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May 31, 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. 6320
(SECTION 19) AND 6348 (SECTION 9.2.1)

Dear Sir:

Luminant Generation Company LLC (Luminant) submits herein the response to Requests for Additional Information (RAIs) No. 6320 (CP RAI #248) and No. 6348 (CP RAI #251) 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 and address the essential service water system.

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

There are no commitments in this letter.

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

Executed on May 31, 2012.

Sincerely,

Luminant Generation Company LLC

RDBird for

Rafael Flores

Attachments: 1. Response to Request for Additional Information No. 6320 (CP RAI #248)
2. Response to Request for Additional Information No. 6348 (CP RAI #251)

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Attachment 1

Response to Request for Additional Information No. 6320 (CP RAI #248)

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.: 6320 (CP RAI #248)

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

QUESTIONS for PRA and Severe Accidents Branch (SPRA)

DATE OF RAI ISSUE: 2/27/2012

QUESTION NO.: 19-19

The staff reviewed the applicant's response, dated May 2, 2011, to RAI Letter Number 210 (5069) question 19-14 regarding the high winds shutdown assessment. In the applicant's response, only tornado strike frequencies were considered. For example, tornado wind speeds of 86-110 mph were reported to have a strike frequency of 1.5E-4 per year (Table 19.1-201 page 19.1-12). However, Chapter 2 of the COLA (Table 2.0-1R page 2.0-2) references a site specific extreme wind speed (other than tornado) of 96 mph in 1/100 years.

Using the site specific extreme wind speed and exceedance frequency referenced in Chapter 2 of the COLA:

(1) Please confirm that extreme winds as discussed in Chapter 2 of the US-APWR DCD do not contribute more than 10 percent of the shutdown core damage frequency compared to the US-APWR DC PRA. In this assessment, please consider that the containment equipment hatch could be opened which requires AC power to close. Please also consider that the switchyard could be damaged resulting in a loss of offsite power (LOOP) event that cannot be recovered within 24 hours. Please consider the site impacts of the site specific extreme wind speed on non-safety related structure, system, and components (SSCs).

(2) Please confirm that extreme winds as discussed in Chapter 2 of the DCD do not contribute more than 10 percent of the full power core damage frequency compared to the US-APWR DC PRA. Please also consider that the switchyard could be damaged resulting in a LOOP event that cannot be recovered within 24 hours. Please consider the site impacts of the site specific extreme wind speed on non-safety related SSCs.

ANSWER:

(1) Data describing the frequency of a LOOP event were reviewed to perform a sensitivity study using the constraints and assumptions proposed by the RAI question to evaluate the potential for extreme winds contributing to the core damage frequency (CDF) during low-power and shutdown conditions. NUREG/CR-6890 (Vol. 1, "Analysis of Loss of Offsite Power Events: 1986-2004")

identifies that the average U.S. frequency of a LOOP due to weather-related causes for shutdown operation is 3.5E-2/year, which is larger than the site-specific extreme wind speed (other than tornado) of 1E-2/year for 96 mph. This value applies to weather-related events from all causes and includes events in which power may be recovered in a relatively short time period. If it is assumed that all such weather-related LOOP events are due to extreme winds and the potential for recovery is ignored, a conservative estimate of extreme winds causing a LOOP of duration sufficient to lead to core damage is 3.5E-2/year. The study assumed that this LOOP event is coincident with the loss of the non-safety related SSCs that support the alternate component cooling water functions of the Fire Suppression System and non-Essential Chilled Water System, and makeup function of the Refueling Water Storage Auxiliary Tank. The study also assumed the most limiting low-power and shutdown (LPSD) conditions in terms of core inventory, i.e., reduced inventory operation.

The Conditional Core Damage Probability (CCDP), assuming unavailability of non-safety related equipment located outside of Seismic I or II structures, is dependent on the Plant Operational State (POS) because the plant configuration is not common to all POSs. The study assumed that the plant uses a two-year fuel cycle with a nominal 25-day outage and that the equipment hatch is open for the duration of the outage. The duration of the reduced inventory, based on a review of POSs in the US-APWR PRA, is assumed to be ten days of a 25-day outage.

$$\begin{aligned} CDF &= \Sigma CDF_{POS\,i} \\ &= \Sigma\,(IE_{POS\,i} \times CCDP_{POS\,i}) \\ &= \Sigma\,(IE \times t_{LPSD/RedInv,POS\,i} \times CCDP_{POS\,i}) \\ &= IE \times \Sigma\,(t_{LPSD/RedInv,POS\,i} \times CCDP_{POS\,i}) \\ &= 8.5E\text{-}10 \text{ per year} \end{aligned}$$

$POS_{(i)}$	$t_{LPSD/RedInv\ POS\ i}$ [hr]	$CCDP_{POS\ i}$
3	24	7.2E-05
4-1	24	7.2E-05
4-2	12	7.0E-05
4-3	36	2.0E-04
8-1	60	4.0E-04
8-2	12	1.5E-04
8-3	24	2.8E-04
9	8	2.8E-04
11	33	2.8E-04

where:

$POS_{(i)}$: Plant Operational State "i"
IE: Frequency of Initiating Event
$CCDP_{POS\ i}$: CCDP of $POS_{(i)}$
$t_{LPSD/RedInv\ POS\ i}$: Fraction of time in reduced inventory of $POS_{(i)}$

In the sensitivity study, the dominant core damage scenario is a LOOP event involving a station blackout with failure to connect the AAC GTGs to the Class 1E buses, which results in no RCS injection and decay heat removal systems. If core cooling and makeup functions are unavailable, RCS inventory would eventually be lost through boiloff. No credit is taken in the sensitivity study for recovery. For configurations other than reduced inventory, the time to boil is longer, which would allow credit to be taken for mitigative actions.

Based on these assumptions, the CDF for this extreme wind event sensitivity study is less than 1% of the LPSD CDF of 1.8 E-7 per reactor year, as provided in DCD Revision 3. In the sensitivity study, the LRF was conservatively assumed to be equal to the CDF because no credit is taken for closure of the containment hatch.

Given the insights from the sensitivity study and conservatisms applied, the CDF and potential Large Release Frequency (LRF) contribution due to extreme wind damage during LPSD is not considered significant because the extreme wind CDF and LRF values are less than 10% of the LPSD CDF. (Note that although the calculated extreme wind risk would increase for shorter operating cycles, e.g., 12 months, the conclusion regarding relative risk would remain valid).

(2) For full power operations, the CCDP for a LOOP event assuming no recovery and loss of non-safety related SSCs is 4.6E-5. The dominant core damage scenario is a LOOP event involving a station blackout with failure to connect the AAC GTGs to the Class 1E buses, which results in loss of mitigating systems.

Data describing the frequency of a LOOP event were reviewed to perform a sensitivity study using the constraints and assumptions proposed by this RAI question to evaluate the potential for extreme winds contributing to the CDF during power operation. NUREG/CR-6890 identifies the average U.S. frequency of a LOOP due to weather-related causes for critical operation as 4.8E-3/year. This value applies to weather-related events from all causes and includes events in which power may be recovered in a relatively short time period. If it is assumed that all such weather-related LOOP events are due to extreme winds and the potential for recovery is ignored, a conservative estimate of extreme winds causing a LOOP of a duration sufficient to lead to core damage is 4.8E-3/year.

CDF = IE x CCDP
= (4.8E-3) x (4.6E-5)
= 2.2E-7 per year

where:

IE: Frequency of Initiating Event
CCDP: Conditional Core Damage Probability

The CDF for extreme winds during power operation is 2.2E-7 per year, constituting approximately 8% of the CDF of 2.8E-6/reactor year for internal and external (internal flooding and fire) events at power.

Given the insights from the sensitivity study and conservatisms applied, the CDF due to extreme wind damage during power operation is not considered significant.

Impact on R-COLA

See attached marked-up FSAR Revision 2 page 19.1-9, and Table 19.1-205 sheets 25 and 26.

Impact on S-COLA

This response is standard.

Impact on DCD

None.

- Enhanced F-scale intensity of F3, F4 and F5 tornado strike-induced LOOP and T/B damage combined with failure of all four emergency gas turbine generators.

The plant switchyard and the T/B are assumed to be damaged by the tornado strike with wind speed between 136 mph and 230 mph. A LOOP occurs and the emergency gas turbine generators fail to operate due to common cause failure. The alternative power source is unavailable since the T/B is damaged and total loss of ac power occurs. Offsite power cannot be recovered due to damage of the T/B. RCP seal LOCA occurs and eventually the core is damaged. The CDF for this scenario is 2.3E-08/RY.

- Failure of all safety systems by a beyond design basis tornado. This event leads directly to core damage. This CDF for this scenario is 2.5E-08/RY.

The total CDF caused by a tornado strike during at-power operation is less than 8E-08/RY. Tornado induced CDF is one order of magnitude lower than the total CDF for internal events and internal flood and internal fire events. A bounding assessment for extreme winds has been performed. The results show that the extreme wind CDF is less than 10% of the internal events CDF at power operation. RCOL2_19-19

The CDF from tornadoes during LPSD does not contribute more than ten percent of the total shutdown CDF and total shutdown LRF compared to the US-APWR DCD PRA. Tornado events during LPSD do~~es~~ not have significant contribution to risk. A bounding assessment for extreme winds has been performed. The results show that the extreme wind CDF and LRF values are less than 10% of the LPSD CDF. RCOL2_19-19

External Flooding

Subsection 2.4.2 systematically considers the various factors that can contribute to the incident of external flooding. Based on the discussions in this section, the contribution of such events to the total CDF is considered insignificant as described in Table 19.1-205. ~~These events meet the preliminary screening criteria of ASME/ANS RA-Sa-2009.~~ Bounding analysis show that the CDF from probable maximum flood is below the quantitative screening criterion of 10^{-7}/year. RCOL2_19-17

Transportation and Nearby Facility Accidents

These events consist of the following:

- Hazards associated with nearby industrial activities, such as manufacturing, processing, or storage facilities

CP COL 19.3(4)

Table 19.1-205 (Sheet 25 of 37)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability			
				Criteria(1)	Freq. (/yr)	Site Appl.	
	Ultimate Heat Sink	2.3.1.2.10 2.3.2.1.3	The performance of the ultimate heat sink is discussed in Subsection 9.2.5. The wet bulb design temperature for the ultimate heat sink was selected to be 80°F based on 30 yr (1977 -2006) of climatological data obtained from National Climatic Data Center/National Oceanic and Atmospheric Administrator for Dallas/Fort Worth International Airport Station in accordance with RG 1.27. The worst 30 day period was selected from the above climatological data between June 1, 1998 and June 30, 1998, with an average wet bulb temperature of 78.0°F. A 2°F margin was added to the maximum average wet bulb temperature for conservatism. These are not significant impact to ultimate heat sink.	1	None	No	
	Extreme Winds	2.3.1.2.11 3.3.1.1	Estimated extreme winds (fastest mile) for the general area based on the Frechet distribution are: Return Period (y~~i~~ear) — Wind Speed (mi per hr) 2 — 51 10 — 61 50 — 71 100 — 76 Fastest mile winds are sustained winds, normalized to 30 ft above ground and include all meteorological ~~ghenomena~~phenomena ~~excegt~~except ~~tornadoes~~tornadoes.	~~1, 4~~Not screened (bounding analysis conducted)	None	No	RCOL2_19-19 RCOL2_19-17 RCOL2_19-17 RCOL2_19-19

CP COL 19.3(4)

Table 19.1-205 (Sheet 26 of 37)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			The design wind has a basic speed of 155 mph, corresponding to a 3-second gust at 33 ft above ground for exposure category C (open terrain). For all seismic category I and II SSCs, the basic wind speed is multiplied by an importance factor of 1.15 correlating to essential facilities in hurricane-prone regions as defined in ASCE/SEI 7-05 Tables 1-1 and 6-1. ~~Site-specific structures, systems, and components (SSCs) are designed using the site-specific basic wind speed of 90 mph, or higher. Therefore, the maximum wind speed by extreme winds is not greater than the F-scale intensity F1 of tornadoes for CPNPP. Also a~~All seismic category I and II SSCs ~~including fire suppression systems~~ are designed for the wind load and are not damaged by the extreme winds. ~~Although o~~Only loss of offsite power is the hazardous potential by extreme winds~~, it is considered as the loss of offsite power (LOOP) event for internal event PRA as weather-related LOOP~~. A bounding assessment determined that the risk from extreme winds is not significant. ~~Thus, extreme winds are insignificant potential hazards (criteria 1 and 4).~~			

RCOL2_19-19

RCOL2_19-17

Attachment 2

Response to Request for Additional Information No. 6348 (CP RAI #251)

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.: 6348 (CP RAI #251)

SRP SECTION: 09.02.01 - Station Service Water System

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

DATE OF RAI ISSUE: 3/13/2012

QUESTION NO.: 09.02.01-6

This is a Follow-up to RAI 3698 (CP Letter # 109), Question 09.02.01-1:

On December 20, 2011 the Luminant Generation Company LLC (Luminant) submitted an Update Tracking Report (UTR) Revision 0, for the Final Safety Analysis Report Revision 2, which is part of the Combined License Application (COLA) for Comanche Peak Nuclear Power Plant Units 3 and 4. The UTR reflects changes made to maintain consistency with the US-APWR Design Control Document (DCD) and responses to DCD Requests for Additional Information (RAIs), provide consistency within the COLA, update the FSAR to provide a more complete discussion of construction impacts on plant operations, modifies the FSAR to address discussions at ACRS subcommittee briefings, and includes editorial changes or corrections.

Based on the staff's review of this UTR, CP COL 9.2(6), and Section 9.2.1.2.2.1, "ESWPS," pump testing for adequate net positive suction head (NPSH) and pump vortex testing is described in, according to procedures indicated, DCD 14.2.12.1.113, "Ultimate Heat Sink (UHS) System Preoperational Test." Revision 2 of the COL applicant, Section 14.2.12.1.113 describes the UHS preoperational test, but omits specific testing for ESWS NPSH and pump vortex. The ESWS NPSH and testing for vortex should be clearly addressed in COL Section 14.2.12.1.113.

ANSWER:

FSAR Subsection 14.2.12.1.113 has been revised to include the requested information.

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

See attached marked-up FSAR Revision 2 page 14.2-5.

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

This response is standard.

Impact on DCD

None.

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.
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). RCOL2_09.02.01-6
3. To demonstrate the operation of the UHS transfer pumps.
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.

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.

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.: 6348 (CP RAI #251)

SRP SECTION: 09.02.01 - Station Service Water System

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

DATE OF RAI ISSUE: 3/13/2012

QUESTION NO.: 09.02.01-7

This is a Follow-up to RAI 3698 (CP Letter # 109) Question 09.02.01-2, Part B.

Related to the component cooling water system (CCWS) heat exchanger over-pressurization, the applicant states in the response to RAI 3698, during back flush operation for a typical train heat exchanger (HX), inlet and outlet isolation valves VLV-514A and VLV-517A are closed and bypass valves VLV-531A and VLV-532A are opened. Water from the inlet of the HX inlet isolation valve VLV-514A flows through the bypass valve VLV-531A and into the HX from the discharge side. The water flows out of the HX from the inlet side to the bypass valve VLV-532A and then to the outlet side of the valve VLV-517A. Thus, the HX is not isolated during back flushing operation; cooling operation is continued and there will not be any over-pressurization.

Based on this description (from RAI 3698 Question 09.02.01-2), once valves VLV-514A and VLV-517A are closed and before VLV-531A and VLV-532A are opened (allowing operator time to open the large valves), there is a small amount of time that there is a possible ESWS isolation event and the CCWS cooling operation is stopped. The COL FSAR should reflect this isolation event and continued cooling operation and provide justification this is an acceptable configuration. Describe in the FSAR if this cooling train remains Operable during the ESWS side back flush.

ANSWER:

There is a small amount of time for a possible ESWS isolation event with the CCWS cooling operation stopped if VLV-514A and VLV-517A are closed before VLV-531A and VLV-532A are opened. For this reason, the back flushing procedure requires opening bypass valves VLV-531A and VLV-532A before closing isolation valves VLV-514A and VLV-517A. The train being backwashed is identified as a maintenance outage train prior to commencing the procedure. Making an ESWS train unavailable to perform maintenance is allowed by Technical Specification 3.7.8 as the LCO requires three of the four trains to be OPERABLE.

Therefore, complete isolation of the ESWS train in backflush is not expected to occur based upon procedural controls, but such an isolation would not impact the required cooling because the three other trains remain OPERABLE.

FSAR Subsection 9.2.1.3 has been clarified.

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

See attached marked-up FSAR Revision 2 page 9.2-6.

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

None; this response is site-specific.

<u>Impact on DCD</u>

None.

- The basins are located below grade and thus ground temperature prevents water from freezing.
- In the operating trains, water is continuously circulated which helps to prevent freezing. Ultimate heat sink (UHS) transfer pumps can be used to circulate water from the idle basins. Plant procedures are developed to operate the pumps in this mode based on the basin water and ambient temperatures.
- UHS ESW pump house ventilation system maintains pre determined minimum temperature in the pump house areas. This is further described in Subsection 9.4.
- Temperature in the reactor building is maintained through ventilation and therefore heat tracing is not required. DCD_09.02.01-32
- ~~Any e~~Exposed ~~essential~~safety-related ESW piping that may be filled with water while the pump is not operating is heat traced. The safety-related heat tracing is activated when the thermostat senses a pre-set low ambient temperature.

For the thermal overpressure protection of the component cooling water heat exchanger ESW side, the valves located at the component cooling water heat exchanger ESW side inlet and outlet lines are administratively locked open valves. These locked open valves assure protection from the thermal overpressurization due to the erroneous valve operation coincident with the heat input from the component cooling water (CCW) side to ESW side. During backflush operation of the heat exchanger, essential service water flows from the discharge side of the heat exchanger and then exits from the inlet side to the discharge header. The backflush procedure requires opening the bypass valves before closing the isolation valves. The train to be backflushed is identified as a maintenance outage train before backflush commences. Cooling operation is continued and there is no overpressurization. RCOL2_09.02.01-7

CP COL 9.2(7)
CP COL 9.2(29)

Replace the ~~thirteenth~~seventeenth paragraph in DCD Subsection 9.2.1.3 with the following: DCD_09.02.01-33

The non-safety-related ~~portion of the ESWS~~portions connected to the CWS blowdown header are automatically isolated by the ~~begins at the discharge side of the strainer and CCW heat exchangers vent and drain valves~~ESWS Blowdown Main Header Isolation Valve to the CWS blowdown main header, which closes with ECCS actuation signal, undervoltage signal, ESW pump stop signal, or low UHS basin level signal. The supply line to the fire protection water supply system (FSS) is isolated by normally closed manual valves. The positions of these valves are controlled by the Operating and Maintenance Procedures mentioned in Subsection 13.5.2.1 in order to maintain water-tight conditions and prevent inadvertent draining of the ESW. DCD_09.02.01-33

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.: 6348 (CP RAI #251)

SRP SECTION: 09.02.01 - Station Service Water System

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

DATE OF RAI ISSUE: 3/13/2012

QUESTION NO.: 09.02.01-8

The staff reviewed this supplemental information related to the ESWS piping materials, including fittings and flanges, and internal polyethylene coating. It is unclear based on the replacement of the fourth sentence for Tier 2 US-APWR DCD Section 9.2.1.2.2.5, "Piping," whether the rest of the piping is carbon steel and has cathodic protection. In addition, it is not clear how periodic inspections for portions of piping in the essential service water pipe tunnel (ESWPT) will be conducted and how inspections of the internal coatings will be possible (access manholes?). The COL applicant is requested to provide information in the COL FSAR on how the internal polyethylene coats will be inspected and clarify those portions that are not internally coated and include where cathodic protection is being utilized. Finally, clarify in the COL FSAR any piping material differences that may exist between ESWS piping in tunnels, trenches, and above ground piping.

ANSWER:

The general arrangements of the ESWPTs are provided in FSAR Figures 3.8-201 through 3.8-205 and show that the ESWPTs have adequate space for maintenance and inspection. The ESWS pipes are connected by flanges and are easy to disassemble if necessary for maintenance. Also, as stated in FSAR Subsections 3.1.4.16.1 and 3.8.4.1.3.1, manholes and hand holes in the the ESW piping are provided for inspection.

Periodic visual inspections of the lining will be conducted to detect cracking, peeling, lining separation, abnormal color, or extraneous incrustation. The inspection will utilize the manholes and hand holes, and the pipe end flanges can be removed if necessary.

If damage is found during the inspection, lining repair in a shop or pipe replacement will be performed depending on the extent of damage. If the extent of damage is unclear, a non-destructive test with a pinhole detector may be used to confirm the extent of damage.

All safety-related portions of the ESWS piping are carbon steel coated internally with polyethylene. All ESWS piping is installed in pipe chases inside the buildings or in concrete pipe tunnels outside the buildings. There is no buried ESWS piping, no ESWS piping located in trenches, and no above-ground ESWS piping outside the buildings. There is no buried ESWS piping, so cathodic protection of piping is not needed and is not provided.

FSAR Subsection 9.2.1.2.2.5 has been revised to reflect the above information.

Impact on R-COLA

See attached marked-up FSAR Revision 2 page 9.2-4.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

STD COL 9.2(33) Replace the ~~sixth~~last paragraph in DCD Subsection 9.2.1.2.2.2 with the following: CTS-01373

The blowdown line to the CWS blowdown main header from each strainer is used during normal power operation. The normally open Class 1E dc powered isolation valve in the backwash line to the CWS blowdown main header is interlocked to close at a low UHS basin water level signal, ~~LOOP signal and~~ESW pump stop signal, undervoltage signal, or ECCS actuation signal to keep UHS basin inventory required for cooling the unit for a minimum of 30 days without makeup water. Also, in the absence of the above signals, the isolation valve in the backwash line to the CWS is interlocked to close only ~~during~~when the ESW pump ~~stoppage~~is stopped to preclude the system inventory drain down which ~~leads~~can lead to water hammer at pump restart. Table 9.2.1-2R shows the redundancy for the above functions. CTS-01373 CTS-01373

The strainer backwash ~~line~~drains back to the UHS basin ~~is used~~ during ~~abnormal or accident condition which the strainer backwash should not be released out of the system to maintain the basin inventory for 30 days cooling without makeup~~an accident mode or abnormal conditions. This is to maintain the basin inventory when normal makeup water is not available. The normally closed Class 1E dc powered motor operated isolation valve in the backwash line to the basin is interlocked to open at ~~LOOP~~undervoltage signal ~~and~~or ECCS actuation signal to provide lineup to the basin. Also, in the absence of the above signals, the isolation valve in the backwash line to the basin is interlocked to close ~~only during~~when ESW pump ~~stoppage~~is stopped to preclude the system inventory drain down which ~~leads~~can lead to water hammer at pump restart. Table 9.2.1-2R shows the redundancy for above functions. CTS-01373

An automatic vent valve is also installed to sweep out air introduced into the piping system by the vacuum breakers that are installed to prevent water hammer. The drainage is discharged as a floor drain of the UHSRS. CTS-01373

9.2.1.2.2.5 Piping

CP COL 9.2(7) Replace the fourth to seventh sentences with the following. RCOL2_09.02.01-8

~~The lining of inner surface for piping, fittings and flanges of ESWS is polyethylene.~~The rest of the ESWS piping, fittings, and flanges are carbon steel internally lined with polyethylene. Periodic visual inspections of the lining will be conducted to detect cracking, peeling, lining separation, abnormal color, or extraneous incrustation. The inspection will utilize the manholes and hand holes, and the pipe end flanges can be removed if necessary.

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.: 6348 (CP RAI #251)

SRP SECTION: 09.02.01 - Station Service Water System

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

DATE OF RAI ISSUE: 3/13/2012

QUESTION NO.: 09.02.01-9

Related to COL Item 9.2(32), void detection, COL FSAR Section 9.2.1.2.3.1, "Power Operations," states that level switches are installed in the vertical piping before the cooling tower spray header to annunciate if system inventory reduction occurs. The detail of the detector is described in Subsection 9.2.5.5, "Instrumentation Requirements".
COL FSAR Section 9.2.5.5 states that level switches are installed in the vertical piping upstream of the cooling tower spray header to annunciate if system inventory reduction occurs. The factors considered for detector position are the allowable leakage rate for the ESW pump discharge check valve and motor-operated butterfly valve, allowable voiding volume and maintenance durations.

COL FSAR Figure 9.2.5-1R (sheets 1 and 2), "Essential Service Water System Piping and Instrumentation Diagram," shows the level switches with low water alarms in the vertical piping upstream of the cooling tower spray header.
Information related to the system inventory instrumentation related to void protection is missing or incomplete. The COL applicant is requested to address the following items:

1. The safety classification of the void protection instruments and power supplies, as described in Section 9.2.1 and 9.2.5 of the COL, is not specifically provided and should be added to the COL FSAR.
2. COL Chapter 14 testing or site specific inspections, test, analyses, and acceptance criteria, (ITAAC) are not specifically described for these ESWS voiding instruments and should be added to the COL application.
3. Failure Modes and Affects Analysis (FMEA) should be considered related to failures of these instruments to detect voiding.

ANSWER:

1. The level switches installed in the vertical piping upstream of the cooling tower spray header are used to minimize the potential for water hammer rather than to perform accident mitigation. Thus, the safety classification of these level switches is "non safety-related" and they are supplied by non-Class 1E power. This information has been added in FSAR Section 9.2.5.5.

2. The ESWS voiding instruments help minimize water hammer and are not required to assure the safety function of the system. As such the instruments are non-safety and an ITAAC is not required.

3. The instruments to detect voiding minimize water hammer, so the instruments are not needed for the system to perform its safety function. Failure of the instruments will not prevent the system from performing its safety function. Thus, the instruments need not be addressed in the system FMEA.

Impact on R-COLA

See attached marked-up FSAR Revision 2 pages 9.2-22 and 9.2-23.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

Manholes, handholes, inspection ports, ladder, and platforms are provided, as required, for periodic inspection of system components.

Maintenance and test procedures to monitor debris build up and flush out debris in the UHS are discussed in Subsection 9.2.1.2.1.

9.2.5.5 Instrumentation Requirements

STD COL 9.2(24) STD COL 9.2(32) Replace the first paragraph in DCD Subsection 9.2.5.5 with the following.

Water level in each of the basins is controlled by level instrumentation that opens or closes the automatic valves in the makeup lines.

Two level transmitters and associated signal processors are provided for each basin to indicate water level in the basin and annunciate in the MCR for both the high and low water levels in the basin.

A water level signal at six inches below the normal water level causes the makeup water control valve to open. A signal at normal water level then causes the makeup control valve to close. A low level alarm annunciates in the MCR whenever the water level falls one foot below the normal water level.

During accident conditions, level indications from the operating basins are used to alert the MCR operator to start the UHS transfer pump to transfer water from the idle basin to the operating basins.

Blowdown rate is controlled manually. The blowdown control valves close automatically upon receipt of a low water level signal or emergency core cooling system actuation signal. The valve is designed to fail in the close position. Failure of the valve to close is indicated in the MCR.

The conductivity cells are provided at the ESW pump discharge line and conductivity are indicated in the MCR.

Temperature elements are provided in each basin and temperatures are indicated in the MCR.

Local flow rate and pressure indicators located in each UHS transfer pump discharge header are used for pump performance testing.

The cooling tower fan is equipped with vibration sensors that alarm in the control room in the event of high vibration.

Level switches are installed in the vertical piping upstream of the cooling tower spray header to annunciate if system inventory reduction occurs. The factors considered for detector position are the allowable leakage rate for the ESW pump discharge check valve and motor-operated butterfly valve, allowable voiding volume and maintenance durations. These level switches are used to minimize RCOL2_09.02.01-9 the potential for water hammer rather than perform accident mitigation. Thus, the safety classification of these level switches is non safety-related and power is supplied by non-Class 1E power source. RCOL2_09.02.01-9

9.2.6.2.4 Condensate Storage Tank RCOL2_12.03-12.04-11 S02

Replace the last sentence of the first paragraph in DCD Subsection 9.2.6.2.4 with the following.

After analysis for level of contamination, the content inside the dike area can be trucked to Waste Management Pond C for disposal; or to the LWMS for treatment and release.

9.2.7.2.1 Essential Chilled Water System

STD COL 9.2(27) Replace the ~~last~~thirteenth paragraph in DCD Subsection 9.2.7.2.1 with the following. MAP-09-406

The operating and maintenance procedures regarding water hammer are included in system operating procedures in Subsection 13.5.2.1. A milestone schedule for implementation of the procedures is also included in Subsection 13.5.2.1.

9.2.10 Combined License Information

Replace the content of DCD Subsection 9.2.10 with the following.

CP COL9.2(1)
STD COL 9.2(1) ***9.2(1)*** *The evaluation of ESWP at the lowest probable water level of the UHS and the recovery procedures when UHS approaches low water level*

This COL item is addressed in Subsection 9.2.1.3, 9.2.5.2.1, 13.5.2.1.

CP COL 9.2(2) ***9.2(2)*** *The protection against adverse environmental, operating and accident condition that can occur such as freezing, low temperature operation, and thermal over pressurization*

This COL item is addressed in Subsection 9.2.1.3.

CP COL 9.2(3) ***9.2(3)*** *Source and location of the UHS*

This COL item is addressed in Subsection 9.2.5.2, 9.2.5.2.1, 9.2.5.2.2, 9.2.5.2.3.

CP COL 9.2(4) ***9.2(4)*** *The location and design of the ESW intake structure*

This COL item is addressed in Subsection 9.2.5.2, 9.2.5.2.1, 9.2.5.2.2, 9.2.5.2.3.

CP COL 9.2(5) ***9.2(5)*** *The location and the design of the discharge structure*

This COL item is addressed in Subsection 9.2.5.2, 9.2.5.2.1, 9.2.5.2.2, 9.2.5.2.3.

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.: 6348 (CP RAI #251)

SRP SECTION: 09.02.01 - Station Service Water System

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

DATE OF RAI ISSUE: 3/13/2012

QUESTION NO.: 09.02.01-10

COL Part 10, Appendix A.1 addresses the Tier 1 DCD ESWS Interface Requirements, Section 3.2.3, "Essential Service Water System". However, Item b, d and e have not been fully addressed and the COL applicant should address the following:

Item b; System layout of the ESWS/UHS is verified above saturation conditions during all plant operating conditions including normal plant operations, abnormal and accident conditions; however, the staff was unable to locate this item in the COL Appendix A.1 ITAAC.

Item d; ESWS is designed to prevent water hammer, is addressed in Appendix A.1 ITAAC 16 with a 'test report exists'; however, there is no indication of defined water hammer testing.

Item e; ESWS can provide cooling water required for the component cooling water (CCW) heat exchangers and the essential chiller units of the essential chilled water system (ECWS) during all plant operating conditions, including normal plant operations, abnormal and accident conditions, however the staff was unable to locate this item in the COL Appendix A.1 ITAAC.

ANSWER:

Item b: FSAR Subsection 9.2.1.2.1 states:

> The piping layout of the UHS maintains the ESWS/UHS system pressure downstream of the pump discharge check valve above their saturation pressure at 140° F design temperature by ensuring that no piping high points are above the cooling tower spray header.

Voids could be generated and potentially cause water hammer if the ESWS/UHS is not maintained above saturation pressure. Testing for the preclusion of void generation and water hammer is necessary and the ITAAC regarding the occurrence of water hammer is described in COLA Part 10 Appendix A.1 Item #16.

Item d: Test of the as-built UHSS and ESWS will be performed to ensure prevention of a water hammer. A description of ITAAC regarding water hammer in the UHSS and the ESWS has been added in COLA Part 10 Appendix A.1 Item #16.

Item e: The ITAAC described in "Item e" has been described in DCD Tier 1 Revision 3 Table 2.7.3.1-5 Item #7. This standard plant ITAAC item requires tests of the system, which include both the standard plant and site-specific portions of the system. As such, the site-specific interface is being adequately addressed by the US-APWR ITAAC and no additional description is required in COLA Part 10 Appendix A.1 ITAAC.

Impact on R-COLA

See attached marked-up COLA Part 10 Revision 2 pages 9 and 16.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

Appendix A.1

6.b Separation is provided between redundant divisions of Class 1E cables, and between Class 1E cables and non-Class 1E cables.

7. The UHSS is capable of removing the maximum design heat load transferred from the ESWS during normal plant operations, abnormal and accident conditions of the plant.

8. Controls are provided in the MCR to open and close the remotely operated valves identified in Table A.1-2.

9.a The remotely operated valves, identified in Table A.1-2 as having an active safey function perform an active safety function to change position as indicated in the table.

9.b The remotely operated valves identified in Table A.1-2 as having PSMS control perform an active safety function after receiving a signal from PSMS.

9.c After loss of motive power, the remotely operated valves, identified in Table A.1-2, assume the indicated loss of motive power position.

10.a Controls are provided in the MCR to start and stop the pumps and fans identified in Table A.1-3.

10.b The fans identified in Table A.1-2 as having PSMS control perform as active safety function after receiving a signal from PSMS.

11. Alarms and displays identified in Table A.1-3 are provided in the MCR.

12.a Alarms, displays and controls identified in Table A.1-3 are provided in the RSC.

12.b Controls on the RSC operate the as-built pumps, fans and valves identified in Table A.1-3.

13. Each UHS basin has a volume to satisfy the thirty day cooling water supply criteria.

14. The UHS transfer and ESW pumps have sufficient NPSH .

15. ESW pump operation does not cause vortex formation at minimum allowed UHSS water level.

16. Water hammer is prevented in the UHSS and the ESWS. RCOL2_09.02.01-10

17. The sum of the ESW pump shutoff head and static head is such that the ESWS design pressure is not exceeded.

Appendix A.1

Table A.1-1 (Sheet 6 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	
12.~~a~~ Alarms, displays and controls identified in Table A.1-3 are provided in the RSC.	12.a Inspection will be performed for retrievability of the alarms and displays identified in Table A.1-3 in the as-built RSC.	12.a Alarms and displays identified in Table A.1-3 can be retrieved in the as-built RSC.	CTS-01387
	12.b Tests of the as-built RSC control functions identified in Table A.1-3 will be performed.	12.b Controls on the RSC operate to open and close the as-built remotely operated valves and to start and stop the as-built pumps and fans identified in Table A.1-3 with an RSC control function..	
13. Each UHS basin has a volume to satisfy the thirty day cooling water supply criteria.	13. Inspections will be performed to verify the as-built UHS basins include sufficient volume of water.	13. The usable water volume of the each as-built UHS basin is greater than or equal to 3.12×10^6 gallons at the minimum maintained water level.	
14. The UHS transfer and ESW pumps have sufficient NPSH.	14. Tests to measure the as-built suction pressure will be performed. Inspections and analysis to determine NPSH available to each UHS transfer and ESW pump will be performed. The analyses will consider vendor test results of required NPSH and the effects of: • Suction from the UHS basin with water level at the minimum allowed value (after 30 days of accident mitigation) • UHSS design temperature range.	14. A report exists and concludes that the NPSH available to each UHS transfer and ESW pump is greater than the required NPSH.	
15. ESW pump operation does not cause vortex formation at minimum allowed UHSS water level.	15. Test of the as-built ESW pump will be performed.	15. ESW pump operation does not cause vortex formation at minimum allowed UHSS water level.	
16. Water hammer is prevented in the UHSS and the ESWS.	16. Inspection, test and analysis of the as-built UHSS and ESWS will be performed.	16. A report exists and concludes that the as-built UHSS and ESWS is fabricated and installed to prevent water hammer.	RCOL2_09.02.01-10

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.: 6348 (CP RAI #251)

SRP SECTION: 09.02.01 - Station Service Water System

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

DATE OF RAI ISSUE: 3/13/2012

QUESTION NO.: 09.02.01-11

DCD Section 9.2.1.2.3.1, "Power Operations," states that voiding upstream of the pump discharge check valve in any train may occur during loss of offsite power and subsequent pump trip, particularly at a low UHS water level. To maintain the pressure at this portion above the saturation pressure to preclude steam void formation which leads to water hammer, vacuum breakers shall be installed between the pump discharge and its check valve. Air entering the piping cushions any abrupt water flow filling the voids and water hammer will not take place at pump actuation. The entering air then discharges through the automatic vent valve installed in the strainer. The motor-operated pump discharge valve, being powered by a safety DC power source, is unaffected by the loss of offsite power and will close when the pump stops. [[Water in the cooling tower spray header will drain to the UHS.]] The check valve located in the pump discharge pipe will prevent water flowing back through the pump into the intake structure. In order to preclude water hammer on pump restart, the motor operated valve at the discharge of each pump is interlocked to close when the pump is not running or is tripped.

The [[ ]] bracket statement appears to be out of place since the paragraph is addressing voiding of the piping system at the ESWS pumps and draining of the cooling tower spray header may be in error in this section. The COL applicant is requested to clarify this issue related to the spray header drain in their COL FSAR.

ANSWER:

The bracketed statement in DCD Section 9.2.1.2.3.1 is related to the subsequent description regarding the prevention of water hammer. In addition, the above description in DCD Section 9.2.1.2.3.1 is incorporated by reference in the FSAR. The potential for water hammer is minimized by preventing water drainage at the cooling tower spray header by opening the pump discharge MOV gradually and by testing the high point vents to minimize voids as described in FSAR Subsection 9.2.5.2.2. In addition, a report is prepared based on inspection and analysis, which concludes that the as-built UHSS is fabricated and installed to prevent water hammer (see COLA Part 10, Appendix A.1, table A.1-1 item 16).

Impact on R-COLA

None

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None