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June 21, 2012

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555
ATTN: David B. Matthews, Director
Division of New Reactor Licensing

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 3 AND 4
DOCKET NUMBERS 52-034 AND 52-035
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION NO. 6403 (SECTION 14.3.7), 6441 (SECTION 19), AND 6457 (SECTION 14.2)

Dear Sir:

Luminant Generation Company LLC (Luminant) submits herein the response to Requests for Additional Information (RAIs) No. 6403 (CP RAI #254), No. 6441 (CP RAI #259), and No. 6457 (CP RAI #257) for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. The RAIs address the impact of extreme winds on the probabilistic risk assessment, address the Technical Specifications methodology, and address the essential service water system (ESWS), respectively.

Parts 2 and 3 of CP RAI #254 Question 14.03.07-38 and Part 4 of CP RAI #257 Question 14.02-21 address freeze protection. Luminant is currently re-evaluating the freeze protection requirements for the ESWS and commits to provide a supplemental response to these RAIs by August 24, 2012. This is the only commitment made in this letter and it is being tracked as Regulatory Commitment #8359.

Should you have any questions regarding the response, please contact Don Woodlan (254-897-6887, Donald.Woodlan@luminant.com) or me.

I state under penalty of perjury that the foregoing is true and correct.

Executed on June 21, 2012.

Sincerely,

Luminant Generation Company LLC

R. D. Bird for

Rafael Flores

Attachments: 1. Response to Request for Additional Information No. 6403 (CP RAI #254)
2. Response to Request for Additional Information No. 6441 (CP RAI #259)
3. Response to Request for Additional Information No. 6457 (CP RAI #257)

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Attachment 1

Response to Request for Additional Information No. 6403 (CP RAI #254)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak, Units 3 and 4

Luminant Generation Company LLC

Docket Nos. 52-034 and 52-035

RAI NO.: 6403 (CP RAI #254)

SRP SECTION: 14.03.07 - Plant Systems - Inspections, Tests, Analyses, and Acceptance Criteria

QUESTIONS for Balance of Plant and Technical Specifications Branch (BPTS)

DATE OF RAI ISSUE: 4/12/2012

QUESTION NO.: 14.03.07-38

Based on the staff's review of Comanche Peak Nuclear Power Plant Units 3 and 4, Revision 2, Part 10 - ITAAC, Appendix A.1, "Ultimate Heat Sink System (UHSS) and Essential Service Water system (ESWS) (Portions Outside the Scope of the Certified Design)," the applicant is requested to address the following items below.

1. Site-specific ITAAC should clearly describe testing of the UHS transfer pumps and associated MOVs from their various safety-related power supplies.
2. Site-specific ITAAC should clearly describe testing of the ESWS/UHS heat tracing.
3. Site-specific ITAAC should clearly describe testing of the ESWS/UHS freeze protection features (which may include operating the UHS fans in reverse speed).
4. Site-specific ITAAC should clearly describe and conclude that the UHS fans are designed to withstand the effects of design basis tornado differential pressure.
5. Site-specific ITAAC (see ITAAC #18) should clearly describe the UHS is capable of performing its safety function without exceeding the maximum temperature limit of the water in the UHS basin.

Site-specific ITAAC should clearly describe that the UHS spray nozzles and orifices are adequately designed with consideration for blockage. Note, US-APWR DCD 9.2.1.2.2 states that the ESWS strainer mess is 3 mm to assure that potential clogging of the cooling tower nozzles is avoided.

ANSWER:

1. Site-specific inspection and testing of the UHS transfer pumps and associated MOVs are described in COLA Part 10 Table A.1-1. ITAAC #6.a and #6.b are provided to verify through testing and inspection that Class 1E equipment are powered from their respective Class 1E division and that the divisions are physically separated and electrically isolated. ITAAC #9.a.i and #9.a.ii confirm that MOVs and AOVs for the UHS and the site-specific portions of the ESWS operate under design and

pre-operational test conditions. ITAAC #10.a and #12.b test the operation of the UHS transfer pumps from the main control room and the remote shutdown console.

2. Luminant is currently re-evaluating freeze protection requirements for the UHS. Luminant commits to providing a supplemental response to this RAI by August 24, 2012.

3. Luminant is currently re-evaluating freeze protection requirements for the UHS. Luminant commits to providing a supplemental response to this RAI by August 24, 2012.

4. FSAR Subsection 3.8.4.1.3.2 has been revised to state that the UHS fans, motors, and associated equipment are designed to withstand the effects of design basis tornado differential pressure. FSAR Subsection 9.2.5.3 has been revised to describe tornado qualification of the UHS basins, cooling towers, fans, motors, and associated equipment. During design and fabrication, the UHS fans (including motors and associated equipment) will be qualified to withstand the effects of tornado loading. ITAAC #19 has been added in COLA Part 10 Table A.1-1 to include qualification of the UHS fans to withstand tornado loads, and as-built inspection and analysis.

5. COLA Part 10 Table A.1-1 ITAAC #7 describes tests and analyses of the UHSS to remove sufficient heat to maintain the ESWS supply water within the maximum temperature limit of 95°F under peak heat load conditions, as well as under normal, abnormal, or accident conditions. ITAAC #18 describes inspections and analyses which conclude that the UHSS is capable of removing heat during a LOOP and coincident single failure, as described by the standard plant interface requirements in DCD Tier 1 Subsection 3.2.1.a. The "safety function" in ITAAC #18 is described in COLA Part 10 Appendix A.1 Section A.1.1 and further details are provided in DCD Subsection 9.2.5.1. The design basis heat load and the maximum ESW supply temperature are described in these sections.

   For clarification, ITAAC #18 ensures through inspection and analysis that sufficient redundancy exists within the UHSS to account for LOOP and coincident single failure, and ITAAC #7 ensures through testing and analysis that the heat removal capacity of the UHSS is sufficient for peak heat load conditions, which includes normal, abnormal, and accident conditions. The condition under which ITAAC #7 is satisfied is for combinations of two operating trains of the UHS cooling towers and three basins. This is under the assumption that one division is out of service for maintenance coincident with the postulated LOOP and any single failure within the UHSS.

6. The cooling tower spray nozzles are sized sufficiently greater than 3 mm to prevent blockage by debris. This sizing prevents blockage from debris that passes through the 3 mm mesh strainer. The orifices which are installed in 24-inch, 8-inch, and 6-inch ESW piping are also sized sufficiently greater than 3mm to prevent blockage by debris. FSAR Subsection 9.2.5.2.1 has been revised to clarify that the spray nozzles are sized to prevent blockage by debris. ITAAC #20 has been added in COLA Part 10 Table A.1-1 to include inspection of the as-built spray nozzles and orifices.

<u>Impact on R-COLA</u>

See attached marked-up FSAR Revision 2 pages 3.8-6, 9.2-13, 9.2-20, and Part 10 pages 10 and 17.

<u>Impact on S-COLA</u>

This response is site-specific.

<u>Impact on DCD</u>

None.

The operating floor of the pump house is a reinforced concrete slab spanning east-west and supported by UHS basin exterior and interior walls. The operating floor supports the ESWS pump, UHS transfer pump, and motors. The roof of the pump house is a reinforced concrete slab spanning north-south and supported by reinforced concrete beams. To allow access to the ESWS pump/motor, a removable reinforced concrete cover is provided in an opening in the roof of the pump house.

Tornado missile shields are provided to protect the air intake and air outlets of the ESWS pump house HVAC system from tornado missiles. The structural design considers tornado differential pressure loads as discussed in Subsection 3.3.2.2.2.

UHS cooling tower enclosures - Each UHS basin has one cooling tower with two cells. Each cell is enclosed by reinforced concrete structures that house the equipment required to cool the water for ESWS. The reinforced concrete wall running north-south separates the two cell enclosures. The enclosures are an integral part of the UHS basin supported by the basin interior and exterior walls on the basemat foundation. A reinforced concrete wall, running east-west, separates the cell enclosure portion of the basin from the rest of the UHS basin. An east-west wall is provided with openings at the basemat to maintain the continuity of the UHS basin. Air intakes are located at the north and south faces of the cooling tower enclosure. The missile shields at the air intakes are configured to protect the safety-related substructures and components housed within the UHS structure from tornado missiles. FSAR Table 3.2-201 lists the site-specific equipment and components located in the UHSRS that are protected from tornado missiles. The north side air intake is an integral part of the cooling tower enclosure, whereas the south side air intake is an integral part of the ESWPT, and is supported by reinforced concrete piers which are supported by the ESWPT walls and basemat.

Each cooling tower cell enclosure is equipped with a fan and associated equipment to cool the water. Equipment includes header pipe, spray nozzles, and drift eliminators with associated reinforced concrete beams supported by the exterior walls of the enclosure. The fan and motor are supported by reinforced concrete deck above the drift eliminators. A circular opening is provided in the deck for the fan, and the deck is supported by enclosure walls and a deep upside circular concrete beam around the fan opening. The fan is supported by a north-south concrete beam at the center of enclosure. For air circulation and to protect the fan and motor from tornado missiles, a circular opening is provided at the roof of the enclosure (centered on the fan) with a reinforced concrete slab and heavy steel grating between the roof and the deck. The fans, motors and associated equipment are designed ~~with consideration given to~~to withstand the effects of design basis tornado differential pressure. RCOL2_14.03.07-38

All exposed parts of cooling tower enclosure, the UHS ESWS pump house and the UHS basin that could be impacted by a tornado missile are designed to prevent full penetration or structural failure by the spectrum of tornado missiles identified in Subsection 3.5.1.4.

The source of cooling water and location of the UHS are discussed in Subsections 9.2.5.2.1 and 9.2.5.2.2.

The location and design of the ESW intake structure is discussed in Subsections 9.2.5.2.1 and 9.2.5.2.2.

The location and design of the ESW discharge structure is discussed in Subsections 9.2.5.2.1 and 9.2.5.2.2.

9.2.5.2.1 General Description

CP COL 9.2(1)
CP COL 9.2(3)
CP COL 9.2(4)
CP COL 9.2(5)
CP COL 9.2(18)
CP COL 9.2(19)
CP COL 9.2(20)
CP COL 9.2(21)

Replace DCD Subsection 9.2.5.2.1 with the following.

Each unit is provided with its own independent UHS, with no sharing between the two units. The UHS for each unit consists of four 50 percent capacity mechanical draft cooling towers, one for each ESWS train, and four ~~33~~ one-third percent capacity basins to satisfy the thirty day cooling water supply criteria of RG 1.27.

Each cooling tower consists of two cells with fans and motors, drift eliminators, film fills, risers, and water distribution system all enclosed and supported by a seismic category I reinforced concrete structure. Cooling tower components are designed per equipment Class 3 and quality group C requirements. Each basin includes an ESWP intake structure that contains one 50 percent capacity ESWP and one 100 percent capacity UHS transfer pump, and associated piping and components. The UHS system is classified as a moderate-energy system. The UHS piping material, including the UHS transfer piping, is carbon steel with an internal polyethylene lining. The piping is not buried; therefore, cathodic protection is not utilized. The cooling tower spray nozzles are sized to prevent blockage by debris. Tornado missile protection for the cooling tower components, ESWPs and piping is provided by the UHS safety-related seismic category I structures and ESW pipe tunnel as discussed in Subsection 3.8.4. The UHS structural design, including pertinent dimensions, is also discussed in Subsection 3.8.4.

RCOL2_09.02.05-25
RCOL2_09.02.05-19
RCOL2_14.03.07-38

Each cooling tower consists of two cells, each with a motor driven fan driven with a right-angle gear reducer. The fans operate at a single speed and in a single direction. The fan motors are powered from the Class 1E normal ac power system. On loss of offsite power (LOOP), the motors are automatically powered from their respective division emergency power source.

RCOL2_14.02-21

The cooling towers are designed for the following conditions: water flow of 12,000 gpm, hot (inlet) water temperature of 128° F, cold (outlet) water temperature of 95° F, ambient wet bulb temperature of 80° F, and DBA design heat load of 196.00x10^6 Btu/hr.

Each ESW pump is designed to provide 13,000 gpm. In general, the efficiency of removing heat from the cooling tower improves if the supply flow rate to the cooling tower is large. Therefore, the supply flow rate to the cooling tower is estimated to be smaller than the realistic flow rate. The flow rate of 12,000 gpm is

RCOL2_09.02.05-20

9.2.5.3 Safety Evaluation

CP COL 9.2(22) Replace DCD Subsection 9.2.5.3 with the following.

The results of the UHS capability and safety evaluation are discussed in detail in Subsection 9.2.5.2.3 and in this Subsection. The UHS is capable of rejecting the heat under limiting conditions as discussed in Subsection 9.2.5.2.3.

The UHS is arranged to support separation of the four divisions of ESWS.

System functional capability is maintained assuming one division is unavailable due to on-line maintenance during a design basis accident with a single active failure, with or without a LOOP.

The failure modes and effects analysis for the UHS is included in Table 9.2.5-4R and demonstrates that the UHS satisfies the single failure criteria.

The safety-related SSCs of the UHS and the ESWS are classified as seismic Category I. The site-specific safety-related components are identified in FSAR Table 3.2-201. The non-seismic (NS) SSCs are segregated from the seismic Category I SSCs. Structural failure of the UHS non-safety related SSCs will not adversely impact the seismic category I SSCs. These non-safety SSCs are classified as non-seismic.

Leakage cracks and other type of pipe rupture are not postulated in the safety-related UHS piping because the UHS is a moderate energy fluid system and the piping is designed to comply with BTP 3-4 B(iii)(1)(c) and C as stated in DCD Subsection 3.6.2.1.2.2 and 3.6.2.1.3. RCOL2_09.02.05-25

The ~~basin is~~UHS basins, cooling towers, fans, motors, and associated equipment are designed to withstand the effect of natural phenomena, such as earthquakes, tornadoes, hurricanes, and floods taken individually, without loss of capability to perform its safety function. RCOL2_14.03.07-38

The ~~basin~~basis for the structural adequacy of the UHSRS is provided in FSAR Sections 3.3, 3.4, 3.5, 3.7, and 3.8. RCOL2_14.03.07-38

Site-specific UHS design features to address limiting hydrology-related events are addressed in Subsection 2.4.8, 2.4.11, and 2.4.14.

The combined volume of water in the three basins is sufficient to provide at least 30 days required cooling capacity.

The total required 30 days cooling water capacity is approximately 8.40 million gallons, or approximately 2.80 million gallons per cooling tower (CT) basin. This is the minimum volume required in each basin to satisfy the thirty day cooling water supply criteria of RG 1.27. Each basin dimension, not including any column or wall sections, is 120 feet x 120 feet. Normal water level is maintained at 31 feet above the basin floor. A water level decrease to 30 feet above the basin floor is alarmed.

Appendix A.1

18. The UHSS is capable of performing its safety functions under design basis event conditions and coincident single failure with or without offsite power available.

19. The UHS cooling tower fans, identified in Table A.1-2, can withstand design basis tornado effects, including differential pressure effects and overspeed, without loss of safety function. RCOL2_14.03.07-38

20. The UHS cooling tower spray nozzles and orifices are sized to prevent clogging due to debris.

A.1.2 Inspections, Tests, Analysis, and Acceptance Criteria

Table A.1-1 describes ITAAC for the UHSS and ESWS portions outside the scope of the certified design.

Appendix A.1

Table A.1-1 (Sheet 7 of 7)

Ultimate Heat Sink System and Essential Service Water System (Portions Outside the Scope of the Certified Design) Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
17. The sum of the ESW pump shutoff head and static head is such that the ESWS design pressure is not exceeded.	17. Inspection, test and analysis of the as-built ESWS will be performed.	17. A report exists and concludes that the sum of the as-built ESW pump shutoff head and static head is such that the ESWS design pressure is not exceeded.
18. The UHSS is capable of performing its safety functions under design basis event conditions and coincident single failure with or without offsite power available.	18. Inspection and analysis of the as-built UHSS will be performed.	18. A report exists and concludes that the as-built UHSS is capable of performing its safety functions under design basis event conditions and coincident single failure with or without offsite power available.
<u>19. The UHS cooling tower fans, identified in Table A.1-2, can withstand design basis tornado effects, including differential pressure effects and overspeed, without loss of safety function.</u>	<u>19.i Type tests, analyses, or a combination of type tests and analyses will be performed to demonstrate that the UHS cooling tower fans, identified in Table A.1-2, can withstand the design basis tornado effects, including differential pressure effects and overspeed, without loss of safety function.</u>	<u>19.i A report exists and concludes that the UHS cooling tower fans, identified in Table A.1-2, can withstand the design basis tornado effects, including differential pressure effects and overspeed, without loss of safety function.</u> RCOL2_14.03.07-38
	<u>19.ii Inspections and analyses will be performed to verify that the as-built UHS cooling tower fans identified in Table A.1-2 are bounded by the tested or analyzed conditions.</u>	<u>19.ii A report exists and concludes that the as-built UHS cooling tower fans identified in Table A.1-2 are bounded by the tested or analyzed conditions.</u>
<u>20. The UHS cooling tower spray nozzles and orifices are sized to prevent clogging due to debris.</u>	<u>20. Inspections of the as-built UHS cooling tower spray nozzles and orifices will be performed.</u>	<u>20. Each as-built UHS cooling tower spray nozzles and orifices have an orifice size greater than 3mm.</u>

Attachment 2

Response to Request for Additional Information No. 6441 (CP RAI #259)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak, Units 3 and 4

Luminant Generation Company LLC

Docket Nos. 52-034 and 52-035

RAI NO.: 6441 (CP RAI #259)

SRP SECTION: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation

QUESTIONS for PRA and Severe Accidents Branch (SPRA)

DATE OF RAI ISSUE: 5/29/2012

QUESTION NO.: 19-20

(Follow-up to RAI Letter Number 230 (6001), Question 19-16) Please address the following items:

a) The response to Items 2 and 6 of Question 19-16 stated that “Changes to the description related to the initial assessment for fire and other external events in Section 4.0 Step 10 of NEI 04-10 Rev 1 have also been made in conjunction with response to item 2 of this RAI question." The staff finds that similar changes (e.g., use of seismic PRA in lieu of seismic margins) should also be made to the seismic events discussed in NEI 06-09 and NEI 04-10 applicable to new reactors. Luminant is requested to revise the methodology relative to NEI 04-10, Rev. 1, Section 4.0, Step 10 “Initial Assessment for Seismic Events” similar to the revision to the “Initial Assessment for Fire Events.”

b) It should be noted that the term “other external events” mentioned in the ASME/ANS PRA Standard does not implicitly include seismic, high wind, and external flood events, and thus this term should be used carefully. Luminant is requested to revise the methodology relative to NEI 06-09, Rev. 0 to specifically include seismic, high wind, and external flood events in addition to the term “other external events” in Sections 3.3.5 and 4.1.

c) The response to Question 19-16, stated that "The methodology document has been revised to address requirements of 10 CFR 50.71 (h1), (h2) and (h3)." Luminant is requested to revise the document to show 10 CFR 50.71(h)(1), (h)(2), and (h)(3), instead of (h1), (h2), and (h3) as stated in the response.

ANSWER:

a) The methodology document has been revised with respect to “Initial Assessment for Seismic Events” similar to the revision relative to “Initial Assessment for Fire Events.”

b) The methodology document has been revised to explicitly include seismic, high wind, and external flood events in addition to the term “other external events”.

c) The methodology document has been revised to reference 10 CFR 50.71 (h)(1), (h)(2), and (h)(3), as requested.

The methodology document has also been revised to provide acronym definitions consistent with NEI 06-09 and NEI 04-10.

Impact on R-COLA

See attached marked-up "Technical Specifications Methodology for Risk-Managed Technical Specifications and Surveillance Control Program October 2011" pages 3, 4, 6, 7, 8, 9, 10, 11, and 12.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

1.0 Introduction

This methodology addresses how the Risk-Managed Technical Specification (RMTS) and the Surveillance Frequency Control Program (SFCP) are proposed to be implemented for Comanche Peak Nuclear Power Plant (CPNPP) Units 3 and 4 Technical Specifications (TS) 5.5.18 and 5.5.19, respectively. This methodology document will be referenced in Sections 5.5.18 and 5.5.19 of the CPNPP Units 3 and 4 TS.

As noted in these two specifications, actions are to be taken in accordance with NEI 06-09 (Revision 0) for RMTS and NEI 04-10 (Revision 1) for SFCP. Both of these documents were originally written for plants that are currently operating. Section 2.0 of this methodology incorporates these NEI documents by reference and proposes the changes needed to make the documents applicable to CPNPP Units 3 and 4. Section 3.0 provides a complete description of the programs and addresses the technical adequacy of the PRA to support these programs. Finally, Section 4.0 provides discussion on the use of existing risk metrics applied to these risk informed applications.

This methodology applies to CPNPP Units 3 and 4 from issuance of the Combined License (COL) through construction and subsequent operation of the units. Changes to the TS after COL issuance will be performed in accordance with the 10 CFR 50.90 process. RCOL2_19-20

2.0 Incorporation of NEI Documents

TS 5.5.18 and TS 5.5.19 incorporate by reference NEI 06-09 and NEI 04-10, respectively. These NEI documents address many aspects of the RMTS and SFCP. In order to fully implement the documents, they are incorporated by reference into the Technical Specification Methodology for CPNPP Units 3 and 4 with the modifications contained herein to make them fully applicable to these plants. The full incorporation is addressed in Subsections 2.1 and 2.2.

2.1 NEI 06-09, Revision 0, "Risk-Managed Technical Specifications (RMTS) Guidelines"

NEI 06-09, Revision 0, "Risk-Managed Technical Specifications (RMTS) Guidelines" is incorporated by reference into this methodology with the following revisions. These revisions serve to modify the NEI 06-09, which is guidance for operating plants, to make it applicable to pre-operating CPNPP units 3 and 4. These modifications are necessary as NEI 06-09 was prepared for plants with an operating license (OL) and CPNPP is a new plant with a ~~combined license (~~COL~~)~~. This section of the methodology is considered to be the basis for a future addendum to NEI 06-09. RCOL2_19-20

CPNPP proposes to use the aspects of these documents as described in NEI 06-09 and the addendum below.

2.3.1 Configuration Risk Management Process & Application of Technical Specifications

Item 7: replace the bullet before the last with:

RCOL2_19-20

The impact of all initiating events (e.g., internal fire and floods and other external events) and modes of operation (e.g., low power and shutdown operation if applicable), shall be addressed in accordance with 10 CFR 50.71(h)(1), (h)(2) and (h)(3) and included in the Risk Management Action Time (RMAT) and Risk-Informed Completion Time (RICT) calculation." RCOL2_19-20

Item 9: replace the sentence with:

A RICT may not be applied for pre-planned activities when multiple trains of similar equipment required by the Technical Specification Limiting Condition for Operation (LCO) would be RCOL2_19-20 on PRA in effect one year prior to initial fuel load. The review will consider and accept that the plant does not yet have operating experience to be included in the PRA and the plan to add this experience at a later date.

Item 3, replace the last sentence with:

Conservative or bounding assumptions may be used in RMTS calculations as long as they are used in conjunction with PRA models meeting consensus standards if so desired by the licensee for the sake of simplicity.

Item 10: after the first sentence, insert the following sentence:

Key sources of uncertainty and key assumptions of the US-APWR DCD PRA, documented Table 19.1-38 of the US- APWR DCD Chapter 19 or in Chapter 19 of the Comanche Peak Units 3 and 4 FSAR, shall be reviewed (together with any additional potential sources of uncertainty and key assumptions identified by the COL licensee or the peer review process for the detailed as-built, as-operated PRA) to characterize and understand their impact on the RMTS-related decision making. Uncertainty associated with the initial lack of operating experience and the lack of adequate reliability data for some innovative equipment designs (e.g., advanced accumulators and digital I&C) shall be identified and characterized by sensitivity analyses and addressed by using appropriately conservative reliability values in RMTS calculations.

3.2.1 RMTS Implementation Process

Item 3: replace the third paragraph before the last with the following sentence:

Quantitative risk assessments used to support RMTS evaluations shall be performed with a full scope plant specific PRA model approved by station management in accordance with approved station procedures.

3.2.2 RMTS Implementation Process

Item 3: replace the second sentence with the following sentence:

In a RMTS program, a RICT exceeding the current front-stop Completion Time (CT) may not be applied in cases where a total RCOL2_19-20 loss of function has occurred (e.g., multiple trains of a required Technical Specifications LCO are determined to be non-functional, such as in a four train system where the applicable LCO requires three trains to be operable, RICT may be applied if one train is not operable and a second train becomes inoperable but not if a third train becomes inoperable).

3.3.4 Uncertainty Consideration in a RMTS Program

Item 1: add the following sentence after the last sentence:

Key sources of uncertainty and key assumptions of the US-APWR DCD PRA, documented Table 19.1-38 of the US- APWR DCD Chapter 19 or in Chapter 19 of the Comanche Peak Units 3&4 FSAR, should be reviewed (together with any additional potential sources of uncertainty and key assumptions identified by the COL licensee or the peer review process for the detailed as-built, as-operated PRA) to characterize and understand their impact on the RMTS-related decision making. Uncertainty associated with the initial lack of operating experience and the lack of adequate reliability data for some innovative equipment designs (e.g., advanced accumulators and digital I&C) shall be identified and characterized by sensitivity analyses and addressed by using appropriately conservative reliability values in RMTS calculations.

3.3.5 External Events Consideration

Replace the first and second sentences of the first paragraph with the following sentences: RCOL2_19-20

When evaluating risks for use in a RMTS program, plant PRA models should include external floods, fires, high winds, seismic, and other external events that the PRA would indicate as risk significant and that would impact maintenance decisions. For stations without external events PRAs incorporated into their quantitative Configuration Risk Management (CRM) Tools, the station should apply the following criteria to support maintenance activities beyond the front-stop CT: RCOL2_19-20 RCOL2_19-20 RCOL2_19-20

Replace Item 1 with the following sentence: RCOL2_19-20

Provide a reasonable technical argument (to be documented prior to the implementation of the associated RICT) that the configuration risk of interest is dominated by internal events, and that external events, including external floods, fires, high winds, and seismic events, are not a significant contributor to configuration risk (i.e., they are not significant relative to a RICT calculation). RCOL2_19-20

Replace Item 2 with the following sentence:

> Perform a reasonable bounding analysis of the external events, including external floods, fires, high winds, and seismic events, contribution to configuration risk (to be documented prior to the implementation of the associated RICT) and apply this upper bound external events risk contribution along with the internal events risk contribution in calculating the configuration risk and the associated RICT.

Replace the first sentence of Item 3 with the following sentence:

> For limited scope RMTS applications, a licensee may use pre-analyzed external events, including external floods, fires, high winds, and seismic events to restrict Risk Management Action (RMA) thresholds and identify and implement compensatory risk management actions.

Delete the second and fifth sentences in the second paragraph.

3.3.6 Common Cause Failure Consideration

Replace the second sentence of the first paragraph with the following sentences:

> For all RICT assessments of planned configurations, the treatment of common cause failures in the quantitative CRM Tools may be performed by considering only the removal of the planned equipment and not adjusting the common cause failure terms if all combinations of common cause failures among the redundant equipment are explicitly modeled and are considered in risk quantification of the CRM tool. However, if the CRM Tool does not take into account the contribution of common cause failure terms that directly result in system failure for configurations where equipment is removed from service, removal of the equipment without adjusting common cause failure terms could result in a artificially low calculated risk when equipment is taken out of service. In such cases, validity of the common cause failure treatment in the CRM Tool shall be justified or the common cause

failure term shall be adjusted to ensure the configuration risk is not underestimated.

4.1 PRA Attributes

Replace the third and forth sentences of the first paragraph with:

> The scope of this PRA shall include impact of all initiating events (e.g., internal events, internal and external floods, fire, high winds, seismic, ~~internal fire and floods~~ and other external events) and modes of operation (e.g., low power and shutdown operation, if applicable) in accordance with 10CFR 50.71 (h)(1), (h)(2) and (h)(3).

RCOL2_19-20

RCOL2_19-20

Replace the last sentence of the first paragraph with:

> However, where the PRA can demonstrate that one more of the challenges are not significant to the site or application, quantitative modeling may be omitted.

Replace the first sentence of the last paragraph with:

> The PRA model attributes and technical adequacy requirements for RMTS applications must be consistent and compatible with the NRC-endorsed consensus standards on PRA and updates to RG 1.200 in effect one year prior to initial fuel load.

2.2 NEI 04-10, Revision 1, "Risk-Informed Method for Control of Surveillance Frequencies"

NEI 04-10, Revision 1, "Risk-Informed Method for Control of Surveillance Frequencies" is incorporated by reference into this methodology with the following revisions. These revisions serve to modify NEI 04-10 to make it applicable to CPNPP. These modifications are necessary because NEI 04-10 was prepared for operating plants with an OL and CPNPP is a new plant with a COL. This section of the methodology is considered to be the basis for a future addendum to NEI 04-10.

CPNPP proposes to use the aspects of these documents as described in NEI 04-10 and the addendum below.

4.0 SURVEILLANCE FREQUENCY CONTROL PROGRAM CHANGE PROCESS

Step 5: replace the last sentence of the third paragraph with the following sentence:

> The identified "Gaps" to Capability Category II requirements from the endorsed PRA standards in the RG one year prior to initial fuel load, the key sources of uncertainty identified in the US-APWR DCD Chapter 19, Table 19.1-38, and the sources of uncertainty associated with lack of operational experience and lack of reliability data on innovative designs will all serve as inputs to identifying appropriate sensitivity cases in Step 14 below.

Step 10: replace the first sentence of item "*Initial Assessment for Fire Events*" with the following sentence:

> The next step of the screening process is to determine whether the SSC is evaluated in the fire PRA.

Step 10: Delete the second and third paragraph of item "*Initial Assessment for Fire Events*".

Step 10: replace the first sentence of the last paragraph of item "*Initial Assessment for Fire Events*" with the following sentence:

> If the SSC is not evaluated in the fire PRA, (either explicitly or implicitly, and it is judged to have no impact on the PRA results), then the SSC can be qualitatively screened with the information summarized in Step 15 for presentation to the Independent Decision making Panel (IDP). RCOL2_19-20

Step 10: replace the first sentence of item "*Initial Assessment for Seismic Events*" with the following sentence:

> The next step of the screening process is to determine whether the SSC is evaluated in the seismic PRA.

Step 10: Delete the second paragraph of item "*Initial Assessment for Seismic Events*".

Step 10: replace the first sentence of the last paragraph of item "*Initial Assessment for Seismic Events*" with the following sentence:

If the SSC is not evaluated in the seismic PRA, (either explicitly or implicitly, and it is judged to have no impact on the PRA results), then the SSC can be qualitatively screened with the information summarized in Step 15 for presentation to the IDP. RCOL2_19-20

Step 10: replace the first sentence of the second paragraph of item "*Initial Assessment for Other External Events*" with the following sentence:

If the plant does not have an external hazards PRA, then an external hazards screening evaluation should be performed using the PRA available that meets the requirements of 10 CFR 50.71 (h)(1), (h)(2) and (h)(3). RCOL2_19-20

Step 14: add the following bullets after the last bullet of the third paragraph:

- Review the key sources of uncertainty and key assumptions identified in the US-APWR DCD PRA, documented in Table 19.1-38 of the US- APWR DCD Chapter 19 or in Chapter 19 of the Comanche Peak Units 3 and 4 FSAR together with any additional potential sources of uncertainty and key assumptions identified by the COL licensee or the peer review process for the detailed as-built, as-operated PRA to characterize and understand their impact on the change in Core Damage Frequency (ΔCDF) and change in Large Early Release Frequency (ΔLERF) calculations. Compare the results to the RG 1.174 limits. RCOL2_19-20

- Identify and characterize uncertainties associated with the initial lack of operating experience and the lack of adequate reliability data for some innovative equipment designs (e.g., advanced accumulators and digital I&C) by sensitivity analyses and address the uncertainties by using appropriately conservative reliability values. Compare the results to the RG 1.174 limits.

Step 15: add the following bullet after the last bullet:

- Uncertainties associated with the lack of operating experience and lack of reliability data for innovative design features that impact the CDF and LERF changes.

3.0 Programs

3.1 Configuration Risk Management Program ~~CRMP~~ Description

RCOL2_19-20

The Configuration Risk Management Program (CRMP) must be implemented before the requirements of TS 5.5.18 may be applied to any TS. The program must comply with the methodology provided in TS 5.5.18, including NEI 06-09, per the discussion in Section 2.1. The program has the following basic characteristics: RCOL2_19-20

- The basic elements of the program are contained in an approved CPNPP procedure.
- The program identifies the departments of the CPNPP organization that have actions or responsibilities with respect to the program.
- The program delineates who has each of the designated responsibilities.
- The program identifies the training requirements for the members of the organization assigned actions or responsibilities per the program.
- The program and the supporting PRA (see Section 3.3) matches the as-built plant and is updated to the extent necessary to assess the combined risk of the unit in its current and projected configurations.
- The supporting PRA meets the description provided in Section 3.3.
- The program states how the PRA is modified to support the CRMP.
- The program procedure fully describes the CRM tool to be used.

3.2 Surveillance Frequency Control Program~~FCP~~ Description

RCOL2_19-20

The Surveillance Frequency Control Program (SFCP) must be implemented before the requirements of TS 5.5.19 may be applied to any TS. The program must comply with the methodology provided in TS 5.5.19, including NEI 04-10, per the discussion in Section 2.2. The program has the following basic characteristics: RCOL2_19-20

Attachment 3

Response to Request for Additional Information No. 6457 (CP RAI #257)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak, Units 3 and 4

Luminant Generation Company LLC

Docket Nos. 52-034 and 52-035

RAI NO.: 6457 (CP RAI #257)

SRP SECTION: 14.02 - Initial Plant Test Program - Design Certification and New License Applicants

QUESTIONS for Quality and Vendor Branch 1 (AP1000/EPR Projects) (CQVP)

DATE OF RAI ISSUE: 5/3/2012

QUESTION NO.: 14.02-21

During the review of COL FSAR Section 14.2.12.1.113, "Ultimate Heat Sink (UHS) System Preoperational Test," the NRC staff determined there is incomplete or missing information. Specifically, the applicant is requested to address the following in the FSAR:

1. Testing for water hammer (or lack of a water hammer event) during system pump starts and stops.
2. Testing to ensure the ESWS/UHS void detection system works as designed.
3. UHS transfer pumps operate with various power supplies since pumps and associated motor operated valves get powered from more than one safety bus.
4. Testing of the freeze protection design features associated with the ESWS/UHS.
5. Testing of the UHS transfer pumps for adequate net positive suction head at the lower water level requirements and testing for lack of UHS transfer pump vortexing.
6. Testing of the UHS fans (speed and direction) – missing from acceptance criteria.

ANSWER:

Luminant agrees to add testing of the above features, as applicable, consistent with RG 1.68.

1. Luminant has revised FSAR Subsection 14.2.12.1.113 to include testing for water hammer during ESW pump and UHS transfer pump starts and stops.

2. FSAR Subsection 9.2.5.5 states that level switches are installed in the vertical piping upstream of the cooling tower spray header to annunciate system inventory loss. Operation of the level switches has been added to the UHS preoperational test in FSAR Subsection 14.2.12.1.113.

3. In response to CP RAI #252 Question 09.02.05-21 (ML12163A012), Luminant revised FSAR Subsection 14.2.12.1.113 to include testing the ESW pumps, UHS transfer pumps, and MOVs from their various associated power supplies.

4. Luminant is evaluating the freeze protection design features available and commits to provide a supplemental response to this question by August 24, 2012.

5. In the response to CP RAI #251 Question 09.02.01-6 (ML12153A237), Luminant revised FSAR Subsection 14.2.12.1.113 to include testing the ESW pumps and UHS transfer pumps for adequate NPSH, flow rates, and the absence of vortex formation.

6. The UHS fans are single speed and single directional. Luminant has revised FSAR Subsection 9.2.5.2.1 to include the speed and direction of the UHS fans, and revised Subsection 14.2.12.1.113 to include the speed and direction of the UHS fans in the preoperational test acceptance criteria.

Impact on R-COLA

See attached marked-up FSAR Revision 2 pages 9.2-13, 9.2-16, 14.2-5, 14.2-6, and 14.2-7.

Impact on S-COLA

This response is site-specific.

Impact on DCD

None.

The source of cooling water and location of the UHS are discussed in Subsections 9.2.5.2.1 and 9.2.5.2.2.

The location and design of the ESW intake structure is discussed in Subsections 9.2.5.2.1 and 9.2.5.2.2.

The location and design of the ESW discharge structure is discussed in Subsections 9.2.5.2.1 and 9.2.5.2.2.

9.2.5.2.1 General Description

CP COL 9.2(1)
CP COL 9.2(3)
CP COL 9.2(4)
CP COL 9.2(5)
CP COL 9.2(18)
CP COL 9.2(19)
CP COL 9.2(20)
CP COL 9.2(21)

Replace DCD Subsection 9.2.5.2.1 with the following.

Each unit is provided with its own independent UHS, with no sharing between the two units. The UHS for each unit consists of four 50 percent capacity mechanical draft cooling towers, one for each ESWS train, and four 33 one-third percent capacity basins to satisfy the thirty day cooling water supply criteria of RG 1.27.

Each cooling tower consists of two cells with fans and motors, drift eliminators, film fills, risers, and water distribution system all enclosed and supported by a seismic category I reinforced concrete structure. Cooling tower components are designed per equipment Class 3 and quality group C requirements. Each basin includes an ESWP intake structure that contains one 50 percent capacity ESWP and one 100 percent capacity UHS transfer pump, and associated piping and components. The UHS system is classified as a moderate-energy system. The UHS piping material, including the UHS transfer piping, is carbon steel with an internal polyethylene lining. The piping is not buried; therefore, cathodic protection is not utilized. The cooling tower spray nozzles are sized to prevent blockage by debris. Tornado missile protection for the cooling tower components, ESWPs and piping is provided by the UHS safety-related seismic category I structures and ESW pipe tunnel as discussed in Subsection 3.8.4. The UHS structural design, including pertinent dimensions, is also discussed in Subsection 3.8.4.

RCOL2_09.02.05-25
RCOL2_09.02.05-19
RCOL2_14.03.07-38

Each cooling tower consists of two cells, each with a motor driven fan driven with a right-angle gear reducer. The fans operate at a single speed and in a single direction. The fan motors are powered from the Class 1E normal ac power system. On loss of offsite power (LOOP), the motors are automatically powered from their respective division emergency power source.

RCOL2_14.02-21

The cooling towers are designed for the following conditions: water flow of 12,000 gpm, hot (inlet) water temperature of 128° F, cold (outlet) water temperature of 95° F, ambient wet bulb temperature of 80° F, and DBA design heat load of 196.00x10^6 Btu/hr.

Each ESW pump is designed to provide 13,000 gpm. In general, the efficiency of removing heat from the cooling tower improves if the supply flow rate to the cooling tower is large. Therefore, the supply flow rate to the cooling tower is estimated to be smaller than the realistic flow rate. The flow rate of 12,000 gpm is

RCOL2_09.02.05-20

positive pressure at the spray nozzle headers. This together with the high point vents minimize system drain down in the idle trains or upon loss of offsite power and subsequent pump trip.

The following features preclude or minimize water hammer forces:

- On loss of off-site power (LOOP), the discharge MOV of the operating train is closed by DC power. This, together with the discharge check valve, prevents draindown to the basin.
- The ESW pump start logic interlocks the discharge MOV operation with the pump operation. The re-start of the tripped pump or start of the stand-by pump, opens the discharge valve slowly after a pre-determined time delay, sweeping out voids from the discharge piping and CT riser and distribution piping.
- The system valve lineup and periodic inservice testing of the idle trains, including testing of the high point vents, help minimize potential voids and water hammer forces.
- Level switches are installed in the vertical piping of the cooling tower spray header to annunciate if system inventory reduction occurs and operator action is required to supply water to the vertical piping. RCOL2_14.02-21

Four 100% capacity UHS transfer pumps, one located in each UHS ESW pump house, are provided to transfer cooling water from a non-operating UHS basin to the operating UHS basins when required during accident conditions.

All transfer pumps discharge into a common header which in turn discharges to individual UHS basins. All discharge piping is located in missile protected and tornado protected areas. The common discharge header and other UHS system piping are designed to seismic Category I requirements. The piping is located in seismic Category I structures. There is no non-seismic piping in the vicinity of this header, and there are no seismically induced failures. Pipes are protected from tornado missiles. The UHS transfer pump(s) operate during accident conditions, during IST in accordance with plant Technical Specifications, during maintenance, and for brief periods during cold weather conditions for recirculation. As the header is normally not in service, deterioration due to flow-accelerated corrosion is insignificant. Transfer of water inventory is required assuming one train/basin of ESW/UHS is out of service (e.g., for maintenance), and a second train is lost due to a single failure. When a transfer pump is in operation, fluid velocity in the header is approximately 5.1 ft/sec. Operating conditions are approximately 20 psig and 95° F. Therefore, header failures are not considered credible.

The UHS transfer pump is designed to supply 800 gpm flow at a total dynamic head (TDH) of 40 feet. Transfer pump capacity is more than adequate to replenish the maximum water inventory losses from two operating ESWS trains. Minimum available net positive suction head (NPSHA) is approximately 40 feet. This is

STD COL 14.2(10) Add new item after item C.7 in DCD Subsection 14.2.12.1.90 as follows.

8. Verify that local offsite fire departments utilize hose threads or adapters capable of connecting with onsite hydrants, hose couplings, and standpipe risers.

Replace DCD Subsections 14.2.12.1.113 and 14.2.12.1.114 with the following.

STD COL 14.2(10) **14.2.12.1.113 Ultimate Heat Sink (UHS) System Preoperational Test**

A. Objectives

1. To demonstrate operation of the UHS cooling towers and associated fans, essential service water (ESW) pumps, ~~and~~ UHS transfer pumps, and associated valves. RCOL2_14.02-16 S01 RCOL2_09.02.05-21 RCOL2_09.02.01-6

2. ~~With the basin at minimum level (end of the 30 day emergency period), to demonstrate that the ESW pumps and the UHS transfer pumps maintain design flow rates.~~ To demonstrate that the ESW pumps and the UHS transfer pumps have adequate NPSH and maintain design flow rates without vortex formation with the basin at minimum level (end of the 30-day emergency period).

3. ~~To demonstrate the operation of the UHS transfer pumps.~~ To demonstrate the operation of the UHS basin water level and temperature sensors, logic, and associated control functions; water chemistry monitors, logic, and associated control functions; ESW pump start logic, interlocks, and associated control functions; ESW pump discharge strainer isolation and backwash valves and valve logic; associated makeup and blowdown equipment; and spray header level switches and logic. RCOL2_14.02-16 S01 RCOL2_14.02-21

4. ~~To demonstrate the operation of the UHS basin water level sensors and basin water level controls, and water chemistry monitors, controls, basin water level logic, and associated blowdown equipment.~~ To demonstrate the absence of any significant water hammer during ESW pump and UHS transfer pump starts and stops. RCOL2_14.02-16 S01 RCOL2_14.02-21

B. Prerequisites

1. Required construction testing is completed.
2. Component testing and instrument calibration is completed.
3. Test instrumentation is available and calibrated.

4. Required support systems are available.

5. Required system flushing/cleaning is completed.

6. Required electrical power supplies and control circuits are energized and operational.

7. Makeup water to the UHS basins is available.

C. Test Method

1. System component control and interlock circuits and alarms are verified, including cooling tower fan logic, basin water level sensors, temperature sensors, makeup water control, basin process chemical sensors, spray header level switches, and blowdown control valves. RCOL2_14.02-16 S01 RCOL2_14.02-21

2. The performance of each ESW pump and UHS transfer pump are monitored as basin water level is decreased to the minimum water level (end of the 30 day emergency period).

3. Basin water level and chemistry controls are monitored during continuous operations in the water level and chemistry control mode using the ESWS blowdown feature.

4. The capability of the ESWS to provide water to the FSS is demonstrated by opening the isolation valves and obtaining a total flow of at least 150 gpm to the hose stations located in the R/B and ESWS pump house while maintaining required ESWS flows and pressures.

D. Acceptance Criteria

1. With the basin at minimum level (end of the 30 day emergency period), each ESW pump and UHS transfer pump has adequate NPSH and maintain design flow rates without vortex formation. RCOL2_14.02-21

2. The UHS fans operate as discussed in Subsection 9.2.5, including speed and direction.

3. ~~UHS transfer pumps operate as discussed in Subsection 9.2.5.~~ESW pumps, UHS transfer pumps and associated motor-operated valves operate from their associated Class 1E buses as discussed in Subsections 9.2.1 and 9.2.5. RCOL2_09.02.05-21

4. ~~UHS basin water level sensors and basin water level controls, and water chemistry monitors, controls, interlocks and associated blowdown equipment operate as discussed in Subsection 9.2.5.~~The UHS basin water level and temperature sensors, logic, RCOL2_14.02-16 S01

and associated control functions; water chemistry monitors, logic, and associated control functions; ESW pump start logic, interlocks, and associated control functions; ESW pump discharge strainer isolation and backwash valves and valve logic; associated makeup and blowdown equipment; and spray header level switches and logic operate as discussed in Subsections 9.2.1 and 9.2.5. RCOL2_14.02-16 S01 RCOL2_14.02-21

5. ESWS maintains required flows and pressures while water is provided to the FSS as described in Subsection 9.2.1.3.

6. Significant water hammer does not occur during ESW pump and UHS transfer pump starts and stops. RCOL2_14.02-21

STD COL 14.2(10)

14.2.12.1.114 UHS ESW Pump House Ventilation System Preoperational Test

A. Objectives

1. To demonstrate operation of the UHS ESW pump house ventilation system.

B. Prerequisites

1. Required construction testing is completed.
2. Component testing and instrument calibration are completed.
3. Test instrumentation is available and calibrated.
4. Required support systems are available.

C. Test Method

1. Simulate interlock signals for each exhaust fan and unit heater and verify operation and annunciation.
2. Verify that alarms and status indications are functional.
3. Verify design airflow.
4. Verify position of the backdraft dampers with the ventilation system operating and not operating. RCOL2_09.04.05-19

D. Acceptance Criteria

1. UHS ESW pump house ventilation system operates on the proper signal (see Subsection 9.4.5).