

**Comanche Peak Nuclear Power Plant, Units 3 & 4**  
**COL Application**  
**Part 2, FSAR**

CHAPTER 17

QUALITY ASSURANCE AND RELIABILITY ASSURANCE

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17.4-201 Risk-significant SSCs (Phase II D-RAP)

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ACRONYMS AND ABBREVIATIONS

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ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
CCF	common cause failure
CCW	component cooling water
CCWS	component cooling water system
CFR	Code of Federal Regulations
COL	Combined License
COLA	Combined License Application
CPNPP	Comanche Peak Nuclear Power Plant
DCD	Design Control Document
D-RAP	design reliability assurance program
EFW	emergency feedwater
ESWS	essential service water system
FSAR	Final Safety Analysis Report
HSS	high safety significance
ITAAC	inspections, tests, analyses, and acceptance criteria
LPSD	low power and shut down operation
MHI	Mitsubishi Heavy Industries, Ltd.
MNES	Mitsubishi Nuclear Energy Systems, Inc.
NEI	Nuclear Energy Institute
NQA	Nuclear Quality Assurance
NRC	U.S. Nuclear Regulatory Commission
O-RAP	operational reliability assurance program
QA	quality assurance
QAP	quality assurance program

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ACRONYMS AND ABBREVIATIONS

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QAPD	quality assurance program description
QAPP	quality assurance project plan
RAP	reliability assurance program
RAW	risk achievement worth
RG	Regulatory Guide
SECY	Secretary of the Commission, Office of the (NRC)
SRP	Standard Review Plan
SSC	structure, system, and component
UHS	ultimate heat sink

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**17.0        QUALITY ASSURANCE AND RELIABILITY ASSURANCE**

This section of the referenced Design Control Document (DCD) is incorporated by reference with the following departures and/or supplements.

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STD COL 17.5(1) Add the following paragraph after the paragraph in **DCD Section 17.0**.

The Quality Assurance Program (QAP) described in **Sections 17.1, 17.2, 17.3 and 17.5** is applicable for the site-specific design, construction and operation.

**17.1        QUALITY ASSURANCE DURING THE DESIGN PHASE**

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

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STD COL 17.5(1) Replace the last paragraph in **DCD Section 17.1** with the following.

Quality Assurance (QA) for the site-specific design is described in **Sections 17.3 and 17.5**.

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**17.2      QUALITY ASSURANCE DURING THE CONSTRUCTION AND  
OPERATION PHASES**

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

STD COL 17.5(1) Replace the paragraph in **DCD Section 17.2** with the following.

QA for construction and operation is described in **Sections 17.3** and **17.5**.

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**17.3 QUALITY ASSURANCE PROGRAM**

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

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CP COL 17.5(1) Replace the last paragraph in **DCD Section 17.3** with the following.

Luminant is responsible for the establishment and implementation of the QAP for the design, construction, and operation of Comanche Peak Nuclear Power Plant (CPNPP) Units 3 and 4. Luminant may delegate, and has delegated to others, the work of establishing and executing the QAP, or any parts thereof, but retains responsibility for the QAP.

QA for the preparation and review of the Combined License (COL) application (COLA) and for CPNPP Units 3 and 4 activities, up through issuance of the COL, is governed by the Luminant "NuBuild Quality Assurance Project Plan" (NuBuild QAPP). The NuBuild QAPP describes the processes and procedures to be used in the implementation, control, and oversight of activities related to CPNPP Units 3 and 4 by invoking elements of the existing U.S. Nuclear Regulatory Commission (NRC) approved QAP for CPNPP Units 1 and 2. Utilizing established procedures and manuals from the CPNPP Units 1 and 2 QAP, the NuBuild QAPP provides for the application of 10 CFR 50 Appendix B criteria to CPNPP Units 3 and 4 activities.

Luminant contracted with Mitsubishi Nuclear Energy Systems, Inc. (MNES) to develop the COLA, including conducting site characterization activities. The process for collecting, reviewing and analyzing the necessary data for site characterization was performed under the MNES QAP and is described in the MNES Quality Assurance Program Description(QAPD), SQ-QD-070001. Although the NuBuild QAPP and the NRC approved QAP for CPNPP Units 1 and 2 are based on the guidance of American National Standards Institute/American Society of Mechanical Engineers(ANSI/ASME) N45.2-1971, "Quality Assurance Program Requirements for Nuclear Facilities" and its applicable daughter standards, Luminant has imposed on MNES, a QAP based on ASME NQA-1-1994, "Quality Assurance Requirements for Nuclear Facility Applications" and Nuclear Energy Institute (NEI) 06-14A "Quality Assurance Program Description" (Reference 17.3-201). Luminant oversight of COLA development, engineering, procurement, and construction activities by MNES is provided through reviewing the MNES QAPD, conducting QA audits and surveillances, and participating in project management activities. Any future parties contracted for work establishing or developing the COLA shall be required to be compliant to 10CFR50 appendix B and meet latest approved revision of NQA-1.

Upon issuance of the COL and as the project progresses, the QAP will transition from the NuBuild QAPP to implementation by the "Comanche Peak Nuclear

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Power Plant Units 3 and 4 Quality Assurance Program Description” described in **Section 17.5**.

**17.3.1 Reference**

- |          |  |
|----------|--|
| 17.3-201 | <u>Quality Assurance Program Description</u> , NEI 06-14A, Revision 7, NEI, August 2010.   |
| 17.3-202 | NuBuild Quality Assurance Project Plan, Revision 2, Luminant, July 2010.   |
| 17.3-203 | Comanche Peak Nuclear Power Plant Units 1 and 2 Quality Assurance Plan, Comanche Peak Steam Electric Station Final Safety Analysis Report, Chapter 17. |
| 17.3-204 | US-APWR Quality Assurance Program Description, SQ-QD-070001.   |
| 17.3-205 | Quality Assurance Program Requirements for Nuclear Facilities, N45.2-1971, ANSI/ASME, 1971.  |
| 17.3-206 | Quality Assurance Requirements for Nuclear Facility Applications, NQA-1-1994, ANSI/ASME, 1994.   |
| 17.3-207 | Comanche Peak Units 3 and 4 Quality Assurance Program Description  |



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## **17.4 RELIABILITY ASSURANCE PROGRAM**

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

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### **17.4.3 Scope**

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CP COL 17.4(1) Add the following paragraph after the last paragraph in **DCD Subsection 17.4.3**.  
CP COL 17.4(2)

The site-specific phase, Phase II design reliability assurance program (D-RAP), introduces the site-specific design to the D-RAP process. Phase III, the last phase of the D-RAP, implements the procurement, fabrication, construction, and pre-operational testing in accordance with the site-specific D-RAP. The operational reliability assurance program (O-RAP) addresses the site-specific plant operation and maintenance activities. As described in **Section 17.4.2** of US-APWR DCD, the objective during this stage is to ensure that the reliability for the SSCs within the scope of the RAP is maintained during plant operation. The RAP activities should be integrated into the existing operational program (i.e., Maintenance Rule, surveillance testing, in-service inspection, in-service testing, and QA) in the O-RAP.

The Phase II and Phase III programs continue the structure and quality controls of the Phase I process used in the Design Certification of the US-APWR as described in **DCD Subsection 17.4.4**. The continuity of Phase II and III of the D-RAP program uses the process and information developed for Phase I and supplements it with site specific input using additional Luminant organizations in the evaluation process (e.g. Luminant Engineering, Procurement, Construction and Startup, etc.). The Phase I program migrates through Phases II and III to become the basis and records for O-RAP after fuel load.

### **17.4.4 Quality Controls**

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CP COL 17.4(1) Add the following paragraphs after the last paragraph of "a. Organization" in **DCD**  
CP COL 17.4(2) **Subsection 17.4.4**.

Phases II and III of the D-RAP and the O-RAP are the responsibility of Luminant.

Phases II and III of the D-RAP occur before initial fuel load. The startup organization is created to perform the initial test program including pre-operational and startup tests. This temporary group administratively reports to the plant Operation organization and includes members from on-site organizations such as Luminant Engineering, Operations, QA representatives, Mitsubishi Heavy

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Industries, Ltd. (MHI), and participants from the initial test program. Initial test program experience attained by the startup members is applied to the commercial operation of the plant. This experience includes integrating reliability assurance program (RAP) activities into programs established to meet existing requirements (i.e., maintenance rule, surveillance testing, inservice inspection, inservice testing, and QA). MHI and other contractors may be responsible for detailed design and development of engineering and procurement specifications.

During plant operations, the O-RAP will transition to the System Engineering and Maintenance Engineering organizations. At this stage, all operational phase/site-specific RAP structures, systems, and components (SSCs) must be included in the high safety significance (HSS) category within the scope of the Maintenance Rule Program. These organizations will ensure that the objectives of site O-RAP are incorporated into existing programs. In addition, these organizations periodically evaluate the reliability assumptions based on actual equipment, train, system performance, and operational experience and take into account considerations such as changes in individual component reliability throughout the course of plant life due to aging and changes in suppliers and technology.

The interface between the Reliability organization and Design Engineering and Maintenance Engineering organizations ensures that Procurement Engineering and testing activities will be able to incorporate the significant RAP assumptions, such as equipment reliability, in their respective areas of responsibility.

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CP COL 17.4(1) Add the following paragraph after the last paragraph of "b. Design Control" in **DCD**  
CP COL 17.4(2) **Subsection 17.4.4.**

The design control of Phases II and III of the D-RAP and the O-RAP is accomplished within the framework of the QAPD described in **Section 17.3** and **17.5.**

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CP COL 17.4(1) Add the following paragraph after the last paragraph of "c. Procedures and  
CP COL 17.4(2) Instructions" in **DCD Subsection 17.4.4.**

The procedures and instructions of Phases II and III of the D-RAP and the O-RAP are accomplished within the framework of the QAPD described in **Section 17.3** and **17.5.**

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CP COL 17.4(1) Add the following paragraph after the last paragraph of "d. Records" in **DCD**  
CP COL 17.4(2) **Subsection 17.4.4.**

The records of Phases II and III of the D-RAP and the O-RAP are accomplished within the framework of the QAPD described in **Subsection 17.3** and **17.5.**

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**17.4.5 Integration into Existing Operational Programs**

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CP COL 17.4(2) Add the following paragraphs after the last paragraph in **DCD Subsection 17.4.5**.

The O-RAP is integrated into the Maintenance Rule Program (**Section 17.6**), and other operational programs as listed below. The O-RAP SSCs are included in the high-safety-significant category within the scope of the Maintenance Rule Program. The Maintenance Rule Program incorporates the evaluation process of risk-significant SSCs, the maintenance of the reliability of risk-significant SSCs, and monitoring of the effectiveness of maintenance needed for reliability assurance. Industry operational experience will be used in the monitoring process to verify that reliability assumptions remain valid.

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Quality Assurance Program	FSAR Table 13.4-201, 175
Maintenance Rule Program	FSAR Table 13.4-201, 17.6
Inservice Inspection Program	FSAR 5.2, 6.1, 6.6, Table 13.4-201
Maintenance programs	
Technical Specification Surveillances	Technical Specifications, Part 4, 5.5.8
Inservice Testing Program	FSAR 3.9, 5.2, Table 13.4-201
Reactor Vessel Material Surveillance Program	FSAR 5.3, Table 13.4-201; ITAAC Part 10, 3

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The scope of the Maintenance Rule Program includes safety-related SSCs and certain nonsafety-related SSCs, as determined using a Maintenance Rule scoping procedure, consistent with SECY 95-132. Procurement, fabrication, construction, and test specifications for safety-related and nonsafety-related SSCs within the scope of the RAP are prepared and implemented under QAP referenced in **Sections 17.1, 17.2, 17.3, and 17.5**. These elements of the QAPs provide adequate confidence that SSCs will perform satisfactorily in service and ensure that significant assumptions, such as equipment reliability, are realistic and achievable.

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**17.4.7 D-RAP**

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CP COL 17.4(1) Add the following paragraphs after the paragraph in **DCD Subsection 17.4.7**.  
CP COL 17.4(2)

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Phases II and III of the D-RAP occur before initial fuel load.

Phase II, the site-specific phase, introduces the site-specific design information to the D-RAP process.

The program of Phase III, the last phase of the D-RAP, will be established prior to the procurement, fabrication, construction, and pre-operational testing.

The O-RAP, which addresses the specific plant operation and maintenance activities, will be developed and implemented prior to the initial fuel loading by integrating the RAP activities into the specific plant operational program (Maintenance Rule, surveillance testing, in-service inspection, in-service testing and QA, as appropriate).

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STD COL 17.4(1) Add the following new Subsection after the last paragraph in **DCD Subsection 17.4.7.3**.

**17.4.7.4 Phase II D-RAP Implementation and SSCs Included**

Implementation of the Phase II D-RAP is site-specific. The SSCs included in Phase II are listed in **Table 17.4-201** and **DCD Table 17.4-1** (incorporated by reference).

**17.4.8 ITAAC for the D-RAP**

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STD COL 17.4(1) Add the following paragraph after the last paragraph in **DCD Subsection 17.4.8**.

A list of the risk-significant SSCs for the Phase II D-RAP is provided in **Table 17.4-201** and **DCD Table 17.4-1** (incorporated by reference).

**17.4.9 Combined License Information**

Replace the contents of **DCD Subsection 17.4.9** with the following.

CP COL 17.4(1) **17.4(1) Implementation of Phases II and III of the D-RAP**  
STD COL 17.4(1)

*This COL item is addressed in **Subsections 17.4.3, 17.4.4, 17.4.7, 17.4.8, and Table 17.4-201**.*

CP COL 17.4(2) **17.4(2) Implementation of the O-RAP**

*This COL item is addressed in **Subsections 17.4.3, 17.4.4, 17.4.5, and 17.4.7**.*

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CP COL 17.4(1)

**Table 17.4-201**  
**Risk-significant SSCs (Phase II D-RAP)**

#	Systems, Structures and Components (SSCs)	Rationale <sup>(1)</sup>	Insights and Assumptions
1		Essential service water system (ESWS)	
1	Ultimate Heat Sink Cooling Tower Fan 1 [UHS-MFN-001A, (B, C, D)]  Ultimate Heat Sink Cooling Tower Fan 2 [UHS-MFN-002A, (B, C, D)]	RAW /CCF/LPSD	<p>The essential service water system (ESWS) transfers heat from the component cooling water (CCW) system as ultimate heat sink (UHS), which is the cooling tower. This system supports the CCW system (CCWS), which supports various safety and non-safety mitigation systems. Accordingly, reliability of CCWS and ESWS has significant impact on risk.</p> <p>Since ESWS consists of four independent trains, failure of one train does not have significant impact on risk. However, failures of SSCs that impact multiple trains have significant impact on risk. Accordingly, SSCs that have potential to cause common cause failures among multiple trains are risk significant.</p>

Notes:

1. Definition of Rationale Terms:

RAW = risk achievement worth

CCF = common cause failure

LPSD = low power and shut down operation

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**17.5 QUALITY ASSURANCE PROGRAM DESCRIPTION**

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

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CP COL 17.5(1) Replace the last paragraph in **DCD Section 17.5** with the following.

The implementation of the QAP for CPNPP Units 3 and 4 will transition, upon issuance of the COL and as project progresses, from the NuBuild QAPP to the "Comanche Peak Nuclear Power Plant Units 3 and 4 Quality Assurance Program Description." The full transition to the QAPD will be completed no later than 30 days prior to fuel load. All nuclear operations will be conducted using a fully implemented QA program based on the QAPD. The QAPD is based on NEI 06-14A "Quality Assurance Program Description" (**Reference 17.5-201**) which was approved by the NRC.

**17.5.1 Combined License Information**

Replace the content of **DCD Subsection 17.5.1** with the following.

CP COL 17.5(1) **17.5(1)** *Development and implementation of the QAP for the site specific design*  
STD COL 17.5(1) *activities (i.e., non-standard plant design) and for the construction and operation*

*This COL item is addressed in **Sections 17.0, 17.1, 17.2, 17.3 and 17.5.***

**17.5.2 References**

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CP COL 17.5(1) Add the following reference and Subsection 17.5.3 after the last reference in **DCD Subsection 17.5.2**.

17.5-201      Quality Assurance Program Description, NEI 06-14A, Revision 7, NEI, August 2010.

17.5-202      Comanche Peak Units 3 and 4 Quality Assurance Program Description

**17.5.3 Evaluation of QAPD Against the SRP and QAPD Submittal Guidance**

As described in **Section 17.3**, Luminant will initially use the existing NRC approved QAP for CPNPP Units 1 and 2 for the engineering, procurement, and construction (EPC) phase. The QAP for CPNPP Units 1 and 2 is based on the guidance of ANSI/ASME N45.2-1971, "Quality Assurance Program Requirements for Nuclear Facilities" and its daughter standards. This differs from Standard

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Review Plan (SRP) Section 17.5 which is based on ASME NQA-1-1994, Regulatory Guide (RG) 1.8, "Qualification and Training of Personnel for Nuclear Power Plants," RG 1.28, "Quality Assurance Program Requirements (Design and Construction)," RG 1.33, "Quality Assurance Program Requirements (Operation)."

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**17.6 DESCRIPTION OF THE APPLICANT'S PROGRAM FOR  
IMPLEMENTATION OF 10 CFR 50.65, THE MAINTENANCE RULE**

STD COL 17.6(1) Replace the contents of **DCD Section 17.6** with the following.

**17.6.1 Combined License Information**

*17.6(1) Implementation of the Maintenance Rule.*

*This COL item is addressed in **Section 17.6***

**17.6.2 Maintenance Rule Program**

This subsection incorporates by reference NEI 07-02A, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed under 10 CFR Part 52," (**Reference 17.6-201**) which was approved by the NRC.

The text of the template provided in NEI 07-02A is generically numbered as "17.X" and "17.Y." When the template is incorporated by reference into this FSAR, section numbering is changed from "17.X" to "17.6.2" and from "17.Y" to 17.4."

Descriptions of the programs listed in Subsection 17.6.2.3 of NEI 07-02A are provided in the following Part 2 FSAR chapters/sections or **Part 4**:

- Maintenance Rule Program (**Section 17.6**)
- Quality Assurance Program (**Chapter 17**)
- Inservice Inspection Program (**Sections 5.2 and 6.6**)
- Inservice Testing Program (**Sections 3.9 and 5.2**)
- Technical Specifications Surveillance Test Program (**Part 4**)

**17.6.3 Reference**

17.6-201     Generic FSAR Guidance for Maintenance Rule Program  
Description for Plants Licensed Under 10 CFR Part 52, NEI  
07-02A, Revision 0, NEI, March 2008.