensate Storage Facility (cont.)

DCD (cont.)

- detailed description of the condensate storage and transfer system, including design bases, environmental design considerations, listing of components, modes of operation, flow paths, and instrumentation, controls, and alarms
- detailed design criteria for prevention of connections to systems having the potential for containing radioactive material
- description of requirements for leakage control, including leakage collection features and mitigation of environmental effects
- description of plan for prevention of backflow of potentially radioactive streams into the system
- description of how the system functions without compromising safe plant operation under both normal operating or transient situations, including impacts of sharing between modules (units)
- description of limits for radioactivity concentration
- detailed evaluation of the adequacy of stored inventory for coping with both safe shutdown and station blackout conditions
- detailed material compatibility and corrosion control features
- reference to applicable sections in DCD Chapters 11 and 12 that describe radiological considerations for normal operation
- system testing and inspection requirements
- table(s) showing the condensate storage facility component data
- figure(s) showing simplified P&IDs of the condensate storage and transfer system, including all major components, instrumentation and alarms, and system interfaces

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FSAR Same contents as mPower standard plant DCD Section 9.2.6.

Section 9.2 Outline

9.2.7 Chilled Water System

PSAR The Clinch River SMR Plant chilled water system is a nonsafety-related, hybrid-type heat sink for the Nuclear Island component cooling water heat exchangers. This closed loop system utilizes an air-cooled fin-fan heat exchanger and air-cooled refrigerated chillers. During normal operating mode, the refrigerated chillers are utilized for heat removal. During both the high and low pressure decay heat removal modes, the air cooled heat exchanger is utilized for heat removal. Specific aspects of the system are provided below:

- preliminary description and design bases of the chilled water system
- proposed design criteria for prevention of connections to systems having the potential for containing radioactive material
- proposed approach to demonstrate how the system functions without compromising safe plant operations under both normal operating or transient conditions
- proposed approach to providing necessary protection for nonsafety-related systems that are required to function following design basis events
- proposed approach to demonstrate how the system will function as part of the residual heat removal philosophy of the plant following design basis events
- provisions to detect and prevent leakage of radioactive material into the environment
- proposed approach to prevent long-term corrosion and organic fouling that may degrade system performance
- proposed testing, inspection, and instrumentation requirements
- preliminary figure(s) showing simplified P&IDs of the chilled water system

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DCD The mPower standard plant chilled water system is a nonsafety-related, hybrid-type heat sink for the Nuclear Island component cooling water heat exchangers. This closed loop system utilizes an air-cooled fin-fan heat exchanger and air-cooled refrigerated chillers. During normal operating mode, the refrigerated chillers are utilized for heat removal. During both the high and low pressure decay heat removal modes, the air cooled heat exchanger is utilized for heat removal. Specific aspects of the system are provided below:

- detailed description of the chilled water system, including design bases, listing of components, modes of operation, flow paths, and instrumentation, controls, and alarms
- description of design criteria for prevention of connections to systems having the potential for containing radioactive material
- description of approach to demonstrate how the system will function as part of the residual heat removal philosophy of the plant following design basis events

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Section 9.2 Outline

9.2.7 Chilled Water System (cont.)

DCD (cont.)

- description of approach to prevent long-term corrosion and organic fouling that may degrade system performance
- description of plans for detection, prevention, and monitoring of radioactivity leaks into system
- description of protection measures for nonsafety-related systems required to function following design basis events
- description of how the system functions without compromising safe plant operation under both normal operating or transient situations
- system testing and inspection requirements
- table(s) showing the cooling requirements for the chilled water system under each operating mode
- figure(s) showing simplified P&IDs of the chilled water system, including the components, interfaces with the component cooling water system, and instrumentation and alarms

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FSAR Same contents as mPower standard plant DCD Section 9.2.7.

Section 9.2 Outline

9.2.8 Turbine Building Cooling Water System

PSAR The Clinch River SMR Plant turbine building cooling water system provides cooling water for the removal of heat from nonsafety-related heat exchangers in the turbine building and rejects the heat to the circulating water system. Specific aspects of the system are provided below:

- description and preliminary design bases of the turbine building cooling water system
- proposed design criteria for prevention of connections to systems having the potential for containing radioactive material
- proposed approach to demonstrate how the system functions without compromising safe plant operations under both normal operating or transient conditions
- proposed testing, inspection, and instrumentation requirements
- preliminary figure(s) showing simplified P&IDs of the turbine building cooling water system

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DCD The mPower standard plant turbine building cooling water system provides cooling water for the removal of heat from nonsafety-related heat exchangers in the turbine building and rejects the heat to the circulating water system. Specific aspects of the system are provided below:

- detailed description of the turbine building cooling water system, including design bases, listing of components, modes of operation, flow paths, and instrumentation, controls, and alarms
- detailed design criteria for prevention of connections to systems having the potential for containing radioactive material
- description of how the system functions without compromising safe plant operation under both normal operating or transient situations
- system testing and inspection requirements
- figure(s) showing simplified P&IDs of the turbine building cooling water system, including the components cooled by the system, interfaces with the heat sink (circulating water system), and instrumentation and alarms

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FSAR Same contents as mPower standard plant DCD Section 9.2.8.

Section 9.2 Outline

9.2.9 Raw Water and Pre-Treatment System

PSAR The Clinch River SMR Plant raw water and pre-treatment system is a nonsafety-related system which treats and forwards water from a site-specific water source, provides storage capacity for the raw water, and transfers the water to other plant systems. Specific aspects of the system are provided below:

- preliminary description and design bases of the raw water and pre-treatment system
- proposed design criteria for prevention of connections to systems having the potential for containing radioactive material
- proposed approach to demonstrate how the raw water and pre-treatment system functions without compromising safe plant operations under both normal operating or transient conditions, including impacts of sharing between modules (units)
- proposed testing, inspection, and instrumentation requirements
- table(s) showing the preliminary raw water and pre-treatment system component data- preliminary figure(s) showing simplified P&IDs of the raw water and pre-treatment system, including the site-specific water source

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DCD The mPower standard plant raw water and pre-treatment system is a nonsafety-related system which receives treated water from a [site-specific water source], provides storage capacity for the raw water, and transfers the water to other plant systems. Specific aspects of the system are provided below:

- detailed description of the raw water and pre-treatment system, including design bases, listing of components, modes of operation, flow paths, and instrumentation, controls, and alarms
- description of design criteria for prevention of connections to systems having the potential for containing radioactive material
- description of how the system functions without compromising safe plant operation under both normal operating or transient situations, including impacts of sharing between modules (units)
- system testing and inspection requirements
- table(s) showing the raw water and pre-treatment system component data
- figure(s) showing simplified P&IDs of the raw water and pre-treatment system, including all major components, instrumentation and alarms, interfaces with other systems, water receipt, transfer to fire water storage, demineralized water system, potable water system, ultimate heat sink makeup (following beyond-design basis event)

Section 9.2 Outline

9.2.9 Raw Water and Pre-Treatment System (cont.)

FSAR Same contents as mPower standard plant DCD Section 9.2.9 with the following site-specific supplemental information:

- detailed description of the Clinch River SMR Plant site-specific water source, including listing of components, modes of operation, and instrumentation and controls
- figure(s) showing simplified P&IDs of the Clinch River SMR Plant site-specific water source, including all major components, interfaces with other systems, treatment processes (chemical or filtration) and transfer to the raw water storage tank, and instrumentation and alarms

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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 (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
9.3.1 Compressed Air and Gas Systems	PSAR	10 CFR 50, App. A, GDC 1, 2, 5 10 CFR 50.63	No	RG 1.70 Note: PSAR Section 9.3.1 will include a preliminary failure analysis that also addresses loss of offsite power	9.3.1	RGs 1.29, 1.68.3, 1.155 NUREG-1275, Vol. 2 GL 88-14	ANSI/ISA-7.0.01-1996	Yes SBO information	No	ISG-019 (Draft)	3.2, 3.3, 3.4, 3.5, 3.6 - 3.11, 5.2, 6.6, 7.1, 8.1, 8.4, 9.3, 9.5, 14, 16, 17
	DCD	10 CFR 50, App. A, GDC 1, 2, 5 10 CFR 52.47(b)(1) 10 CFR 50.63	No	RG 1.206	9.3.1	RGs 1.29, 1.68.3, 1.155 NUREG-1275, Vol. 2	ANSI/ISA-7.0.01-1996	N/A	N/A	ISG-019 (Draft)	3.2, 3.3, 3.4, 3.5, 3.6 - 3.11, 5.2, 6.6, 7.1, 8.1, 8.4, 9.3, 9.5, 14, 16, 17
	FSAR	10 CFR 50, App. A, GDC 1, 2, 5 10 CFR 50.63	No	RG 1.206	9.3.1	RGs 1.29, 1.68.3, 1.155 NUREG-1275, Vol. 2 GL 88-14	ANSI/ISA-7.0.01-1996	N/A	No	ISG-019 (Draft)	3.2, 3.3, 3.4, 3.5, 3.6 - 3.11, 5.2, 6.6, 7.1, 8.1, 8.4, 9.3, 9.5, 14, 16, 17

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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
9.3.2 Process Sampling System	PSAR	10 CFR 20.1101(b) 10 CFR 50, App. A, GDC 1, 2, 13, 14, 26, 41, 60, 63, 64 10 CFR 50.34(f)(2)(viii) 10 CFR 50.34(f)(2)(xxvi)	No	RG 1.70	9.3.2	RGs 1.21, 1.26, 1.29, 1.97, 1.151, 8.8 NUREG-0737 (TMI Action Item III.D.1.1) NUREG-1793 (Section 9.3.3)	ANSI/HPS N13.1-1999 EPRI TR-1008224-Revision 6 EPRI TR-1002884-Revision 5 EPRI TR-105714-V2R4 ANSI/ISA S67.02.01-1999 ANSI/ISA 67.01.01-2002	No	No	None	3.2, 3.3, 3.5, 3.6-3.8, 3.10, 3.11, 6.2, 6.6, 7.3, 7.5, 8.3, 11.2, 11.3, 11.5, 12.3, 13.3, 16, 17
	DCD	10 CFR 20.1101(b) 10 CFR 50, App. A, GDC 1, 2, 13, 14, 26, 41, 60, 63, 64 10 CFR 50.34(f)(2)(viii) 10 CFR 50.34(f)(2)(xxvi) 10 CFR 52.47(b)(1)	No	RG 1.206	9.3.2	RGs 1.21, 1.26, 1.29, 1.97, 1.151, 8.8 NUREG-0737 (TMI Action Item III.D.1.1) NUREG-1793 (Section 9.3.3)	ANSI/HPS N13.1-1999 EPRI TR-1008224-Revision 6 EPRI TR-1002884-Revision 5 EPRI TR-105714-V2R4 ANSI/ISA S67.02.01-1999 ANSI/ISA 67.01.01-2002	N/A	N/A	None	3.2, 3.3, 3.5, 3.6-3.8, 3.10, 3.11, 6.2, 6.6, 7.3, 7.5, 8.3, 11.2, 11.3, 11.5, 12.3, 13.3, 16, 17
	FSAR	10 CFR 20.1101(b) 10 CFR 50, App. A, GDC 1, 2, 13, 14, 26, 41, 60, 63, 64 10 CFR 50.34(f)(2)(viii) 10 CFR 50.34(f)(2)(xxvi)	No	RG 1.206	9.3.2	RGs 1.21, 1.26, 1.29, 1.97, 1.151, 8.8 NUREG-0737 (TMI Action Item III.D.1.1) NUREG-1793 (Section 9.3.3)	ANSI/HPS N13.1-1999 EPRI TR-1008224-Revision 6 EPRI TR-1002884-Revision 5 EPRI TR-105714-V2R4 ANSI/ISA S67.02.01-1999 ANSI/ISA 67.01.01-2002	N/A	No	None	3.2, 3.3, 3.5, 3.6-3.8, 3.10, 3.11, 6.2, 6.6, 7.3, 7.5, 8.3, 11.2, 11.3, 11.5, 12.3, 13.3, 16, 17

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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 (See Note 1)	Industry Guidance	CPA Information Beyond RG 1.70	Changes to the Standard Plant Design	Key Issues	Related Sections
9.3.3 Equipment and Floor Drainage System	PSAR	10 CFR 50, App. A, GDC 2, 4, 60	No	RG 1.70	9.3.3	No	None	No	No	None	3.2, 3.3, 3.4-3.9, 6.2, 6.6, 11.2, 12.3, 16, 17
	DCD	10 CFR 50, App. A, GDC 2, 4, 60 10 CFR 52.47(b)(1)	No	RG 1.206	9.3.3	No	None	N/A	N/A	None	3.2, 3.3, 3.4-3.9, 6.2, 6.6, 11.2, 12.3, 16, 17
	FSAR	10 CFR 50, App. A, GDC 2, 4, 60	No	RG 1.206	9.3.3	No	None	N/A	No	None	3.2, 3.3, 3.4-3.9, 6.2, 6.6, 11.2, 12.3, 16, 17
9.3.4 Chemical and Volume Control System (PWR)	PSAR	The functions of the chemical volume and control system (CVCS) are provided by the reactor coolant inventory and purification system (RCIPS). See Regulatory Framework Document for PSAR Section 5.4.7.	See RFD for 5.4.7	See RFD for 5.4.7	See RFD for 5.4.7	See RFD for 5.4.7	See RFD for 5.4.7	See RFD for 5.4.7	See RFD for 5.4.7	None	See RFD for 5.4.7
	DCD										
	FSAR										
9.3.5 Standby Liquid 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										

Notes:
(1) 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

Section 9.3 Outline

9.3.1 Compressed Air and Gas Systems

PSAR The Clinch River SMR Plant compressed air system is a nonsafety-related system with the exception of the safety-related containment isolation function for lines that provide filtered, dried, and oil-free air for instrument and actuator control use (air-operated valves and dampers) and service air drop stations (manual air tools or pumps). High pressure compressed air is also provided as backup for post-accident breathing air in the control room envelope as discussed in PSAR Section 6.4.

The Clinch River SMR Plant compressed gas system is a nonsafety-related system, with the exception of the safety-related containment isolation function for lines that provide hydrogen to the reactor coolant inventory and purification system's low pressure tank in order to maintain primary water chemistry, and for lines that provide nitrogen gas to various nuclear steam supply system components during purge modes of operation. Specific aspects of the compressed air and gas systems are provided below:

- preliminary description and preliminary design bases
- preliminary description of air-cleanliness, quality, and environmental design requirements
- preliminary failure analysis (including diverse sources of electric power)
- preliminary maintenance guidelines for air cleanliness to ensure system reliability
- preliminary design criteria for prevention of connections to systems having the potential for containing radioactive material
- preliminary inspection, testing, and instrumentation requirements
- preliminary simplified piping and instrumentation diagrams (P&IDs) of compressed air and gas systems

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DCD The mPower standard plant compressed air system is a nonsafety-related system with the exception of the safety-related containment isolation function for lines that provide filtered, dried, and oil-free air for instrument and actuator control use (air-operated valves and dampers) and service air drop stations (manual air tools or pumps). High pressure compressed air is also provided as backup for post-accident breathing air in the control room envelope as discussed in DCD Section 6.4.

The mPower standard plant compressed gas system is a nonsafety-related system, with the exception of the safety-related containment isolation function for lines that provide hydrogen to the reactor coolant inventory and purification system's low pressure tank in order to maintain primary water chemistry, and for lines that provide nitrogen gas to various nuclear steam supply system components during purge modes of operation. Specific aspects of the compressed air and gas system are provided below:

Section 9.3 Outline

9.3.1 Compressed Air and Gas Systems (cont.)

DCD (cont.)

- detailed compressed air and gas system descriptions, including air and gas properties (pressure, temperature, dewpoint temperature, gas composition), and identification of the equipment (compressors, dryers, receivers, etc.)
- design basis and functional description
- maintenance provisions to ensure air cleanliness
- description of instrumentation and control features to monitor system operation
- provisions for periodic testing of air quality, pressure and leakage, and functional testing
- safety implications related to sharing of the system for multi-unit plants
- figure(s) showing simplified P&IDs, including isolation and/or interconnection capabilities between subsystems

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FSAR Same contents as mPower standard plant DCD Section 9.3.1.

Section 9.3 Outline

9.3.2 Process Sampling System

PSAR The Clinch River SMR Plant process sampling system includes both Nuclear Island (NI) and Turbine Island (TI) sub-systems and collects both liquid and gaseous samples during normal plant operation, and provides for local grab samples. The system additionally provides post accident sampling in accordance with Regulatory Guide 1.97. The process sampling system is nonsafety-related and has no safety function other than containment isolation for piping that penetrates containment. Specific aspects of the process sampling system are provided below:

- preliminary description and preliminary design basis for the process sampling system
- preliminary description of sampling volumes, conditions, and handling requirements (to ensure representative samples are obtained)
- preliminary provisions for system isolation and means to limit reactor coolant losses - proposed locations from which samples will be obtained
- preliminary provisions for using sampling systems for post-accident radioactivity monitoring
- preliminary design criteria for prevention of connections to systems having the potential for containing radioactive material
- preliminary failure analysis, including a description of system's capability to function in the event of adverse conditions
- preliminary inspection, testing, and instrumentation requirements
- preliminary simplified P&IDs of process sampling system
- preliminary primary and secondary water sampling provisions

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DCD The mPower standard plant process sampling system includes both Nuclear Island (NI) and Turbine Island (TI) sub-systems and performs the sampling of various plant fluids. The system is nonsafety-related and has no safety function other than containment isolation for piping that penetrates containment. The system collects both liquid and gaseous samples during normal operation, and provides for local grab samples. The system additionally provides post accident sampling in accordance with Regulatory Guide 1.97. Specific aspects of the process sampling system are provided below:

- detailed description and design bases of the system, including description of the sample analysis laboratory and counting room, identification of sampling volumes, conditions, and handling requirements to ensure representative samples are obtained from liquid and gaseous process streams and tanks
- provisions for purging and draining sampling steams and draining sampling lines back to the system of origin, or to an appropriate waste treatment system and for system isolation

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Section 9.3 Outline

9.3.2 Process Sampling System (cont.)

DCD (cont.)

- plans for using sampling systems for post-accident radioactivity monitoring
- description of plan for leakage detection system capability to meet RG 1.45 sensitivity requirements
- system inspection, testing, and instrumentation requirements
- description of on-line water chemistry monitoring for both primary and secondary systems
- table(s) showing locations where sampling will be obtained, as well as a description of the parameters to be determined at each sample location
- figure(s) providing simplified P&IDs of the process sampling system

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FSAR Same contents as mPower standard plant DCD Section 9.3.2.

Section 9.3 Outline

9.3.3 Equipment and Floor Drainage System

PSAR The Clinch River SMR Plant equipment and floor drainage system is nonsafety-related and has no safety function other than containment isolation for piping that penetrates containment. The system collects the non-radioactive and radioactive equipment drains and floor drainage from various specified equipment and building areas. The liquid drains are transferred to the appropriate processing and disposal systems during all operating modes. Specific aspects of the equipment and floor drainage system are provided below:

- description and preliminary design bases
- description of areas requiring leakage detection for safety-related systems
- preliminary design considerations for preventing transfer of contaminated fluids to non-contaminated drainage systems
- preliminary design considerations for precluding back-flooding of equipment in safety-related compartments
- preliminary locations of leakage monitoring and sampling points
- preliminary system inspection, testing, and instrumentation requirements
- preliminary simplified P&IDs of equipment and floor drainage system

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DCD The mPower standard plant equipment and floor drainage system is nonsafety-related and has no safety function other than containment isolation for piping that penetrates containment. The system collects the non-radioactive and radioactive equipment drains and floor drainage from various specified equipment and building areas. The liquid drains are transferred to the appropriate processing and disposal systems during all operating modes. Specific aspects of the equipment and floor drainage system are provided below:

- detailed description and design bases for the equipment and floor drainage system including functional requirements, provisions for excluding oil and other non-compatible fluids from the system
- final design for precluding back-flooding of equipment, as well as prevention of the transfer of contaminated fluids to non-contaminated drainage systems
- identification of areas where drainage system is used to detect leakage in order to identify conditions adverse to safety
- results of interfacing reviews for protection of drainage systems against flooding
- reference to applicable sections in DCD Chapters 11 and 12 that describe radiological considerations for normal and postulated spills and accidents, as well as arrangement of fire suppression water drainage
- system inspection, testing, and instrumentation requirements
- figure(s) providing simplified P&IDs of equipment and floor drainage system

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Section 9.3 Outline

9.3.3 Equipment and Floor Drainage System (cont.)

FSAR Same contents as mPower standard plant DCD Section 9.3.3.

Section 9.3 Outline

9.3.4 Chemical and Volume Control System (PWR)

PSAR The functions of the chemical volume and control system (CVCS) for the Clinch River SMR Plant are provided by the reactor coolant inventory and purification system (RCIPS) as discussed in PSAR Section 5.4.7.

DCD The functions of the chemical volume and control system (CVCS) for the mPower standard plant are provided by the reactor coolant inventory and purification system (RCIPS) as discussed in DCD Section 5.4.7.

FSAR Same contents as mPower standard plant DCD Section 9.3.4.

Section 9.3 Outline

9.3.5 Standby Liquid Control System (BWR)

PSAR N/A - BWR

DCD N/A - BWR

FSAR N/A - BWR

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
9.5.2 Communication Systems	PSAR	10 CFR 50.34(f)(2)(xxv) 10 CFR 50.47(a)(8) 10 CFR 50.55a 10 CFR 50, App A, GDCs 1, 2, 3, 4, and 19 10 CFR 50, App. E 10 CFR 73.45(e)(2)(iii) 10 CFR 73.45(g)(4)(i) 10 CFR 73.46(e)(5) 10 CFR 73.46(f) 10 CFR 73.55(e) 10 CFR 73.55(f)	No	RG 1.70 Note: PSAR Section 9.5.2 will also address current regulatory guidance on communication systems.	9.5.2 BTP 9.5.1	RG 1.180 RG 1.189 RG 8.15, Section 5.6 NUREG-0654/FEMA-REP-1 NUREG-0696 NUREG-0700 BL 80-15 IN 83-83 IN 85-77 IN 86-97 IN 89-19 CR 80-09 GL 91-14	EPRI NP-5652, 1988 EPRI TR-106439, 1996 EPRI NP-6559, 1989 EPRI TR-102323, 1997 INPO 06-001 (SER 6-90) IEEE 269-2002 IEEE 384-2008 IEEE 487-2000 IEEE 692-2010 IEEE 776-1992 (R2003) IEEE 1050-2004 IEEE 1590-2003 IEEE 1613-2003 IEEE C62.41-1991(R1995) IEEE C63.12-1999 MIL-STD-461F, 2007 MIL-STD-810G, 2009 NFPA 70-2011 NFPA 72-2010 TIA-603-D-2010	Yes Content will be consistent with level of detail for plant communication systems in previous PSAR Sections 9.5.2 with discussion adjusted to address current regulatory guidance.	No	May need enhancements to the communication plan and systems as a result of lessons learned from the Fukushima event	7.9, 9.5, 13.3, 13.6, 14, 18
	DCD	10 CFR 50.34(f)(2)(xxv) 10 CFR 50.47(a)(8) 10 CFR 50.55a 10 CFR 50, App A, GDCs 1, 2, 3, 4, and 19 10 CFR 50, App. E 10 CFR 52.47(b)(1) 10 CFR 73.45(e)(2)(iii) 10 CFR 73.45(g)(4)(i) 10 CFR 73.46(e)(5) 10 CFR 73.46(f) 10 CFR 73.55(e) 10 CFR 73.55(f)	No	RG 1.206	9.5.2 BTP 9.5.1	RG 1.68 RG 1.180 RG 1.189 RG 8.15, Section 5.6 NUREG-0654/FEMA-REP-1 NUREG-0696 NUREG-0700 BL 80-15 IN 83-83 IN 85-77 IN 86-97 IN 89-19 CR 80-09 GL 91-14	EPRI NP-5652, 1988 EPRI TR-106439, 1996 EPRI NP-6559, 1989 EPRI TR-102323, 1997 INPO 06-001 (SER 6-90) IEEE 269-2002 IEEE 384-2008 IEEE 487-2000 IEEE 692-2010 IEEE 776-1992 (R2003) IEEE 1050-2004 IEEE 1590-2003 IEEE 1613-2003 IEEE C62.41-1991(R1995) IEEE C63.12-1999 MIL-STD-461F, 2007 MIL-STD-810G, 2009 NFPA 70-2011 NFPA 72-2010 TIA-603-D-2010	N/A	NA	May need enhancements to the communication plan and systems as a result of lessons learned from the Fukushima event	7.9, 9.5, 13.3, 13.6, 14, 14.3, 18

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
9.5.2 Communication Systems	FSAR	10 CFR 50.34(f)(2)(xxv) 10 CFR 50.47(a)(8) 10 CFR 50.55a 10 CFR 50, App A, GDCs 1, 2, 3, 4, and 19 10 CFR 50, App. E 10 CFR 73.45(e)(2)(iii) 10 CFR 73.45(g)(4)(i) 10 CFR 73.46(e)(5) 10 CFR 73.46(f) 10 CFR 73.55(e) 10 CFR 73.55(f)	No	RG 1.206	9.5.2 BTP 9.5.1	RG 1.68 RG 1.180 RG 1.189 RG 8.15, Section 5.6 NUREG-0654/FEMA-REP-1 NUREG-0696 NUREG-0700 BL 80-15 IN 83-83 IN 85-77 IN 86-97 IN 89-19 CR 80-09 GL 91-14	EPRI NP-5652, 1988 EPRI TR-106439, 1996 EPRI NP-6559, 1989 EPRI TR-102323, 1997 INPO 06-001 (SER 6-90) IEEE 269-2002 IEEE 384-2008 IEEE 487-2000 IEEE 692-2010 IEEE 776-1992 (R2003) IEEE 1050-2004 IEEE 1590-2003 IEEE 1613-2003 IEEE C62.41-1991(R1995) IEEE C63.12-1999 MIL-STD-461F, 2007 MIL-STD-810G, 2009 NFPA 70-2011 NFPA 72-2010 TIA-603-D-2010	N/A	No	May need enhancements to the communication plan and systems as a result of lessons learned from the Fukushima event	7.9, 9.5, 13.3, 13.6, 14, 14.3, 18

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 3 Lighting Systems	PSAR	None	No	RG 1.70	9.5.3	RG 1.75 RG 1 189 NUREG-0700	IEEE 692-2010 NFPA 70 -2011 (NEC) NFPA 101-2009 Illuminating Engineering Society of North America (IESNA) Handbook, 2000 UL 844-2006 UL 924-2006 IES RP-1-2004 IES RP-7-2001 IES RP 8-2000	Yes Content will be consistent with level of detail for plant lighting systems in previous PSAR Sections 9 5 3 with discussion adjusted to address current regulatory guidance.	No	May need enhancements to the emergency lighting systems as a result of lessons learned from the Fukushima event	9 5, 13 6, 18
	DCD	10 CFR 52 47(b)(1)	No	RG 1.206	9.5.3	RG 1 68 RG 1.75 RG 1.189 NUREG-0700	IEEE 692-2010 NFPA 70 -2011 (NEC) NFPA 101-2009 Illuminating Engineering Society of North America (IESNA) Handbook, 2000 UL 844-2006 UL 924-2006 IES RP-1-2004 IES RP-7-2001 IES RP 8-2000	NA	NA	May need enhancements to the emergency lighting systems as a result of lessons learned from the Fukushima event	9 5, 13 6, 14 3, 18
	FSAR	None	No	RG 1.206	9.5.3	RG 1 68 RG 1 75 RG 1.189 NUREG-0700	IEEE 692-2010 NFPA 70 -2011 (NEC) NFPA 101-2009 Illuminating Engineering Society of North America (IESNA) Handbook, 2000 UL 844-2006 UL 924-2006 IES RP-1-2004 IES RP-7-2001 IES RP 8-2000	NA	No	May need enhancements to the emergency lighting systems as a result of lessons learned from the Fukushima event	9.5, 13 6, 18

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
9.5.4 Standby Diesel Generator and Ancillary Power Unit Support Systems	PSAR	10 CFR 50, App. A, GDCs 2, 4, 5, 17, 44, 45, 46	No	RG 1.70 PSAR Section 9.5.4 will address current regulatory guidance on diesel generator support systems and includes discussions on: fuel oil storage and transfer (9.5.4), cooling water (9.5.5), starting (9.5.6), lubrication (9.5.7), and combustion air intake and exhaust (9.5.8) systems The standby diesel generators and their support systems and the ancillary power units and their support systems, are both nonsafety-related and non-Class 1E. Both systems are designed to RTNSS Category B criteria to withstand seismic and flooding events. Both systems are considered Augmented Quality "AQ".	9.5.4, 9.5.5, 9.5.6, 9.5.7, 9.5.8	RGs 1.29, 1.115, 1.117, 1.137 NUREG/CR-0660 SECY 95-132	DEMA Standard, 1974 NEMA MG-1-2009 (R1 2010) ANSI/ANS-59.51-1997 (R 2007) (as applicable to an AQ system) ANSI/ANS-59-52-1998 ASTM D975, 2011	Yes Based on current regulations for passive plant nonsafety-related standby diesel systems and the ancillary power units, which will be classified as RTNSS Category B.	No	Assess and apply lessons learned from the Fukushima event regarding diesel generator operation during and after earthquakes or other natural phenomena	3.2, 3.5.1.1, 3.5.2, 3.9.1, 7.1, 8.3., 9.5.1, 16
	DCD	10 CFR 50, App. A, GDCs 2, 4, 5, 17, 44, 45, 46 10 CFR 52.47(b)(1)	No	RG 1.206	9.5.4, 9.5.5, 9.5.6, 9.5.7, 9.5.8	RGs 1.29, 1.115, 1.117, 1.137 NUREG/CR-0660 SECY 95-132	DEMA Standard, 1974 NEMA MG-1-2009 (R1 2010) ANSI/ANS-59.51-1997 (R 2007) (as applicable to an AQ system) ANSI/ANS-59-52-1998 ASTM D975, 2011	NA	NA	Assess and apply lessons learned from the Fukushima event regarding diesel generator operation during and after earthquakes or other natural phenomena	3.2, 3.5.1.1, 3.5.2, 3.9.1, 7.1, 8.3., 9.5.1, 16
	FSAR	10 CFR 50, App. A, GDCs 2, 4, 5, 17, 44, 45, 46	No	RG 1.206	9.5.4, 9.5.5, 9.5.6, 9.5.7, 9.5.8	RGs 1.29, 1.115, 1.117, 1.137 NUREG/CR-0660 SECY 95-132	DEMA Standard, 1974 NEMA MG-1-2009 (R1 2010) ANSI/ANS-59.51-1997 (R 2007) (as applicable to an AQ system) ANSI/ANS-59-52-1998 ASTM D975, 2011	NA	No	Assess and apply lessons learned from the Fukushima event regarding diesel generator operation during and after earthquakes or other natural phenomena	3.2, 3.5.1.1, 3.5.2, 3.9.1, 7.1, 8.3., 9.5.1, 16

Notes:

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

Sections 9.5.2, 9.5.3, and 9.5.4 Outline

9.5 Other Auxiliary Systems

9.5.2 Communication Systems

PSAR The Clinch River SMR Plant communication systems provide effective on-site and off-site communications during normal operation, transients, fire, accidents, off-normal environmental conditions, and security-related events. Specific aspects of the communication systems included in the PSAR are provided below:

- preliminary design bases for intra-plant and offsite communication, including diversity of system types
- preliminary description and evaluation of the plant communications program
- reference to PSAR Section 7.9 for discussion on proposed data communications systems
- reference to PSAR Section 13.6 for discussion on proposed communication plans related to security
- proposed inspection and testing requirements

DCD The mPower standard plant communication systems provide effective on-site and off-site communications during normal operation, transients, fire, accidents, off-normal environmental conditions, and security-related events. Specific aspects of the communication systems included in the DCD are provided below:

- detailed design bases for the communication systems for intra-plant and plant-to-offsite communications, including discussion of the use of diverse system types, integrated design and features to support efficient on-site communication between plant personnel in vital areas, and off-site for both operations related functions as well as for off-normal notification and coordination conditions
- demonstration that the standard plant design ensures efficient communication under environmental conditions, including weather, moisture, noise level, electromagnetic interference/radiofrequency interference, fire and radiological events, as well as the ability to communicate effectively while equipped with respiratory protection
- reference to DCD Section 7.9 for discussion on data communication systems
- reference to DCD Section 13.6 for discussion on communications related to security
- inspection and testing requirements and associated procedures

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Sections 9.5.2, 9.5.3, and 9.5.4 Outline

9.5.2 Communication Systems (cont.)

FSAR Same contents as mPower standard plant DCD Section 9.5.2 with the following supplemental information:

- site-specific description for the on-site and off-site communication systems
- description of interfaces with required offsite locations, including utility private networks, commercial carriers and the federal telephone system
- description of the emergency offsite communication system, including the crisis management radio system
- reference to FSAR Section 13.6 for site-specific details on the security communication system as discussed in separate security documents
- figure(s) showing features of the communication systems

Section 9.5.2, 9.5.3 and 9.5.4 Outline

9.5.3 Lighting Systems

PSAR The Clinch River SMR Plant lighting systems provide adequate lighting during all plant operating conditions, including normal operation and anticipated fire, transient, and accident conditions. Specific aspects of the lighting systems are provided below:

- preliminary description of the normal and emergency lighting systems, including design criteria and design bases
- proposed failure analysis, including the effects of inability to maintain lighting during all plant operating conditions (e.g. normal, anticipated fire, transient, and accident conditions)
- preliminary evaluation of the lighting system's ability to perform its function during a station blackout (SBO)

DCD The mPower standard plant lighting systems provide adequate lighting during all plant operating conditions, including normal plant operation and anticipated fire, transient, and accident conditions. Specific aspects of the lighting systems are provided below:

- description of the normal, emergency, and supplementary lighting systems, including design criteria and design bases
- discussion of the effect of a SBO event on emergency lighting systems
- failure analysis of normal and emergency lighting systems
- description of provisions for lighting needed in areas required for fire fighting
- description of provisions for lighting needed in areas for control and maintenance of safety-related equipment
- description of access routes to and from areas required for fire fighting and areas needed for control and maintenance of safety-related equipment
- description of inspection and testing requirements
- reference to DCD Section 13.6 for information on separate security documents that describe the security lighting system

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FSAR Same contents as mPower standard plant DCD Section 9.5.3 with the following supplemental information:

- site-specific information to demonstrate that the Clinch River lighting systems provide adequate lighting during all plant operating conditions

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Section 9.5.2, 9.5.3, and 9.5.4 Outline

9.5.4 Standby Diesel Generator and Ancillary Power Unit Support Systems

PSAR The Clinch River SMR Plant standby diesel generators and their support systems are nonsafety-related systems designed to prevent the complete loss of AC power to the plant and to support nonsafety-related active systems that provide investment protection and defense-in-depth capabilities for reactor coolant makeup and decay heat removal. The ancillary power units and their support systems are designed to power the Class 1E battery chargers and other select loads associated with long-term post accident monitoring if the standby diesel generators are not available. Each standby diesel generator and ancillary power unit is located in separate rooms within the Reactor Service Building (RSB) and are not shared with other units; all support systems are separate and independent (i.e., are not shared between diesel generators). Fuel oil is stored outside of the RSB in underground tanks. Specific aspects of the support systems included in the PSAR are provided below:

- preliminary design bases and description for the diesel generator fuel oil storage and transfer systems, including the requirement for onsite storage capacity, capability to meet single point vulnerability criterion, code design requirements, and environmental design bases
- preliminary safety evaluation of the fuel oil storage and transfer system, including the potential for material corrosion and fuel oil contamination, a failure analysis demonstrating capability to meet design criteria, consideration of internally or externally generated missiles, forces from piping breaks in mid- or high-energy piping, impacts of failure of non-seismic Category I Structures, Systems, and Components (SSCs), single point vulnerability criteria, ability to withstand environmental design conditions, capability to function following a SBO, and the plans by which additional oil may be procured
- preliminary design bases and description for the cooling water system, including the functional capability during high water levels, capability to detect and control system leakage, prevention of long-term corrosion and organic fouling and the compatibility of system materials, provision for instruments and testing, provision to ensure the normal interlocks do not preclude the engine operation during emergency conditions
- preliminary safety evaluation of the cooling water system, including consideration of internally or externally generated missiles, forces from pipe breaks in mid- or high-energy piping, impacts of failure of non-seismic Category I SSCs, single point vulnerability criteria, and the ability to withstand environmental design conditions
- preliminary design bases and description for the starting system, including the required system capacity

Section 9.5.2, 9.5.3, and 9.5.4 Outline

9.5.4 Standby Diesel Generator and Ancillary Power Unit Support Systems (cont.)

PSAR (cont.)

- preliminary safety evaluation of the starting system, including consideration of internally or externally generated missiles, forces from pipe breaks in mid- or high-energy piping, impacts of failure of non-seismic Category I SSCs, single point vulnerability criteria, ability to withstand environmental design conditions
- preliminary design bases and description for the lubricating system, including the functional capability during high water levels, capability to detect and control system leakage, provision for instruments and testing, provision to ensure the normal interlocks do no preclude the engine operation during emergency conditions, provisions for cooling the system and removing system heat load, system design for prevention of dry starting (momentary lack of lubrication)
- preliminary safety evaluation of the lubricating system, including consideration of internally or externally generated missiles, forces from pipe breaks in mid- or high-energy piping, impacts of failure of non-seismic Category I SSCs, single point vulnerability criteria, ability to withstand environmental design conditions
- preliminary design bases and description for the combustion air intake and exhaust systems, including criteria for protection from the effects of natural phenomena, missiles, and contaminating substances at the facility
- reference to PSAR Section 3.2 for discussion on seismic and quality group classifications for all diesel generator support systems
- preliminary safety evaluation of the combustion air intake and exhaust systems, including minimum quantity and oxygen content requirements for intake combustion air, system degradation due to the consequences of missiles or failures of high- or moderate-energy piping systems, single point vulnerability criteria, ability to withstand environmental design conditions
- preliminary inspection and testing requirements for all diesel generator support systems, including fuel oil storage and transfer, cooling water, starting air, lubrication, and combustion air intake and exhaust systems
- preliminary figure(s) showing the diesel generator support systems, including fuel oil storage and transfer, cooling water, starting, lubrication, and combustion air intake and exhaust

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Section 9.5.2, 9.5.3, and 9.5.4 Outline

9.5.4 Standby Diesel Generator and Ancillary Power Unit Support Systems (cont.)

DCD The mPower standard plant standby diesel generators and ancillary power units and their support systems are nonsafety-related systems designed to prevent the complete loss of AC power to the plant and to support nonsafety-related active systems that provide investment protection and defense-in-depth capabilities for reactor coolant makeup and decay heat removal. The ancillary power units and their support systems are designed to power the Class 1E battery chargers and other select loads associated with long-term post accident monitoring if the standby diesel generators are not available. Each standby diesel generator and ancillary power unit is located in separate rooms within the Reactor Service Building (RSB) and are not shared with other units; all support systems are separate and independent (i.e., are not shared between diesel generators). Fuel oil is stored outside of the RSB in underground tanks. Specific aspects of the support systems included in the DCD are provided below:

- description and design bases for the diesel generator fuel oil storage and transfer systems, including the requirement for onsite storage capacity, capability to meet single point vulnerability criterion, capability to detect and control leakage, measures to prevent material corrosion and fuel oil contamination, code design requirements, and environmental design bases
- safety evaluation of the fuel oil storage and transfer system, including the potential for material corrosion and fuel oil contamination, consideration of internally or externally generated missiles, forces from pipe breaks in mid- or high-energy piping, impacts of failure of non-seismic Category I SSCs, single point vulnerability criteria, and the ability to withstand environmental design conditions
- description and design bases for the cooling water system, including the functional capability during high water levels, capability to detect and control system leakage, prevention of long-term corrosion and organic fouling and the compatibility of system materials, provision for instruments and testing, provision to ensure the normal interlocks do no preclude the engine operation during emergency conditions
- safety evaluation of the cooling water system, including consideration of internally or externally generated missiles, forces from pipe breaks in mid- or high-energy piping, impacts of failure of non-seismic Category I SSCs, single point vulnerability criteria, and the ability to withstand environmental design conditions
- description and design bases for the starting system, including the required system capacity
- safety evaluation of the starting system, including consideration of internally or externally generated missiles, forces from pipe breaks in mid- or high-energy piping, impacts of failure of non-seismic Category I SSCs, single point vulnerability criteria, and the ability to withstand environmental design conditions

Section 9.5.2, 9.5.3, and 9.5.4 Outline

9.5.4 Standby Diesel Generator and Ancillary Power Unit Support Systems (cont.)

DCD (cont.)

- description and design bases for the lubricating system, including the functional capability during high water levels, capability to detect and control system leakage, provision for instruments and testing, provision to ensure the normal interlocks do no preclude the engine operation during emergency conditions, provisions for cooling the system and removing system heat load, system design for prevention of dry starting (momentary lack of lubrication)
- safety evaluation of the lubricating system, including consideration of internally or externally generated missiles, forces from pipe breaks in mid- or high-energy piping, impacts of failure of non-seismic Category I SSCs, single point vulnerability criteria, and the ability to withstand environmental design conditions
- description and design bases for the combustion air intake and exhaust systems, including criteria for protection from the effects of natural phenomena, missiles, and contaminating substances at the facility
- reference to DCD Section 3.2 for discussion on seismic and quality group classifications for diesel generator support systems
- safety evaluation of the combustion air intake and exhaust systems, including minimum quantity and oxygen content requirements for intake combustion air, system degradation due to the consequences of missiles or failures of high- or moderate-energy piping systems, single point vulnerability criteria, and the ability to withstand environmental design conditions
- description of instrumentation and control features to permit operational testing of the diesel generator support systems assure that interlocks do not preclude operation during emergency conditions
- inspection and testing requirements for all diesel generator support systems, including fuel oil storage and transfer, cooling water, starting air, lubrication, and combustion air intake and exhaust systems
- figure(s) showing the diesel generator support systems, including fuel oil storage and transfer, cooling water, starting, lubrication, and combustion air intake and exhaust

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FSAR Same contents as mPower standard plant DCD Section 9.5.4 with the following site-specific supplemental information:

- identification of acceptable sources of fuel oil available to the Clinch River SMR Plant, including a means of transporting and recharging fuel oil storage tanks following a DBA to enable the standby diesel generators and/or the ancillary power units systems to supply power for as long as required

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Clinch River Regulatory Framework Document
NRC Version

Section Number /Title	Submittal Document	Regulatory Requirements	RG 1.206 Contents	RG 1.70 Contents	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
11.1 Source Terms	PSAR	10 CFR 20.1301 10 CFR 20.1302 10 CFR 20, App B, Table 2 10 CFR 50.34 10 CFR 50.34a 10 CFR 50, App. A, GDC 60, GDC 61 10 CFR 50, App I		9.1.1	None	RG 1.70	11.1	RG 1.110 RG 1.112 RG 1.140 NUREG-0017	ANSI/ANS 18.1-1999	No	No	None	11.2 11.3 11.4 11.5 12.2 15.0
	DCD	10 CFR 20.1301 10 CFR 20.1302 10 CFR 20, App B, Table 2 10 CFR 50.34 10 CFR 50.34a 10 CFR 50, App A, GDC 60, GDC 61 10 CFR 50, App I	New Fuel Storage - The design bases for new fuel storage facilities should be provided and should include such considerations as: _quantity of fuel to be stored, _means for maintaining a subcritical array, and _the degree of subcriticality provided for the most reactive condition possible together with the assumptions used in this calculation and _design loadings to be withstood		None	RG 1.206	11.1	RG 1.110 RG 1.112 RG 1.140 NUREG-0017	ANSI/ANS 18.1-1999	N/A	No	None	11.2 11.3 11.4 11.5 12.2 15.0
	FSAR	10 CFR 20.1301 10 CFR 20.1302 10 CFR 20, App B, Table 2 10 CFR 50.34 10 CFR 50.34a 10 CFR 50, App A, GDC 60, GDC 61 10 CFR 50, App I	C.I.9.1.2		None	RG 1.206	11.1	RG 1.110 RG 1.112 RG 1.140 NUREG-0017	ANSI/ANS 18.1-1999	No	No	None	11.2 11.3 11.4 11.5 12.2 15.0

Section Number /Title	Submittal Document	Regulatory Requirements	RG 1.206 Contents	RG 1.70 Contents	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
11.2 Liquid Waste Management System	PSAR	10 CFR 20.1301 10 CFR 20.1302 10 CFR 20.1406 10 CFR 20, App B, Table 2 10 CFR 50.34a 10 CFR 50.36a 10 CFR 50, App. A, GDC 60, GDC 61, GDC 64 10 CFR 50, App I 40 CFR 190		9.1.1	None	RG 1.70	11.2 BTP 11-6	RG 1.11, RG 1.33, RG 1.68, RG 1.109, RG 1.110,RG 1.112, RG 1.113, RG 1.143, RG 4.21 NUREG-0017, -0133, -1301 NUREG/CR-3587, -4013 IEB 80-10 IEC 77-10, 77-14, 79-21, 81-09 IEN 79-07, 79-09 GL 89-01, Supp 1 DC/COL-ISG-013 DC/COL-ISG-014	ANSI/ANS 40.37-1993 ANSI/ANS 55.6-1993 (R1999)	Yes Updated to reflect use of mobile processing systems	No	None	2.4 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8 9.2, 9.3.3, 9.4 11.1, 11.3, 11.4, 11.5 12.3, 12.4 16.0 17.0
	DCD	10 CFR 20.1301 10 CFR 20.1302 10 CFR 20.1406 10 CFR 20, App B, Table 2 10 CFR 50.34a 10 CFR 50.36a 10 CFR 50, App. A, GDC 60, GDC 61, GDC 64 10 CFR 50, App I 10 CFR 52.47(b)(1) 40 CFR 190	New Fuel Storage - The design bases for new fuel storage facilities should be provided and should include such considerations as: _quantity of fuel to be stored, _means for maintaining a subcritical array, and _the degree of subcriticality provided for the most reactive condition possible together with the assumptions used in this calculation and _design loadings to be withstood		None	RG 1.206	11.2 BTP 11-6	RG 1.11, RG 1.33, RG 1.68, RG 1.109, RG 1.110,RG 1.112, RG 1.113, RG 1.143, RG 4.21 NUREG-0017, -0133, -1301 NUREG/CR-3587, -4013 IEB 80-10 IEC 77-10, 77-14, 79-21, 81-09 IEN 79-07, 79-09 GL 89-01, Supp 1 DC/COL-ISG-013 DC/COL-ISG-014	ANSI/ANS 40.37-1993 ANSI/ANS 55.6-1993 (R1999)	N/A	No	None	2.4 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8 9.2, 9.3.3, 9.4 11.1, 11.3, 11.4, 11.5 12.3, 12.4 14.3 16.0 17.0
	FSAR	10 CFR 20.1301 10 CFR 20.1302 10 CFR 20.1406 10 CFR 20, App B, Table 2 10 CFR 50.34a 10 CFR 50.36a 10 CFR 50, App. A, GDC 60, GDC 61, GDC 64 10 CFR 50, App I 40 CFR 190	C.I.9.1.2		None	RG 1.206	11.2 BTP 11-6	RG 1.11, RG 1.33, RG 1.68, RG 1.109, RG 1.110,RG 1.112, RG 1.113, RG 1.143, RG 4.21 NUREG-0017, -0133, -1301 NUREG/CR-3587, -4013 IEB 80-10 IEC 77-10, 77-14, 79-21, 81-09 IEN 79-07, 79-09 GL 89-01, Supp 1 DC/COL-ISG-013 DC/COL-ISG-014	ANSI/ANS 40.37-1993 ANSI/ANS 55.6-1993 (R1999)	Yes	No	None	2.4 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8 9.2, 9.3.3, 9.4 11.1, 11.3, 11.4, 11.5 12.3, 12.4 16.0 17.0

Section Number /Title	Submittal Document	Regulatory Requirements	RG 1.206 Contents	RG 1.70 Contents	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
11.3 Gaseous Waste Management System	PSAR	10 CFR 20.1301 10 CFR 20.1302 10 CFR 20.1406 10 CFR 20, App B, Table 2 10 CFR 50.34a 10 CFR 50.36a 10 CFR 50, App. A, GDC 3, GDC 60, GDC 61, GDC 64 10 CFR 50, App I 40 CFR 190		9.1.1	None	RG 1.70	11.3 BTP 11-5	RG 1.11, RG 1.33, RG 1.52, RG 1.68, RG 1.109, RG 1.110, RG 1.111, RG 1.112, RG 1.140, RG 1.143, RG 4.21 RG 8.8, RG 8.10 NUREG-0017, -0133, -1301 NUREG/CR -3587, -4653 IEB 80-10 GL 89-01, Supp 1	ANSI/ANS 40.37-1993 ANSI/ANS 55.4-1993 (R1999)	No	No	None	2.4 3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 9.3, 9.4 11.1, 11.2, 11.4, 11.5 12.3, 12.4 16.0 17.0
	DCD	10 CFR 20.1301 10 CFR 20.1302 10 CFR 20.1406 10 CFR 20, App B, Table 2 10 CFR 50.34a 10 CFR 50.36a 10 CFR 50, App. A, GDC 3, GDC 60, GDC 61, GDC 64 10 CFR 50, App I 10 CFR 52.47(b)(1) 40 CFR 190	New Fuel Storage - The design bases for new fuel storage facilities should be provided and should include such considerations as: _quantity of fuel to be stored, _means for maintaining a subcritical array, and _the degree of subcriticality provided for the most reactive condition possible together with the assumptions used in this calculation and _design loadings to be withstood		None	RG 1.206	11.3 BTP 11-5	RG 1.11, RG 1.33, RG 1.52, RG 1.68, RG 1.109, RG 1.110, RG 1.111, RG 1.112, RG 1.140, RG 1.143, RG 4.21 RG 8.8, RG 8.10 NUREG-0017, -0133, -1301 NUREG/CR -3587, -4653 IEB 80-10 GL 89-01, Supp 1	ANSI/ANS 40.37-1993 ANSI/ANS 55.4-1993 (R1999)	N/A	No	None	2.4 3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 9.3, 9.4 11.1, 11.2, 11.4, 11.5 12.3, 12.4 14.3 16.0 17.0
	FSAR	10 CFR 20.1301 10 CFR 20.1302 10 CFR 20.1406 10 CFR 20, App B, Table 2 10 CFR 50.34a 10 CFR 50.36a 10 CFR 50, App. A, GDC 3, GDC 60, GDC 61, GDC 64 10 CFR 50, App I 40 CFR 190	C.I.9.1.2		None	RG 1.206	11.3 BTP 11-5	RG 1.11, RG 1.33, RG 1.52, RG 1.68, RG 1.109, RG 1.110, RG 1.111, RG 1.112, RG 1.140, RG 1.143, RG 4.21 RG 8.8, RG 8.10 NUREG-0017, -0133, -1301 NUREG/CR -3587, -4653 IEB 80-10 GL 89-01, Supp 1	ANSI/ANS 40.37-1993 ANSI/ANS 55.4-1993 (R1999)	No	No	None	2.4 3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 9.3, 9.4 11.1, 11.2, 11.4, 11.5 12.3, 12.4 16.0 17.0

Section Number /Title	Submittal Document	Regulatory Requirements	RG 1.206 Contents	RG 1.70 Contents	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
11.4 Solid Waste Management System	PSAR	10 CFR 20.1201,10 CFR 20.1202 10 CFR 20.1301,10 CFR 20.1302 10 CFR 20.1406 10 CFR 20.2006, 10 CFR 20.2007 10 CFR 20.2108 10 CFR 20, App B, Table 2 10 CFR 20, App G 10 CFR 50.34a,10 CFR 50.36a 10 CFR 50, App. A, GDC 60, GDC 61, GDC 63, GDC 64 10 CFR 50, App I 10 CFR 61.55, 10 CFR 61.56 10 CFR Part 71 40 CFR 190 49 CFR Parts 171-180		9.1.1	None	RG 1.70	11.4 BTP 11-3	RG 1.11, RG 1.21, RG 1.33, RG 1.68, RG 1.110,RG 1.112 RG 1.143, RG 4.21, RG 8.8, RG 8.10 NUREG-0017, -0133, -1301 NUREG/CR-3587 IEN 84-72, 85-92, 86-20, 87-07, 90-31 IEC 77-10, 77-14, 79-07, 79-09, 79-21 IEB 79-19, 80-10 GL 80-09, 81-38, 81-39 SECY 93-323, 94-198 IP 84850	ANSI/ANS 40.37-1993 ANSI/ANS 55.1-1992 (R2009) ANSI/ANS 55.6-1993 (R2009	Yes Updated to reflect use of mobile processing systems.	No	None	3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 9.2, 9.3, 9.4, 9.5 11.1, 11.2, 11.3, 11.5 12.3, 12.4 13.4 16.0 17.0
	DCD	10 CFR 20.1201,10 CFR 20.1202 10 CFR 20.1301,10 CFR 20.1302 10 CFR 20.1406 10 CFR 20.2006, 10 CFR 20.2007 10 CFR 20.2108 10 CFR 20, App B, Table 2 10 CFR 20, App G 10 CFR 50.34a,10 CFR 50.36a 10 CFR 50, App. A, GDC 60, GDC 61, GDC 63, GDC 64 10 CFR 50, App I 10 CFR 52.47(b)(1) 10 CFR 61.55, 10 CFR 61.56 10 CFR Part 71 40 CFR 190 49 CFR Parts 171-180	New Fuel Storage - The design bases for new fuel storage facilities should be provided and should include such considerations as: _quantity of fuel to be stored, _means for maintaining a subcritical array, and _the degree of subcriticality provided for the most reactive condition possible together with the assumptions used in this calculation and _design loadings to be withstood.		None	RG 1.206	11.4 BTP 11-3	RG 1.11, RG 1.21, RG 1.33, RG 1.68, RG 1.110,RG 1.112 RG 1.143, RG 4.21, RG 8.8, RG 8.10 NUREG-0017, -0133, -1301 NUREG/CR-3587 IEN 84-72, 85-92, 86-20, 87-07, 90-31 IEC 77-10, 77-14, 79-07, 79-09, 79-21 IEB 79-19, 80-10 GL 80-09, 81-38, 81-39 SECY 93-323, 94-198 IP 84850, IMC-2504	ANSI/ANS 40.37-1993 ANSI/ANS 55.1-1992 (R2009) ANSI/ANS 55.6-1993 (R2009	N/A	No	None	3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 9.2, 9.3, 9.4, 9.5 11.1, 11.2, 11.3, 11.5 12.3, 12.4 13.4 14.3 16.0 17.0
	FSAR	10 CFR 20.1201,10 CFR 20.1202 10 CFR 20.1301,10 CFR 20.1302 10 CFR 20.1406 10 CFR 20.2006, 10 CFR 20.2007 10 CFR 20.2108 10 CFR 20, App B, Table 2 10 CFR 20, App G 10 CFR 50.34a,10 CFR 50.36a 10 CFR 50, App. A, GDC 60, GDC 61, GDC 63, GDC 64 10 CFR 50, App I 10 CFR 61.55, 10 CFR 61.56 10 CFR Part 71 40 CFR 190 49 CFR Parts 171-180	C.I 9.1.2		None	RG 1.206	11.4 BTP 11-3	RG 1.11, RG 1.21, RG 1.33, RG 1.68, RG 1.110,RG 1.112 RG 1.143, RG 4.21, RG 8.8, RG 8.10 NUREG-0017, -0133, -1301 NUREG/CR-3587 IEN 84-72, 85-92, 86-20, 87-07, 90-31 IEC 77-10, 77-14, 79-07, 79-09, 79-21 IEB 79-19, 80-10 GL 80-09, 81-38, 81-39 SECY 93-323, 94-198 IP 84850	ANSI/ANS 40.37-1993 ANSI/ANS 55.1-1992 (R2009) ANSI/ANS 55.6-1993 (R2009	N/A	No	None	3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 9.2, 9.3, 9.4, 9.5 11.1, 11.2, 11.3, 11.5 12.3, 12.4 13.4 16.0 17.0

Section Number /Title	Submittal Document	Regulatory Requirements	RG 1.206 Contents	RG 1.70 Contents	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
11.5 Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems	PSAR	10 CFR 20.1201,10 CFR 20.1202 10 CFR 20.1301,10 CFR 20.1302 10 CFR 20.1406 10 CFR 20 App. B 10 CFR 50.34(f)(2)xvii 10 CFR 50.34(f)(2)xxvii 10 CFR 50.34a, 10 CFR 50.36a 10 CFR 50, App. A, GDC 13, GDC 60, GDC 61, GDC 63, GDC 64 10 CFR 50, App. I 10 CFR 61.55 10 CFR 61.56 40 CFR 190			None	RG 1.70	11.5 BTP 7-10	RG 1.21, RG 1.33, RG 1.68, RG 1.97, RG 1.109, RG 1.111, RG 1.112 RG 1.113, RG 1.143, RG 4.1, RG 4.15, RG 8.8, RG 8.10 NUREG-0017, 0133, 0718, 0737, 1301 NUREG/CR-3587 IEN 79-07, 86-43, 91-40 IEC 77-14, 79-21, 81-09 IEB 80-10 GL 89-01 Radiological Assessment BTP, Rev. 1, November 1979	ANSI/HPS N13.1-1999 ANSI N42.18-2004	Yes Updated to address post-accident sampling requirements.	No	None	2.3 3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 7.5, 9.2, 9.3, 9.3.2 11.2, 11.3, 11.4 12.3, 12.4 13.3 16.0 17.0
	DCD	10 CFR 20.1201,10 CFR 20.1202 10 CFR 20.1301,10 CFR 20.1302 10 CFR 20.1406 10 CFR 20 App. B 10 CFR 50.34(f)(2)xvii 10 CFR 50.34(f)(2)xxvii 10 CFR 50.34a, 10 CFR 50.36a 10 CFR 50, App. A, GDC 13, GDC 60, GDC 61, GDC 63, GDC 64 10 CFR 50, App. I 10 CFR 61.55 10 CFR 61.56 10 CFR 52.47(b)(1) 40 CFR 190			None	RG 1.206	11.5 BTP 7-10	RG 1.21, RG 1.33, RG 1.68, RG 1.97, RG 1.109, RG 1.111, RG 1.112 RG 1.113, RG 1.143, RG 4.1, RG 4.15, RG 8.8, RG 8.10 NUREG-0017, 0133, 0718, 0737, 1301 NUREG/CR-3587 IEN 79-07, 86-43, 91-40 IEC 77-14, 79-21, 81-09 IEB 80-10 GL 89-01 Radiological Assessment BTP, Rev. 1, November 1979	ANSI/HPS N13.1-1999 ANSI N42.18-2004 NEI 07-09A NEI 07-10A	N/A	No	None	2.3 3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 7.5, 9.2, 9.3, 9.3.2 11.2, 11.3, 11.4 12.3, 12.4 13.3 14.3 16.0 17.0
	FSAR	10 CFR 20.1201,10 CFR 20.1202 10 CFR 20.1301,10 CFR 20.1302 10 CFR 20.1406 10 CFR 20 App. B 10 CFR 50.34(f)(2)xvii 10 CFR 50.34(f)(2)xxvii 10 CFR 50.34a, 10 CFR 50.36a 10 CFR 50, App. A, GDC 13, GDC 60, GDC 61, GDC 63, GDC 64 10 CFR 50, App. I 10 CFR 61.55 10 CFR 61.56 40 CFR 190			None	RG 1.206	11.5 BTP 7-10	RG 1.21, RG 1.33, RG 1.68, RG 1.97, RG 1.109, RG 1.111, RG 1.112 RG 1.113, RG 1.143, RG 4.1, RG 4.15, RG 8.8, RG 8.10 NUREG-0017, 0133, 0718, 0737, 1301 NUREG/CR-3587 IEN 79-07, 86-43, 91-40 IEC 77-14, 79-21, 81-09 IEB 80-10 GL 89-01 Radiological Assessment BTP, Rev. 1, November 1979	ANSI/HPS N13.1-1999 ANSI N42.18-2004 NEI 07-09A NEI 07-10A	Yes	No	None	2.3 3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 7.5, 9.2, 9.3, 9.3.2 11.2, 11.3, 11.4 12.3, 12.4 13.3 16.0 17.0
		Note 1: RG revisions are not identified as these will be consistent with the version in effect 6 months prior to the PSAR submittal.											

Chapter 11 Outline

11 Radioactive Waste Management

11.1 Source Terms

PSAR PSAR Section 11.1 describes the sources of radioactivity that are generated within the core (fission products) and have a potential of leaking into the RCS and the activation and corrosion products generated within the RCS. In addition, Section 11.1 also addresses radioactive sources contained within systems and equipment outside of the RCS that result from either a planned liquid or gaseous process flow, or leakage, from the RCS, including preliminary information related to:

- design basis source terms for the primary coolant assuming a design-basis fuel defect level, including fission, corrosion, and activation products
- design basis source terms for the secondary coolant assuming a design-basis fuel defect level and design basis primary-to-secondary leakage
- design basis source terms for primary and secondary radioactive gaseous and liquid effluent releases and effluent monitoring requirements during routine operations, including anticipated operational occurrences (AOO)
- expected source terms for primary and secondary coolant, based on industry experience at operating plants
- expected liquid and gaseous source terms by plant systems
- expected radioactive materials released annually in liquid and gaseous effluents during routine plant operations, including AOO
- transport or leakage mechanisms including flow rates, radionuclide partitioning, decontamination factors, and release pathways
- mathematical models and parameters used for developing the design basis and expected (realistic) source terms and justification for assumptions
- source of each radionuclide, its concentration, and the bases for assumptions and parameters used

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DCD DCD Section 11.1 describes the sources of radioactivity that are generated within the core (fission products) and have a potential of leaking into the RCS and the activation and corrosion products generated within the RCS. In addition, Section 11.1 also addresses radioactive sources contained within systems and equipment outside of the RCS that result from either a planned liquid or gaseous process flow, or leakage, from the RCS, including final source term as described below:

- design basis source terms for the primary coolant assuming a design-basis fuel defect level, including fission, corrosion, and activation products
- design basis source terms for the secondary coolant assuming a design-basis fuel defect level and design basis primary-to-secondary leakage

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Chapter 11 Outline

11.1 Source Terms (cont.)

DCD (cont.)

- design basis source terms for primary and secondary radioactive gaseous and liquid effluent releases and effluent monitoring requirements during routine operations, including AOO
- expected source terms for primary and secondary coolant, based on industry experience at operating plants
- expected liquid and gaseous source terms by plant systems
- expected radioactive materials released annually in liquid and gaseous effluents during routine plant operations, including AOO
- transport or leakage mechanisms including flow rates, radionuclide partitioning, decontamination factors, and release pathways
- mathematical models and parameters used for developing the design basis and expected (realistic) source terms and justification for assumptions
- source of each radionuclide, its concentration, and the bases for assumptions and parameters used
- reference to DCD Chapter 16 (Technical Specifications) for operating limits on RCS specific activity

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FSAR Same contents as mPower standard plant DCD Section 11.1 with updated information to reflect site-specific information, if needed.

Chapter 11 Outline

11.2 Liquid Waste Management System

PSAR PSAR Section 11.2 describes the capabilities of the liquid waste management system to control, collect, process, handle, store, and dispose of liquid radioactive waste, including the following preliminary information:

- description of the liquid waste management system (LWMS) design, design objectives, design criteria, methods of treatment, and associated quality assurance procedures
- compliance with regulatory requirements including 10 CFR 50, Appendix A General Design Criteria and a general discussion on RG 1.143
- expected annual quantities of radioactive material released, averaged over the life of the plant
- principal parameters used in calculating releases of radioactive materials
- compliance of design basis primary and secondary radioactive liquid effluent releases with effluent concentration limits (ECL) of 10 CFR Part 20, Appendix B during routine operations, including AOO
- compliance of expected liquid releases with effluent concentration limits and dose limits in 10 CFR Part 20 and 10 CFR Part 50, Appendix I meeting ALARA objectives
- show that the proposed systems contain all items of reasonably demonstrated technology based on a cost-benefit analysis meeting ALARA objectives
- system design capacity relative to design and expected input flows for low and high total dissolved solids (TDS) inputs
- period of time required to process normal waste flows
- capabilities to process surge flow rates associated with AOO, such as from back-to-back refueling and equipment downtime
- system capability to process wastes in the event of a single major equipment item failure
- system capability to accept additional wastes during operations that result in peak waste generation
- expected tritium concentrations in process streams
- location of process and effluent radiation monitoring systems
- design features to prevent, control, and collect the release of radioactive materials due to overflows from tanks
- design features to preclude adverse vacuum conditions
- design features to avoid uncontrolled and unmonitored releases
- use of mobile or temporary equipment for storing or processing liquid radwaste including:
    - equipment design features
    - interconnections between plant systems and mobile processing
    - how the design avoids contamination of nonradioactive systems and uncontrolled releases of radioactivity to the environment
    - requirements for utilizing mobile processing equipment for refueling outages

Chapter 11 Outline

11.2 Liquid Waste Management System (cont.)

PSAR (cont.)

- potential for an operator error or equipment malfunction (single failures) to result in uncontrolled and unmonitored releases to the environment
- subsystems and components that are shared between reactor modules
- inspection and testing provisions to enable periodic evaluation of system operability and functional performance
- design features related to reduction of maintenance, equipment down time, and liquid or gaseous releases to the building atmosphere
- tables showing:
  - radwaste system components with design and performance parameters
  - parameters, assumptions, and bases used to calculate releases
- figures of process flow diagrams that illustrate methods of operation, seismic and quality group interfaces

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DCD

DCD Section 11.2 describes the capabilities of the liquid waste management system to; control, collect, process, handle, store, and dispose of liquid radioactive waste, including the following information:

- description of the LWMS design, design objectives, design criteria, methods of treatment, and associated quality assurance procedures
- compliance with regulatory requirements including 10 CFR 50, Appendix A General Design Criteria and RG 1.143
- expected annual quantities of radioactive material released, averaged over the life of the plant
- principal parameters used in calculating releases of radioactive materials
- compliance of design basis primary and secondary radioactive liquid effluent releases with effluent concentration limits (ECL) of 10 CFR Part 20, Appendix B during routine operations, including AOO
- compliance of expected liquid releases with effluent concentration limits and dose limits in 10 CFR Part 20 and 10 CFR Part 50, Appendix I meeting ALARA objectives
- show that the proposed systems contain all items of reasonably demonstrated technology based on a cost-benefit analysis meeting ALARA objectives
- system design capacity relative to design and expected input flows for low and high TDS inputs
- period of time required to process normal waste flows
- capabilities to process surge flow rates associated with AOO, such as from back-to-back refueling and equipment downtime
- system capability to process wastes in the event of a single major equipment item failure

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Chapter 11 Outline

11.2 Liquid Waste Management System (cont.)

DCD (cont.)

- system capability to accept additional wastes during operations that result in peak waste generation
- expected tritium concentrations in process streams
- location of process and effluent radiation monitoring systems
- design features to prevent, control, and collect the release of radioactive materials due to overflows from tanks
- design features to preclude adverse vacuum conditions
- design features to avoid uncontrolled and unmonitored releases
- use of mobile or temporary equipment for storing or processing liquid radwaste including:
    - equipment design features
    - interconnections between plant systems and mobile processing
    - how the design avoids contamination of nonradioactive systems and uncontrolled releases of radioactivity to the environment
    - requirements for utilizing mobile processing equipment for refueling outages
- potential for an operator error or equipment malfunction (single failures) to result in uncontrolled and unmonitored releases to the environment
- subsystems and components that are shared between reactor modules
- inspection and testing provisions to enable periodic evaluation of system operability and functional performance
- design features related to reduction of maintenance, equipment down time, and liquid or gaseous releases to the building atmosphere
- tables showing:
    - radwaste system components with design and performance parameters
    - parameters, assumptions, and bases used to calculate releases
    - releases by radionuclide for normal operation, AOO, and design basis effluent concentrations
    - comparison of effluent releases to regulatory objectives
- figures of process flow diagrams that illustrate methods of operation, seismic and quality group interfaces

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FSAR Same contents as mPower standard plant DCD Section 11.2 with the following site-specific updated supplemental information:

- liquid release dilution factors
- expected doses to individuals at or beyond the site boundary
- comparison of effluent releases and doses to the regulatory objectives of 10 CFR 20, CFR Part 50, Appendix I, and 40 CFR 190
- operational procedures for mobile or temporary equipment
- discussion on compliance with RG 1.33 and RG 1.143

Chapter 11 Outline

11.3 Gaseous Waste Management System

PSAR PSAR Section 11.3 describes the capabilities of the gaseous waste management system to; control, collect, process, handle, store, and dispose of gaseous radioactive waste including the following preliminary information:

- description of the gaseous waste management system (GWMS) design, design objectives, design criteria, methods of treatment, and associated quality assurance procedures
- compliance with regulatory requirements including 10 CFR 50, Appendix A General Design Criteria and a general discussion on RG 1.143
- expected annual quantities of radioactive material (by radionuclide) released, averaged over the life of the plant
- principal parameters used in calculating releases of radioactive materials in gaseous effluents
- compliance of design basis primary and secondary radioactive gaseous effluent releases with effluent concentration limits (ECL) of 10 CFR Part 20, Appendix B during routine operations, including AOO
- compliance of expected gaseous releases with effluent concentration limits and dose limits in 10 CFR Part 20 and 10 CFR Part 50, Appendix I meeting ALARA objectives
- show that the proposed systems contain all items of reasonably demonstrated technology based on a cost-benefit analysis meeting ALARA objectives
- system design capacity relative to design and expected input flows
- the period of time required to process normal waste flows
- capabilities to process surge waste flow rates associated with AOO
- system capability to process wastes in the event of a single major equipment item failure
- system capability to accept additional wastes during operations that result in peak waste generation
- design features to preclude possibility of explosive conditions
- design features to avoid uncontrolled and unmonitored releases
- identification of the types of adsorbent media to be used in the gaseous radwaste system
- identification of adsorbent media bounding operating conditions (e.g., pressure, temperature, humidity, flow rates, residence time)
- location of process and effluent radiation monitoring systems
- identification of release points of gaseous wastes and dilution factors considered
- information on proposed release points, including; height, temperature, flow, opening size, and exit velocity
- description of plans for mobile or temporary equipment used for storing or processing gaseous radwaste
- X/Q dispersion characteristics

Chapter 11 Outline

11.3 Gaseous Waste Management System (cont.)

PSAR (cont.)

- potential for an operator error or equipment malfunction (single failures) to result in uncontrolled and unmonitored releases to the environment
- subsystems and components that are shared in multi-unit installations - inspection and testing provisions to enable periodic evaluation of system operability and functional performance
- discuss building ventilation systems that are expected to contain radioactive materials (volumes, filtration, and expected concentrations for normal operation and AOO
- replenishment of liquid seals if used
- tables showing:
  - radwaste system components with design and performance parameters
  - parameters, assumptions, and bases used to calculate releases of radioactive materials in gaseous effluents
  - expected frequency and quantity of steam released
- figures of process flow diagrams that illustrate methods of operation, seismic and quality group interfaces

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DCD

DCD Section 11.3 describes the capabilities of the gaseous waste management system to; control, collect, process, handle, store, and dispose of gaseous radioactive waste, including the following information:

- description of the gaseous waste management system design, design objectives, design criteria, methods of treatment, and associated quality assurance procedures.
- compliance with regulatory requirements including 10 CFR 50 Appendix A General Design Criteria and RG 1.143
- expected annual quantities of radioactive material (by radionuclide) released, averaged over the life of the plant
- principal parameters used in calculating releases of radioactive materials
- compliance of design basis primary and secondary radioactive gaseous effluent releases with effluent concentration limits (ECL) of 10 CFR Part 20, Appendix B during routine operations, including AOO
- compliance of expected gaseous releases with effluent concentration limits and dose limits in 10 CFR Part 20 and 10 CFR Part 50, Appendix I meeting ALARA objectives
- show that the proposed systems contain all items of reasonably demonstrated technology based on a cost-benefit analysis meeting ALARA objectives
- system design capacity relative to design and expected input flows
- the period of time required to process normal waste flows
- capabilities to process surge waste flow rates associated with AOO

Chapter 11 Outline

11.3 Gaseous Waste Management System (cont.)

DCD (cont.)

- system capability to process wastes in the event of a single major equipment item failure
- design features to preclude possibility of explosive conditions
- design features to avoid uncontrolled and unmonitored releases
- system capability to accept additional wastes during operations that result in peak waste generation
- identification of the types of adsorbent media to be used in the gaseous radwaste system
- identification of adsorbent media bounding operating conditions (e.g., pressure, temperature, humidity, flow rates, residence time)
- location of process and effluent radiation monitoring systems
- identification of release points of gaseous wastes and dilution factors considered
- for release points, provide the following information:
    - height of release (both above grade and relative to adjacent buildings)
    - inside dimensions of release point exit
    - effluent temperature, flow rate, and exit velocity
    - size and shape of flow orifices
- description of plans for mobile or temporary equipment used for storing or processing gaseous radwaste
- generic X/Q dispersion characteristics
- potential for an operator error or equipment malfunction (single failures) to result in uncontrolled and unmonitored releases to the environment
- subsystems and components that are shared
- inspection and testing provisions to enable periodic evaluation of system operability and functional performance
- provide information on building ventilation systems that are expected to contain radioactive materials (including volumes, filtration, and expected airborne concentrations for normal operation and AOO
- replenishment of liquid seals if used
- tables showing:
    - radwaste system components with design and performance parameters
    - parameters, assumptions, and bases used to calculate releases of radioactive materials in gaseous effluents
    - releases by radionuclide for normal operation, AOO, and design basis
    - effluent concentrations
    - comparison of effluent releases to regulatory objectives
    - expected frequency and quantity of steam released
- figures of process flow diagrams that illustrate methods of operation, seismic and quality group interfaces

Chapter 11 Outline

11.3 Gaseous Waste Management System (cont.)

FSAR Same contents as mPower standard plant DCD Section 11.3 with the following site-specific updated supplemental information including:

- release points and site specific X/Q dispersion values
- gaseous release dilution factors
- expected doses to individuals at or beyond the site boundary
- comparison of effluent releases and doses to the regulatory objectives of 10 CFR 20, CFR Part 50, Appendix I, and 40 CFR 190
- discussion on compliance with RG 1.33 and RG 1.143

Chapter 11 Outline

11.4 Solid Waste Management System

PSAR PSAR Section 11.4 describes the capabilities of the solid waste management system to; control, collect, process, handle, package, and temporarily store prior to shipment wet, dewatered, and dry solid radioactive waste generated including the following preliminary information:

- description of the solid waste management system (SWMS) design, design objectives, design criteria, associated quality assurance procedures, and methods of treatment including treatment and handling methods for different dry and wet waste types
- compliance with regulatory requirements including 10 CFR 50, Appendix A General Design Criteria and a general discussion on RG 1.143
- description of the dry solid waste subsystem used for processing dry filter media, contaminated clothing, equipment, tools, glassware, and miscellaneous radioactive wastes not amenable to stabilization prior to packaging
- sorting methods and waste volume reduction technologies, such as shredders, crushers, and compactors
- provisions for storing spent charcoals prior to shipment including proposed locations and the radiological and physical properties
- provisions for managing and shipping spent charcoal for disposal
- estimates of annual amounts of spent charcoal shipped
- types of waste containers used for storage and disposal
- means to ensure the absence of free liquid in waste containers
- estimates of maximum, expected, and design volumes of solid waste to be handled and processed
- estimated annual quantities of radioactive material shipped
- description of methods used to control and minimize the spread of radioactive contamination
- description of how the ALARA provisions of RG 8.8 and RG 8.10 are implemented in system designs and operation
- description of compliance with occupational dose and exposure limits of 10 CFR 20
- show that the proposed systems contain all items of reasonably demonstrated technology based on a cost-benefit analysis meeting ALARA objectives
- system capacity, including storage, relative to design and expected inputs
- period of time required to process normal waste volume
- capabilities to process surge volume associated with AOO
- capability to process wastes in the event of a single major equipment item failure
- capability to accept additional wastes during operations that result in peak waste generation

Chapter 11 Outline

11.4 Solid Waste Management System (cont.)

PSAR (cont.)

- use of mobile or temporary equipment used for storing or processing solid radwaste including:
  - equipment design features
  - interconnections between plant systems and mobile processing
  - how the design avoids contamination of nonradioactive systems and uncontrolled releases of radioactivity to the environment
  - requirements for utilizing mobile processing equipment for refueling outages
- potential for an operator error or equipment malfunction (single failures) to result in uncontrolled and unmonitored releases to the environment
- inspection and testing provisions to enable periodic evaluation of system operability and functional performance
- description of the method of packaging and equipment to be used
- design features to control, prevent, and collect radioactive solids released due to tank overflows such as filter sludges and spent resins
- description of provisions for controlling airborne radioactivity due to aerosols generated during processing (e.g., compaction operation)
- methods of handling and packaging large waste materials and equipment that have been activated during reactor operation (e.g., core components)
- indicate what waste processing will be contracted out to waste brokers or specialized facilities
- subsystems and components that are shared
- inspection and testing provisions to enable periodic evaluation of system operability and functional performance
- tables showing:
  - radwaste system components with design and performance parameters
  - parameters, assumptions, and bases used to calculate quantities of solid radioactive materials shipped
  - waste storage capacity and shielding provisions
- figures of process flow diagrams that illustrate methods of operation, seismic and quality group interfaces

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DCD

DCD Section 11.4 describes the capabilities of the solid waste management system to; control, collect, process, handle, package, and temporarily store prior to shipment wet, dewatered, and dry solid radioactive waste generated including the following information:

- description of the SWMS design, design objectives, design criteria, associated quality assurance procedures, and methods of treatment including treatment and handling methods for different dry and wet waste types

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Chapter 11 Outline

11.4 Solid Waste Management System (cont.)

DCD (cont.)

- compliance with regulatory requirements including 10 CFR 50, Appendix A General Design Criteria and RG 1.143
- description of the dry solid waste subsystem used for processing dry filter media, contaminated clothing, equipment, tools, glassware, and miscellaneous radioactive wastes not amenable to stabilization prior to packaging
- sorting methods and waste volume reduction technologies, such as shredders, crushers, and compactors
- provisions for storing spent charcoals prior to shipment including proposed locations and the radiological and physical properties
- provisions for managing and shipping spent charcoal for disposal
- estimates of annual amounts of spent charcoal shipped
- types of waste containers used for storage and disposal
- discuss Process Control Program (PCP) that governs methods and criteria for dewatering wet radioactive wastes to be shipped for direct burial
- the means to ensure the absence of free liquid in waste containers
- maximum, expected, and design volumes of solid waste to be handled and processed
- expected annual quantities of radioactive material (by radionuclide) shipped
- description of methods used to control and minimize the spread of radioactive contamination
- description of how the ALARA provisions of RG 8.8 and RG 8.10 are implemented in system designs and operation
- description of compliance with occupational dose and exposure limits of 10 CFR 20
- show that the proposed systems contain all items of reasonably demonstrated technology based on a cost-benefit analysis meeting ALARA objectives
- system capacity, including storage, relative to design and expected inputs
- period of time required to process normal waste volume
- capabilities to process surge volume associated with AOO
- capability to process wastes in the event of a single major equipment item failure
- capability to accept additional wastes during operations that result in peak waste generation
- use of mobile or temporary equipment used for storing or processing solid radwaste including:
    - equipment design features
    - interconnections between plant systems and mobile processing
    - how the design avoids contamination of nonradioactive systems and uncontrolled releases of radioactivity to the environment
    - requirements for utilizing mobile processing equipment for refueling outages
- potential for an operator error or equipment malfunction (single failures) to result in uncontrolled and unmonitored releases to the environment

Chapter 11 Outline

11.4 Solid Waste Management System (cont.)

DCD (cont.)

- inspection and testing provisions to enable periodic evaluation of system operability and functional performance
- packaging and equipment to be used and their compliance with 10 CFR 71 and 49 CFR 171-180
- design features to control, prevent, and collect radioactive solids released due to tank overflows such as filter sludges and spent resins
- provisions for controlling airborne radioactivity due to aerosols generated during processing (e.g., compaction operation)
- methods of handling and packaging large waste materials and equipment that have been activated during reactor operation (e.g., core components)
- indicate what waste processing will be contracted out to waste brokers or specialized facilities
- subsystems and components that are shared
- inspection and testing provisions to enable periodic evaluation of system operability and functional performance
- tables showing:
  - radwaste system components with design and performance parameters
  - parameters, assumptions, and bases used to calculate quantities of solid radioactive materials shipped
  - waste storage capacity and shielding provisions
- figures of process flow diagrams that illustrate methods of operation, seismic and quality group interfaces

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FSAR Same contents as mPower standard plant DCD Section 11.4 with the following site-specific updated supplemental information including:

- development of Process Control Program (PCP) that governs methods and criteria for dewatering wet radioactive wastes to be shipped for direct burial including process parameters such as settling time, drain time, dewatering time, pump suction vacuum, and drying time
- development of operational procedures for mobile or temporary equipment
- discussion on compliance with RG 1.33 and RG 1.143

Chapter 11 Outline

11.5 Process and Effluent Radiological Monitoring and Sampling Systems

PSAR PSAR Section 11.5 describes the radiological monitoring and sampling of process and effluent streams in order to control releases of radioactive materials, including the following information:

- description of the process and effluent radiological monitoring instrumentation systems and sampling systems, including design objectives and design criteria
- system descriptions for process and effluent radiological detectors and samplers
- process and effluent streams to be monitored by radiation detection instrumentation or sampled
- parameters to be determined through monitoring or sampling and analysis
- monitoring requirements for AOO and post-accident conditions and provisions for emergency power supplies
- discussion on how the guidance of RG 1.21 and Appendix A to SRP Section 11.5 is followed for each location subject to routine sampling
- for each sampling location address the basis for selecting the location, expected flow composition, planned measurements, and sampling frequency
- tables showing:
    - liquid process and effluent monitors
    - gaseous process and effluent monitors
    - liquid radiological sample monitoring
    - gaseous radiological sample monitoring
- figures showing locations and typical installation schematics for monitors

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DCD DCD Section 11.5 describes the radiological monitoring and sampling of process and effluent streams in order to control releases of radioactive materials including the following information:

- description of the process and effluent radiological monitoring instrumentation systems and sampling systems, including design objectives and design criteria
- system descriptions for process and effluent radiological detectors and samplers
- process and effluent streams to be monitored by radiation detection instrumentation or sampled
- parameters to be determined through monitoring or sampling and analysis
- monitoring requirements for AOO and post-accident conditions and provisions for emergency power supplies
- identification of a COL Information Item an applicant to provide a description of the Offsite Dose Calculation Manual (ODCM), including criteria, scope and purpose

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Chapter 11 Outline

11.5 Process and Effluent Radiological Monitoring and Sampling Systems (cont.)

DCD (cont.)

- identification of a COL Information Item an applicant to provide a description of the Radiological Environmental Monitoring Program (REMP), including criteria, scope and purpose
- process and effluent radiological monitoring instrumentation systems and sampling systems including design objectives and design criteria
- system descriptions for process and effluent radiological detectors and samplers
- process and effluent streams to be monitored by radiation detection instrumentation or sampled
- reference to Chapter 16 (Technical Specifications) for information related to establishment of a Radioactive Effluent Controls Program
- parameters to be determined through monitoring or sampling and analysis (e.g., gross beta-gamma concentrations, radionuclide distribution, quantities of specific radionuclides)
- discussion on how the guidance of RG 1.21 and Appendix A to SRP Section 11.5 is followed for each location subject to routine sampling
- information for each sampling location, including:
  - basis for selecting the location
  - expected flow, composition, and concentrations
  - quantity to be measured (e.g., gross beta-gamma, radionuclide concentrations)
  - sampling frequency, type of sample nozzle or other sample equipment
  - procedures used to obtain representative samples
  - analytical procedure and sensitivity for selected radioanalytical methods and types of sampling media
- tables showing:
  - liquid process and effluent monitors
  - gaseous process and effluent monitors
  - liquid radiological sample monitoring
  - gaseous radiological sample monitoring
- figures showing locations and typical installation schematics for monitors

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FSAR Same contents as mPower standard plant DCD Section 11.5 with the following site-specific updated supplemental information:

- development of the ODCM, including specific administrative controls and liquid and gaseous effluent source terms to limit the releases to site-specific requirements and parameters for radiation instrumentation alarm setpoints
- development of the REMP taking into account local land use and identifying all potential radiation exposure pathways
- establishment of a Radioactive Effluent Controls Program
