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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. 3790 (SECTION 14.2)

Dear Sir:

As a result of a February 27, 2012 e-mail request from the NRC staff, Luminant Generation Company LLC (Luminant) submits herein supplemental information for the response to Request for Additional Information (RAI) No. 3790 (CP RAI #98) for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. The supplemental information clarifies the interlock features described FSAR Subsection 9.2.5 and is closely related to the response to RAI No. 6358 (CP RAI #252) submitted in letter TXNB-12018 also on June 7, 2012.

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 June 7, 2012.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachment: Supplemental Response to Request for Additional Information No. 3790 (CP RAI #98)

D090
NRO

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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.: 3790 (CP RAI #98)

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

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

DATE OF RAI ISSUE: 9/30/2009

QUESTION NO.: 14.02-16

Since the ultimate heat sink (UHS) for the US-APWR is a site-specific system, COL applicants need to establish the applicable initial test program requirements. This is specified by COL Information Item 14.2(10), which requires COL applicants to establish test abstracts for site-specific systems. The applicant addressed this COL information item for Comanche Peak (in part) by providing FSAR Test Abstract 14.2.12.113, "Ultimate Heat Sink (UHS) System Preoperational Test." Based on a review of this test abstract, the staff found that the following items need to be addressed and the test abstract needs to be revised as appropriate to reflect this information:

- Objective 3 is to demonstrate the operation of the UHS transfer pumps and interlocks. However, FSAR Section 9.2.5 does not describe any interlocks for the UHS transfer pumps. Also, like the ESWS pumps, the UHS transfer pumps need to be tested at the minimum (30 day) water level to demonstrate that design flow rate can be maintained.

- Objective 4 is to demonstrate (in part) operation of controls and interlocks. It is not clear what controls and interlocks are being referred to and they need to be better described.

- Item C.1 refers to UHS transfer pump interlocks, but none are described in FSAR Section 9.2.5. Likewise for Item D.1.

- Item C.2 specifies performance testing of the ESWS pumps and similar testing of the UHS transfer pumps is needed, including demonstration of adequate performance with decreasing level. Likewise for the acceptance criteria specified in D.1.

SUPPLEMENTAL INFORMATION:

As stated in the RAI response, there are no interlocks associated with the UHS transfer pumps and the part describing interlocks in Objective 3 was deleted. The UHS transfer pumps are manually operated and administratively controlled. However, other interlocks exist within the UHS and ESWS, as described

in FSAR Subsection 9.2.5.2.2, and are tested during the preoperational tests described within FSAR Test Abstract 14.2.12.113. As a result, demonstration of the operability of the system interlocks has been added to the test objectives within 14.2.12.1.113 A.4 (now A.3). The original test objective A.3 has been deleted because it is encompassed by test objective A.1. An editorial correction has also been made to Test Method C.1 and C.2.

The ESW pump start logic and the ESW pump discharge MOV (ESW-MOV-503A, B, C, D) operating logic and interlocks are described in FSAR Subsection 9.2.5.2.2 and DCD Section 9.2.1.2.3.1. This interlock prevents water hammer from occurring and the pump from starting if the associated discharge valve is not closed. FSAR Subsections 14.2.12.1.113 A.1, A.3, and D.3 have been revised to state the test objective to demonstrate operation, including interlock of the ESW pump and control logic of the ESW pump discharge valves.

The UHS basin blowdown control valves (EWS-HCV-010, 011, 012, 013) are actuated by the ESW pump stop signal, low basin water level signal, undervoltage signal, or ECCS actuation signal to maintain basin water level as described in FSAR Subsection 9.2.5.2.2. The ESWS blowdown main header isolation valve to the CWS blowdown main header (ESW-AOV-577) automatically closes upon receipt of an undervoltage signal, ECCS actuation signal, ESW pump stop signal, or low UHS basin water level signal as described in FSAR Subsections 9.2.1.2.1 and 9.2.1.2.2.2. These valves are considered part of the associated blowdown equipment.

The ESW pump discharge strainer backwash isolation valves (EWS-MOV-573A, B, C, D and EWS-MOV-574A, B, C, D) are actuated by ESW pump stop, ECCS actuation signal, or undervoltage signal. Actuation of these valves is considered part of the ESW pump discharge strainer backwash and isolation valve operation. The ESW pump discharge strainer to ESWS blowdown main header valves (EWS-AOV-576A, B, C, D) are actuated by UHS basin low water level, ESW pump start and stop, ECCS actuation signal, or undervoltage signal. Actuation of these valves is considered part of the blowdown operation of the ESWS. The functions of these valves are described in DCD Tier 2 and FSAR Subsection 9.2.1.2.2.2.

The term "interlocks" used in each of these FSAR subsections is not consistent with the typical definition. The position of the valves associated with the blowdown lines does not prevent the operation of the ESW pumps. These subsections describe the control functions to operate the components identified above and have been revised to remove the inconsistent use of "interlocks."

DCD Tier 2 Table 7.4-1 and FSAR Table 7.4-201 describe the control functions of the UHSS and ESWS components for normal and safe shutdown.

Test objective A.1 has been revised to include operation of associated ESW pump valves and UHS transfer pump valves. Test objective A.3 has been clarified to test each of the logic and control function and interlocks discussed in DCD and FSAR Subsection 9.2.1 and 9.2.5.

Impact on R-COLA

See attached marked-up FSAR Revision 2 pages 9.2-2, 9.2-4, 9.2-7, 9.2-17, 14.2-5, and 14.2-6.

Impact on S-COLA

This response is considered site specific.

Impact on DCD

None.

expected water level (after 30 days of accident mitigation). The basins have sufficient water inventory to assure adequate cooling and NPSH for 30 days without makeup. This is discussed further in Subsection 9.2.5.2.

STD COL 9.2(8)
STD COL 9.2(25)

Replace the ninth and tenth paragraphs in DCD Subsection 9.2.1.2.1 with the following.

DCD_09.02.01-49

Chemicals are added to the basin to control corrosion, scaling, and biological growth. The water chemistry is managed through a Chemistry Control Program such as following a standard Langelier Saturation Index. The chemical injection system is described in Subsection 10.4.5.2.2.8.

Blowdown is used to maintain acceptable water chemistry composition. This is accomplished by tapping each essential service water pump (ESWP) discharge header. Additional description about blowdown is discussed in Subsection 9.2.5.2.

The isolation valve in the backwash line to the CWS blowdown main header (EWS-AOV-577) ~~is interlocked to~~ closes upon receipt of an undervoltage signal, ECCS actuation signal, ESW pump stop signal, or low UHS basin level signal. This action isolates the UHS basin blowdown line to the CWS blowdown main header to preclude system inventory drain down, which could result in water hammer at pump restart.

DCD_09.02.01-49
RCOL2_14.02-16 S01

STD COL 9.2(~~7~~31)

Replace the eleventh paragraph in DCD Subsection 9.2.1.2.1 with the following.

~~The non-safety related portion of the ESWS begins at the discharge side of the strainer and CCW heat exchangers vent and drain 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.~~Layout of the ESW and UHS piping and equipment, and system operating procedures, ensure that the water pressure remains above saturation conditions for all operating modes.

DCD_09.02.01-36

STD COL 9.2(26)

Replace the twelfth paragraph in DCD 9.2.1.2.1 with the following:

Maintenance and test procedures (see Operating and Maintenance Procedures in Subsection 13.5.2.1) are followed to monitor and flush debris accumulated in the system.

9.2.1.2.2 Component Description

STD COL 9.2(6)

Replace the sentence in DCD Subsection 9.2.1.2.2 with the following.

Table 9.2.1-1R shows the design parameters of the major components in the system.

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~~ closes ~~at~~upon receipt of 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 RCOL2_14.02-16 S01 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~~ opens ~~at~~upon receipt of ~~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~~ closes ~~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 above functions. RCOL2_14.02-16 S01 CTS-01373 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. 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.

The blowdown header to the CWS blowdown header, to which the strainer blowdown line for normal power operation use and the UHS basin blowdown line for maintaining acceptable water chemistry are connected, has an isolation valve powered from a Class 1E DC bus. The blowdown header isolation valve ~~is interlocked to~~ closes ~~at~~upon receipt of LOOP signal ~~and~~or ECCS actuation signal to isolate non-safety-related portions. The blowdown header isolation valve is a redundant valve to the UHS basin blowdown isolation valves and the strainer backwash line isolation valves towards the CWS blowdown main header to maintain the UHS basin inventory required for cooling the unit for a minimum of 30 days without makeup water. The backup line from FSS has administratively locked closed valves in each of the fire protection water supply taps, which assures water inventory loss control. RCOL2_14.0 2-16 S01

The counter measure to prevent long-term corrosion and organic fouling per GL 89-13 are reflected in the system operating procedures in FSAR Section 13.5.2.1.

The ESWS serves as a backup source of water for the FSS in the R/B and in the ESWP house. This is in conformance with the requirement for an alternative fire protection water supply from a seismic category I water system in the event of a safe-shutdown earthquake, in accordance with RG 1.189. Two hose stations at approximately 150 gpm total take water from the ESWS for a maximum of two hours. Approximately 18,000 gallons is consumed by the FSS. The ESWS is not required to supply water to FSS during any other design basis event including LOCA. This water volume has minimal impact on the UHS water inventory and does not jeopardize the 30 day capacity requirement. Administratively locked closed valves in each of the fire protection water supply taps assure that water inventory loss is controlled.

STD COL 9.2(26) Replace the last paragraph in DCD Subsection 9.2.1.3 with the following:

The size of the strainer backwash line is considered to provide adequate velocity to preclude debris buildup without challenging the integrity of the lining. The hole diameter of the orifices installed in the backwash lines are also considered to have adequate diameter to preclude debris buildup. If necessary, the hole diameter should be sufficient; however, the differential pressure will be lower, so the number of orifices will be increased.

9.2.1.4 Inspection and Testing Requirements

CP COL 9.2(30) Replace the last paragraph in DCD Subsection 9.2.1.4 with the following:

Periodic inspection, monitoring, maintenance, performance and functional testing are performed according to the in-service inspection program and in-service testing program that are described in FSAR Section 13.4. Periodic inspections

testing, the UHS transfer system remains full of water except for the discharge piping to the other basin. RCOL2_09.02.05-20

The UHS transfer pumps and the ESWPs located in each basin are powered by the different Class 1E buses, e.g., for basin A, the ESWP is powered from bus A, and the UHS transfer pump is powered from bus C or D, depending on manual breaker alignment. The power operated valve at each transfer pump discharge and instrumentation associated with each individual transfer pump are powered from the same buses as the transfer pump. The power operated valves at the transfer lines discharging into the UHS basins are powered from different buses than the transfer pumps in their respective basins.

The cooling tower fans are automatically activated by the emergency core cooling system (ECCS) actuation signal, the LOOP sequence actuation signal, or the remote manual actuation signal in case of automatic actuation failure.

The ECCS actuation signal ensures continuous cooling to the reactor during accidents to allow the reactor to be brought to safe shutdown condtions. The LOOP sequence actuation signal automatically starts the Class 1E gas turbine generators (GTGs) to resume power to the active components in each UHS train during LOOP events.

The basins are concrete seismic category I structures and are located mostly below grade. Hence, a complete failure resulting in loss of water inventory is considered highly improbable.

Operation details of the ESWS, including chemical treatment, pump NPSH, and freeze protection operation, are provided in Subsection 9.2.1.

A portion of the basin water is discharged through the blowdown via the ESWS when the makeup water is available. The blowdown rate is determined using a conductivity cell located at ESW pump discharge and is based on the total dissolved solids in the water and the makeup water source. During design-basis accident (DBA) conditions or loss of makeup water, the Class 1E DC powered UHS basin blowdown control valves ~~are interlocked to~~ close ~~at~~upon receipt of a low UHS basin water level, LOOP signal ~~and~~or ECCS actuation signal. This is to maintain the UHS basin inventory required for cooling the unit for a minimum of 30 days without makeup water. The UHS blowdown control valves ~~are also interlocked to~~ close ~~during the ESW pump stoppage~~at ESW pump stop signal to preclude the system inventory drain down which could lead~~s~~ to water hammer at pump restart. Table 9.2.5-4R shows the redundancy for the above functions. RCOL2_14.02-16 S01 RCOL2_14.02-16 S01

A water line from the transfer pump discharge to the ESWP discharge is installed in each UHS train for recovering ESWS/UHS inventory after drainage for maintenance. The line provides water at a low flow rate to preclude water hammer that could be caused by the full flow operation of the ESWP for water inventory restoration. Normally-closed double isolation valves with administrative control provide isolation between the ESWS and UHS.

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

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.~~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; and operation of associated makeup and blowdown equipment. RCOL2_14.02-16 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.~~

B. Prerequisites

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

5. Required system flushing/cleaning is completed.

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

7. Makeup water to the UHS basins is available.

C. Test Method

1. System component control and interlock circuits and alarms are verified, including cooling tower fan logic, basin water level sensors, makeup water control, basin process chemical sensors, and blowdown control valves.

2. The performance of each ESW pump and UHS transfer pump ~~are~~is 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.

RCOL2_14.0 2-16 S01

D. Acceptance Criteria

1. With the basin at minimum level (end of the 30 day emergency period), each ESW pump and UHS transfer pump maintain design flow rates.

2. UHS transfer pumps operate as discussed in Subsection 9.2.5.

3. ~~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; and associated makeup and blowdown equipment operate as discussed in Subsection 9.2.1 and 9.2.5.

RCOL2_14.0 2-16 S01

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