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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
SUPPLEMENTAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION NO. 6348 (SECTION 9.2.1) AND 6358 (SECTION 9.2.5)

Dear Sir:

Luminant Generation Company LLC (Luminant) submits herein supplemental information for the responses to Request for Additional Information (RAI) No. 6348 (CP RAI #251) and 6358 (CP RAI #252) for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. The supplemental information addresses the essential service water system and the ultimate heat sink.

Should you have any questions regarding the supplemental information, 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 September 10, 2012.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachments: 1. Supplemental Response to Request for Additional Information No. 6348 (CP RAI #251)
2. Supplemental Response to Request for Additional Information No. 6358 (CP RAI #252)

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Attachment 1

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

SUPPLEMENTAL 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.

SUPPLEMENTAL INFORMATION:

Based on NRC feedback regarding the response to this question, the original response (ML12153A237 Attachment 2 pages 10-13) is replaced with the following.

The ESW pump outlet MOVs open slowly, taking approximately 30 seconds from the time of ESW pump startup to fully open, in order to sweep air from the cooling tower spray riser and distribution piping. Water hammer prevention is achieved by this design. Therefore, the level switches installed in the spray headers for an additional precaution and defense-in-depth have been deleted. Failure of the safety-related outlet MOV to open slowly is considered as a single failure.

The descriptions of the level switches have been deleted from the FSAR and the switches are not included in ITAAC and the FMEA.

Impact on R-COLA

See attached marked-up FSAR Revision 3 pages 9.2-4, 9.2-17, 9.2-25, 14.2-5, 14.2-6, and 14.2-7.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

backwash line to the basin ~~is interlocked to~~ closes when the ESW pump is stopped to preclude the system inventory drain down which can lead to water hammer at pump restart. Table 9.2.1-2R shows the redundancy for above functions. RCOL2_14.02-16 S01

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.

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.

9.2.1.2.3.1 Power Operation

STD COL 9.2(32) ~~Replace the thirteenth sentence of the seventh paragraph in DCD Subsection 9.2.1.2.3.1 with the following:~~ RCOL2_09.02.01-9 S01

~~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.~~

STD COL 9.2(7) Replace the sixth sentence of the eighth paragraph in DCD Subsection 9.2.1.2.3.1 with the following:

The IST program with detailed criteria, including valve leak rates committed to in the implementation milestones, is identified in Table 13.4-201.

Add the following paragraph after the last paragraph in DCD Subsection 9.2.1.2.3.1: RCOL2_14.03.07-38 S01 RCOL2_14.02-21 S01

For the ESWS, the following provisions for freeze protection are provided:

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 RCOL2_09.02.01-9 S01

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/hurricane 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 and hurricane 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. RCOL2_03.03.02-9 RCOL2_03.03.02-9

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

The cooling tower fan is equipped with non safety-related vibration sensors that alarm in the control room in the event of high vibration. RCOL2_09.02.05-22

~~Non-safety-related Llevel 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 allow the good operating practice of not manually starting the ESW pumps with low level in the header. 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_09.02.05-22 RCOL2_09.02.01-9 RCOL2_09.02.01-9 S01

9.2.6.2.4 Condensate Storage Tank

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 thirteenth paragraph in DCD Subsection 9.2.7.2.1 with the following.

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.

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 RCOL2_09.02.01-9 S01

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

5. To demonstrate the ability of the UHS, in conjunction with the ESWS, CCWS, and RHRS, to cool down the RCS. RCOL2_14.02-20

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.
8. CS/RHRS, CCWS, and ESWS are available during hot functional testing. RCOL2_14.02-20

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_09.02.01-9 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.
5. UHS performance data is monitored during RCS cooldown in conjuction with hot functional testing. RCOL2_14.02-20

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, 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_14.02-16 S01 RCOL2_14.02-21 RCOL2_09.02.01-9 S01

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

7. The UHS is capable of cooling down the RCS as discussed in Subsections 9.2.1 and 9.2.5. RCOL2_14.02-20

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.

SUPPLEMENTAL 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.

SUPPLEMENTAL INFORMATION:

Based on NRC feedback regarding the response to this question, supplemental information has been added about draining the cooling tower spray header. The original response (ML12153SA237 Attachment 2 pages 18, 19) remains correct and is supplemented with the following.

In general, when a large capacity pump such as the ESW pump stops, water in the piping near an outlet drains. When a CPNPP Unit 3 and 4 ESW pump stops, water in the UHS cooling tower spray header and the short segment of vertical piping between the header and the spray nozzles will drain to the basins through the nozzles. The bracketed statement in the DCD generally describes this phenomenon. Since the cooling tower spray header is site-specific scope, the description is bracketed in the DCD as CDI.

Impact on R-COLA

None.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

Attachment 2

Supplemental Response to Request for Additional Information No. 6358 (CP RAI #252)

SUPPLEMENTAL 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.: 6358 (CP RAI #252)

SRP SECTION: 09.02.05 - Ultimate Heat Sink

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

DATE OF RAI ISSUE: 3/30/2012

QUESTION NO.: 09.02.05-18

The staff reviewed this COL FSAR supplemental information related to COL Item 9.2(3) and 9.2(28) and finds that additional information is required to determined compliance with 10 CFR Part 50, GDC 44, "Cooling Water".

The applicant does not provide an evaluation or discussion in the COL FSAR for possible cooling tower plume interference and recirculation effects with other safety related air intakes and other cooling towers in the vicinity. Specifically, the applicant is requested to address in the FSAR:

- Ultimate Heat Sink (UHS) cooling tower interference (tower effluent being drawn into the air inlet of a downwind tower). This should include interference among all cooling towers at the site, including between units) related to the design performance of the UHS cooling towers.
- Cooling tower plume recirculation effects with other safety-related air intakes at the site.

SUPPLEMENTAL INFORMATION:

Based on NRC clarifying feedback regarding the response to this question, supplemental information has been added to provide additional details about how the design minimizes plume interference and recirculation. The original response (ML12163A012 Attachment pages 1-3) remains correct. The details of the supplemental information are provided below and a summary has been inserted into the FSAR in Subsection 9.2.5.2.1.

Units 3 and 4 each have four UHS cooling towers, one for each train. The cooling towers are located and designed with a shape, height, and spacing that achieves an air discharge velocity and plume height that ensures proper dissipation of the plume. A 2°F recirculation allowance was added to the wet bulb temperature used for cooling tower design to account for possible recirculation of the plume into the cooling tower air intake. These design features reduce the adverse effects of the cooling tower plume's interference and recirculation to itself, to the other UHS cooling towers, and to nearby safety-related supply air intakes. The cooling tower discharge elevation is approximately 887'-0", or 65 feet above the grade elevation of 822'-0", and approximately 45 feet above the UHS cooling tower air intakes. In addition, the temperature of the plume is higher than the ambient air temperature. This induces natural buoyancy causing the thermal plume to climb higher under low wind conditions. Higher wind conditions would cause rapid air dispersion and mixing, which would effectively cool the plume. Therefore, both the low and the high wind conditions aid in minimizing the interference and recirculation effects.

The following safety-related systems with supply air intakes have been evaluated for potential adverse impact from the UHS cooling tower plume for both units:

- Combustion air intakes for the safety-related Gas Turbine Generators (GTGs).
- Supply air intakes for the following safety-related HVAC systems:
  - UHS/ESW pump house ventilation
  - GTG rooms safety-related ventilation
  - Main control room HVAC
  - Class 1E electrical room HVAC
  - Trains A & D emergency feedwater pump room HVAC

The prevailing SSE wind generally assists in preventing the plume from reaching the air intakes (Subsection 2.3.2.1.2). This prevailing wind drives the cooling tower plume away from structures containing safety-related air intakes.

The combustion air intakes for the safety-related GTGs are not adversely impacted by the UHS cooling tower plume for the following reasons. All distances are approximate.

- The intakes are on the roof of the West and East Power Source Buildings. The edge of the closest cooling tower outlet to the combustion air intakes for Trains C & D GTGs is 440 ft horizontally and 35 ft higher. The edge of the closest cooling tower outlet to the combustion air intake for Trains A & B GTGs is 362 ft horizontally and 35 ft higher. This large separation allows dissipation of the plume minimizing the probability of entry into the combustion air intakes.
- Based on the prevailing SSE wind direction and separation distances, the number of times a plume could drift to the combustion air intake would be limited.

There are no adverse impacts by the UHS cooling tower plume on the following supply air intakes for safety-related HVAC systems for the following reasons. All distances are approximate.

a. UHS/ESW pump house ventilation
   - This is a once-through ventilation system with no cooling coil to be impacted by an additional latent heat load from the cooling tower plume.
   - During the winter the ventilation system is not operated. Only the electric unit heaters would be operating to maintain the room temperature. Therefore, the backdraft dampers would be closed and the cooling tower plume could not enter the ESW pump house.
   - The pump house is adjacent to the cooling tower and the nearest ventilation opening is on the south wall of the pump house. The opening is 47 ft below the top of the cooling tower outlet and 22 ft horizontally from the outlet. This exceeds the typical separation criteria between a ventilation exhaust and a ventilation air intake. The International Mechanical Code-2009, Section 401.4 identifies a minimum distance of 10 feet from any hazardous source for air intakes and Section 501.2.1 identifies that exhausts are to be 10 feet from air intakes.
   - Based on the prevailing SSE wind direction and separation distances, the number of times a plume could drift to the supply air intake would be limited.

b. GTG rooms safety-related ventilation

- The supply air intakes for the GTG rooms are on the roof of the West and East Power Source Buildings. The edge of the closest cooling tower outlet to the supply air intake for Trains C & D GTG room is 440 ft horizontally and 35 ft higher than the intakes. This large separation allows the dissipation of the plume minimizing the probability of entry into the supply air intakes.
- The edge of the closest cooling tower outlet to the supply air intakes for Trains A & B GTG room is 362 ft horizontally and 35 ft higher than the intakes. This large separation allows the dissipation of the plume minimizing the probability of entry into the supply air intakes.
- Based on the prevailing SSE wind direction and separation distances, the number of times a plume could drift to the supply air intake would be limited.

c. Main control room HVAC

- The supply air intakes are on the east and west sides at the south end of the reactor building. There is a horizontal distance of 407 ft and a 19-ft vertical separation from the edge of the closest cooling tower outlet to the supply air intakes. This large separation readily allows dissipation of the plume and minimizes the probability of entry into the supply air intakes.
- Based on the prevailing SSE wind direction and separation distances, the number of times a plume could drift to the supply air intake would be limited.
- The amount of supply air taken in for the HVAC system is not 100% outside air during normal operation of the system. Outside air intake for ventilation purposes is only 1,800 cfm, which is only 9% of the total airflow capacity of the system. During the emergency pressurization mode of operation only 600 cfm of outside air is used, which is only 3% of the total airflow capacity of the system.
- The system is also designed with a 15% margin, which compensates for any added latent heat contributed from the cooling tower plume that enters the supply air intakes.

d. Class 1E electrical room HVAC

- The supply air intakes for Trains A, B, C & D Class 1E Electrical Room HVAC System are on the east and west sides at the south end of the reactor building. There is a horizontal distance of 407 ft and a 19-ft vertical separation from the edge of the closest cooling tower outlet to the supply air intakes. This large separation readily allows dissipation of the plume and minimizes the probability of entry into the supply air intakes.
- Based on the prevailing SSE wind direction and separation distances, the number of times a plume could drift to the supply air intake would be limited.
- The amount of supply air taken in for the HVAC system is not 100% outside air during normal operation of the system. Outside air intake for ventilation purposes is 15% or less of the airflow capacity of the system.
- The system is also designed with a 15% margin, which compensates for any added latent heat contributed from the cooling tower plume that enters the supply air intakes.

e. Emergency feedwater pump room HVAC

- The supply air intakes are on the east and west sides at the south end of the reactor building. There is a horizontal distance of 407 ft and a 19-ft vertical separation from the edge of the closest cooling tower outlet to the supply air intakes. This large separation readily allows dissipation of the plume and minimizes the probability of entry into the supply air intakes.

- Based on the prevailing SSE wind direction and separation distances, the number of times a plume could drift to the supply air intake would be limited.
- The amount of supply air taken in for the HVAC system is not 100% outside air during normal operation of the system. Outside air intake for ventilation purposes is 15% or less of the airflow capacity of the system.
- The system is also designed with a 15% margin, which compensates for any added latent heat contributed from the cooling tower plume that enters the supply air intakes.

Impact on R-COLA

See attached marked-up FSAR Revision 3 pages 9.2-13 and 9.2-14.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

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_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 196.00×10^6 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 used to calculate the required capacity of the cooling tower and the ESW pump design flow rate is conservatively specified as 13,000 gpm. RCOL2_09.02.05-20

Cooling tower plume interference and recirculation effects could adversely affect HVAC systems and other cooling tower operation due to potential increased humidity and air temperature. The UHS cooling towers are designed and located to accept the expected effects without significant compromise of the functions of the other UHS cooling towers of the same unit and of the UHS cooling towers of the other unit, the Gas Turbine Generator (GTG) safety-related air intakes for both units, and air intakes for safety-related HVAC systems for both units. The cooling tower shape combined with the cooling tower height is designed to achieve an air discharge velocity and height that ensures proper dissipation of the plume which minimizes plume interference and recirculation on the other UHS cooling towers and nearby safety-related air intakes.

Units 3 and 4 each have four UHS cooling towers located and designed with a shape, height, and spacing that achieves an air discharge velocity and plume height adequate to ensure proper dissipation of the plume. A 2°F recirculation allowance has been added to the wet bulb temperature used for the cooling tower design to account for possible recirculation of the plume into the cooling tower air intake. Additionally, the temperature of the plume exhausted from the cooling towers is higher than the ambient air temperature. This induces natural buoyancy causing the thermal plume to rise under low wind conditions. Higher wind conditions would cause rapid air dispersion and mixing, which would effectively cool the plume. Therefore, both low and high wind conditions aid in minimizing the interference and recirculation effects. The design features, natural plume buoyancy, and wind effects combine to minimize potential adverse effects of cooling tower plume interference and recirculation to the UHS cooling towers. RCOL2_09.02.05-18 S01

The following Unit 3 and 4 safety-related systems have external air intakes that could potentially be impacted by UHS cooling tower plumes: gas turbine generator (GTG) combustion air, UHS/ESW pump house ventilation, GTG room ventilation, main control room HVAC, Class 1E electrical room HVAC, and emergency feedwater pump room HVAC. All these intakes except the UHS/ESW pump house are separated from the UHS cooling tower discharge by approximately 360 - 450 ft horizontally and 36 ft vertically. This large spacial separation will allow the plume to dissipate, precluding its entry into the external air intakes. Also, the prevailing wind direction at CPNPP is from the SSE, which will assist in preventing the plume from reaching the air intakes. RCOL2_09.02.05-18 S01

The UHS/ESW pump houses are adjacent to their associated cooling towers, but their ventilation air intakes are 47 feet below the top of the cooling tower outlet. The vertical separation and prevailing wind will minimize the potential for a UHS cooling tower plume to adversely affect the pump house ventilation intakes.

Units 3 and 4 each have two circulating water system (CWS) mechanical draft cooling towers in addition to the UHS cooling towers. The plume from the closest CWS cooling tower to the UHS cooling tower intake and the UHS/ESW pump house ventilation intake is approximately 600 feet. The Unit 3 and 4 safety-related air intakes identified above are even further away from the closest CWS cooling tower. Therefore, the CWS cooling tower plumes will not adversely affect Unit 3 and 4 safety-related systems with external air intakes.

As noted in DCD Subsection 5.4.7.1, "Design Bases," and DCD Subsection 5.4.7.3, "Performance Evaluation," with ESW water temperature of 95° F, the RHRS is capable of reducing the reactor coolant temperature from 350° F to 200° F within 36 hours after shutdown. As the Technical Specifications surveillance ensures that the UHS basin water temperature to be 93° F or less, the evaluation provided in DCD Section 5.4.7 is bounding.

Inside dimensions of each basin are approximately 123 feet x 123 feet footprint and 31 feet deep at normal water level. The basin water volume is calculated based on a usable area of 120 feet x 120 feet. The cooling towers utilize the basins for structural foundation. RCOL2_09.02.05-22

The ESW intake basin located underneath the ESW pump house occupies the southwest corner of the UHS basin. The ESW intake basin is 12 feet deeper than the UHS basin. Water volume occupying this 12 feet depth in the ESW intake basin is not included in the UHS basin inventory. This is to assure adequate NPSH to the ESW pump. The UHS basin floor elevation (791 feet) is the reference point for measuring the basin water level.

The UHS operates in conjunction with the ESWS. The ESWS is described in Subsection 9.2.1. P&IDs of the UHS are provided in Figure 9.2.5-1R. The UHS design and process parameters are provided in Table 9.2.5-3R. The normal makeup water to the UHS inventory is from Lake Granbury via the circulating water system described in Subsection 10.4.5. A control valve with instrumentation

SUPPLEMENTAL 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.: 6358 (CP RAI #252)

SRP SECTION: 09.02.05 - Ultimate Heat Sink

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

DATE OF RAI ISSUE: 3/30/2012

QUESTION NO.: 09.02.05-22

The staff reviewed this COL FSAR supplemental information related to COL Item 9.2 (19, 20, and 22) finds that additional information is required to determined compliance with 10 CFR Part 50, GDC 44, "Cooling Water". Specifically, the applicant is requested to address in the FSAR:

- The applicant states two different dimensions for the UHS Basin (approximately 123 ft x 123 ft) in FSAR Section 9.2.5.2.1 and 120 ft X 120 ft in FSAR Section 9.2.5.3. This needs to be clarified.
- FSAR Section 9.2.5 is unclear about what UHS instrumentation is safety related and what has safety grade electrical power. Instrumentation of concern includes: basin water level, basin water temperature, conductivity, flow/pressure, cooling tower fan vibration, and spray header level switches. Note: Part 10 (ITAAC - Table A.1-2) of the COL only has the UHS basin level and water temp as safety class 1E and seismic category I.
- Figure 9.2.5-1R describes that each UHS basin has two level instruments with high and low alarms. Since the UHS transfer pumps have different power supplies than the ESWS pump in the same pump house, describe the respective power supplies for the redundant UHS basin water level instruments. Since the ESWS A pump is supplied by bus A and the UHS transfer pump A is powered from bus C or D, describe in the FSAR the basis for concluding that, in the event of loss of a single power supply (say A), basin level indication is still available for level determination to operated the UHS transfer pump powered from bus C or D.
- Table 9.2.5-4R, "UHS Failure Modes and Effects Analysis," does not adequately describe the 'safety function' related to the effects on system safety function capability related to the loss of the UHS transfer pumps and discharge/inlet valves.
- Table 9.2.5-4R, "UHS Failure Modes and Effects Analysis," has a valve numbering error, AOV-560 in three places (should be AOV-577).

SUPPLEMENTAL INFORMATION:

Based on NRC clarifying feedback regarding the response to this question, supplemental information is provided regarding the UHS cooling tower fans and the vibration instrumentation for these fans. The original response (ML12163A012 Attachment pages 16-21) remains correct.

Technical Specifications Surveillance Requirement 3.7.9.3 requires each cooling tower fan to be operated periodically in accordance with the Surveillance Frequency Program. This ensures that all fans are operable and that all associated controls are functioning properly. It also ensures that fan or motor failure or excessive vibration can be detected for corrective action. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk. This is briefly described in FSAR Subsection 9.2.5.4.

UHS fan vibration is monitored by permanently installed vibration monitoring instrumentation such that early detection of increased vibration allows preventive maintenance to be completed prior to failure. Vibration levels tend to increase slowly over a period of time, which can typically be addressed by planned maintenance. The instrumentation is not safety-related, and is provided only for diagnostics and reliability monitoring. The instrumentation will be procured to operate in the expected ambient environment

Non-safety related vibration instrumentation would not be expected to function during an accident. Therefore, the fan is assumed to fail in the event of high vibration during an accident as addressed in Table 9.2.5-4R. Additionally, a thrown fan blade adversely impacting another UHS cooling tower train fan is prevented by the concrete walls and ceiling superstructure installed between each train of UHS cooling tower fans.

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

None.

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

None; this response is site-specific.

<u>Impact on DCD</u>

None.

SUPPLEMENTAL 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.: 6358 (CP RAI #252)

SRP SECTION: 09.02.05 - Ultimate Heat Sink

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

DATE OF RAI ISSUE: 3/30/2012

QUESTION NO.: 09.02.05-25

COL FSAR Section 3.6.1.3, "Postulated Failure Associates with Site-Specific Piping," states that there is no site-specific high-energy piping within the protective walls of the ESWPT and UHSRSs and therefore, high-energy pipe breaks are not postulated for site-specific piping within these protective walls. The site-specific moderate-energy piping systems are the ESWS and the fire protection water supply system (FSS).

NUREG-0800, NRC Branch Technical Position 3-3, "Protection Against Postulated Piping Failures in Fluid Systems Outside Containment," Revision 3 states that:

A. General Design Criterion (GDC) 2, "Design Bases for Protections Against Natural Phenomena," requires that SSCs important to safety be designed to withstand the effects of natural phenomena such as earthquakes. The BTP 3-4 does not consider full-circumferential breaks in moderate-energy piping, only through-the-wall cracks.

It is the intent of this design approach that postulated piping failures in fluid systems should not cause a loss of function of essential safety-related systems and that nuclear plants should be able to withstand postulated failures of any fluid system piping outside containment, taking into account the direct results of such failure and the further failure of any single active component, with acceptable offsite consequences.

In NUREG-0800, NRC Branch Technical Position 3-3, Appendix A to J.F. O'Leary Letter of July 12, 1972, C.2.a. the following leakage cracks are postulated at the locations specified by the criteria listed under B.

Moderate-Energy Fluid Systems: a. through-wall leakage cracks in piping and branch runs exceeding a nominal pipe size of 1 inch, where the crack opening is assumed as ½ the pipe diameter in length and 1/2 the pipe wall thickness in width.

COL FSAR Section 3.6, does not specially address the UHS transfer system or classify the UHS transfer system (high-energy or moderate-energy). Since the UHS transfer header system connects all four UHS trains, the staff is unable to determine if the UHS transfer system is designed for through-wall cracks.

Specifically,

1. Describe in the FSAR the 'energy' of the UHS transfer system; reference US-APWR DCD Section 3.6.1.1, "Design Basis", and Table 3.6-1, "High and Moderate Energy Fluid Systems".
2. Describe in the FSAR how the UHS transfer system is designed against postulated piping leak paths in the UHS transfer portions. Also describe the bounding conditions related to piping leak size and locations.
3. Describe in the FSAR the consequences of such a piping leak path in the common UHS, looking at the UHS water transfer between UHS basins, post DBA.
4. Describe in FSAR Table 9.2.5-4R, "UHS Failure Modes and Effects Analysis," this failure mode and the effects on the UHS system safety function.

SUPPLEMENTAL INFORMATION:

Based on NRC clarifying feedback regarding the response to this question, supplemental information has been added to provide additional details regarding the classification of the UHS transfer system as a moderate energy fluid system. The original response (ML12163A012 Attachment pages 26-30) remains correct. The site-specific ESWS and the UHS transfer system are each classified as a moderate-energy system. This information has been added to FSAR Subsection 3.6.1.3 and Table 3.6-201.

Impact on R-COLA

See attached marked-up FSAR Revision 3 pages 3.6-1, 3.6-2, and new Table 3.6-201.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

3.6 PROTECTION AGAINST DYNAMIC EFFECTS ASSOCIATED WITH POSTULATED RUPTURE OF PIPING

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

3.6.1.3 Postulated Failures Associated with Site-Specific Piping

STD COL 3.6(1) Replace the paragraph in DCD Subsection 3.6.1.3 with the following.

The site-specific systems or components that are safety-related or required for safe shutdown are limited to the essential service water system (ESWS) and the ultimate heat sink (UHS) system. There is no site-specific high-energy piping within the protective walls of the ESWPT and UHSRSs and therefore, high-energy pipe breaks are not postulated for site-specific piping within these protective walls. The site-specific moderate-energy piping systems are the ESWS, the UHS system and the fire protection water supply system (FSS). RCOL2_09.02.05-25 S01

A qualitative evaluation of site-specific moderate-energy piping systems to assess environmental and flooding impacts is provided below.

The ESWS and the UHS consist of four independent trains with each train providing fifty percent (50%) of the cooling capacity required for a design basis accident and subsequent placement of the plant in the safe shutdown condition. Each train of the ESWS in the ESWPT is physically separated from the other trains by concrete walls and floors, and piping penetrations to other buildings are sealed. The failure in the piping of one ESWS train will not affect the other trains of the ESWS from an environmental and flooding perspective. Therefore, the consequences of failures in site-specific ESWS piping does not affect the ability to safely shut down the plant.

The failure in the FSS piping will not affect the safety function of the ESWS and the UHS from an environmental perspective because the FSS water temperature is approximately room temperature. From a flooding perspective, the ESWS is safe from a FSS pipe failure because FSS piping does not exist in the ESWPT, and the ESWPT piping penetrations prevent intrusion from any postulated FSS spillage in other buildings. Therefore, the consequences of the failure in site-specific FSS piping does not affect the ability to safely shut down the plant. The as-design pipe hazards analysis report to include the impact of all site specific high and moderate piping system is to be updated.

Table 3.6-201 identifies site-specific systems which contain high- and moderate-energy lines. RCOL2_09.02.05-25 S01

3.6.2.1 Criteria used to Define Break and Crack Location and Configuration

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STD COL 3.6(4) Replace the second paragraph in DCD Subsection 3.6.2.1 with the following.

As noted in Subsection 3.6.1.3, there is no site-specific high-energy piping within the protective walls of the ESWPT and UHSRSs. The site-specific moderate energy piping systems are the ESWS and the FSS. A crack in the moderate-energy piping ESWS and FSS does not affect the safety function of the ESWS and the UHS that are required for a design basis accident and for safe shutdown, as described in Subsection 3.6.1.3.

3.6.3.3.1 Water Hammer

STD COL 3.6(10) Replace the fourth paragraph DCD Subsection 3.6.3.3.1 with the following.

Generally, water hammer is not experienced in Reactor Coolant Loop (RCL) branch piping, and the piping is designed to preclude the voiding condition according to operation at a pressure greater than the saturation pressure of the coolant. No valve that requires immediate action, such as pressurizer safety valve or relief valve, is present in the piping. Operating and maintenance procedures regarding water hammer are included in system operating procedures in Subsection 13.5.2.1. A milestones schedule for implementation of the procedures is also included in Subsection 13.5.2.1. The procedures are to address plant operating and maintenance requirements to provide adequate measures to prevent water hammer due to a voided line condition.

3.6.4 Combined License Information

Replace the content of DCD Subsection 3.6.4 with the following.

STD COL 3.6(1) ***3.6(1)*** *Postulated failures associated with site-specific piping*

This COL item is addressed in Subsection 3.6.1.3 and Table 3.6-201. RCOL2_09.02.05-25 S01

3.6(2) *Deleted from the DCD.*

3.6(3) *Deleted from the DCD.*

STD COL 3.6(4) ***3.6(4)*** *Criteria used to define break and crack location and configuration for site-specific piping.*

STD COL 3.6(1)

RCOL2_09.02.05-25 S01

Table 3.6-201 High and Moderate Energy Fluid Systems

System	High-Energy(1)	Moderate-Energy(1)
Site-Specific Essential Service Water System (ESWS)	-	X
Ultimate Heat Sink System (UHS)	-	X
Site-Specific Fire Protection Water Supply System (FSS)	-	X

Note

1. High-energy piping includes those systems or portions of systems in which the maximum normal operating temperature exceeds 200°F or the maximum normal operating pressure exceeds 275 psig.

   Piping systems or portions of systems pressurized above atmospheric pressure during normal plant conditions and not identified as high-energy are considered as moderate-energy.

   Piping systems that exceed 200°F or 275 psig for two percent or less of the time during which the system is in operation are considered moderate-energy