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CP-200901287
Log # TXNB-09040

Ref. # 10 CFR 52

September 8, 2009

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
RESPONSES TO REQUESTS FOR ADDITIONAL INFORMATION NO. 2577 AND 2581

Dear Sir:

Luminant Generation Company LLC (Luminant) hereby submits the attached responses to Requests for Additional Information No. 2577 (CP RAI #24) and No. 2581 (CP RAI #23) for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. Should you have any questions regarding the 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 September 8, 2009.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachments: 1. Response to Request for Additional Information No. 2577 (CP RAI #24)
2. Response to Request for Additional Information No. 2581 (CP RAI #23)

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Attachment 1

Response to Request for Additional Information No. 2577 (CP RAI #24)

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.: 2577 (CP RAI #24)

SRP SECTION: 08.02 – OFFSITE POWER SYSTEM

QUESTIONS for Electrical Engineering Branch (EEB)

DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-1

NUREG-0800, Standard Review Plan, Chapter 8.2, "Offsite Power System,"(Rev. 4) (March 2007) (NUREG-0800) and Regulatory Guide 1.206, Combined License Applications for Nuclear Power Plants (LWR Edition), "Offsite Power" (June 2007) (RG 1.206), C.I.8-2, establish criteria that the NRC staff intends to use to evaluate whether an applicant meets the NRC's regulations.

FSAR Section 8.2.1.1, Transmission System, discusses the rights-of-way for the transmission lines and states that the width of the rights-of-way is adequate for the transmission lines. NUREG-0800 requires the NRC staff to review the location of rights-of-way and transmission lines and towers, and RG 1.206 requires the staff to determine whether the FSAR contains sufficient information on the location of rights-of-way, Explain in further detail what is meant by "adequate width" of the rights-of-way, and the basis for your conclusion that the width is adequate.

ANSWER:

Adequate width for the right-of-way is provided as follows:

(a) Clearances established by the National Electrical Safety Code in the horizontal and vertical direction are met for the selected transmission line voltage and configuration;

(b) Construction of the transmission line can be performed safely in the established right-of-way, especially when other existing lines are present;

(c) Operation and maintenance activities required during the life of the line are able to be performed while safeguarding personnel;

(d) Separation between the normal PPS and the alternate PPS of a unit are maintained such that the failure of a transmission structure on one PPS does not cause the other PPS to fail.

345kV transmission lines in Texas are subject to the approval of the Public Utility Commission of Texas (PUCT) which oversees the siting of all transmission facilities throughout the state. Many parameters of transmission line design, including routing, location and width of the rights-of-way, are reviewed in detail by the PUCT. Approval is given only when acceptable transmission line design parameters are provided. As such, adequate widths for transmission line rights-of-way are established during the siting phase and maintained during the construction phase.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)

SRP SECTION: 08.02 – OFFSITE POWER SYSTEM

QUESTIONS for Electrical Engineering Branch (EEB)

DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-2

NUREG-0800 establishes criteria that the NRC staff intends to use to evaluate whether an applicant meets the NRC's regulations.

In FSAR Section 8.2.1.2.3, Communication with the Electric Reliability Council of Texas (ERCOT) and/or the Oncor Electric Delivery Company, LLC, (Oncor), the applicant discusses the communication agreement among ERCOT, Oncor and Comanche Peak Nuclear Power Plant, Units 3 and 4 (CPNPP), and indicates that such agreement specifies the responsibilities and communication methods among the three entities "which have the responsibilities for the operation, maintenance, and engineering of transmission systems." Provide details of the agreement and the split of responsibilities among the three entities regarding operation, maintenance and engineering pertaining to the transmission system, including the control of the 345 kV circuit breakers located at the unit switchyards.

ANSWER:

The Interconnection Agreement and a separate document, developed in compliance with NERC Standard NUC-001-1 Nuclear Plant Interface Coordination, provide for the following:

1) commercial terms and conditions and responsibilities between Oncor and Luminant (Transmission Service Provider and Generator),
2) the system protection requirements required by ERCOT,
3) communications and training,
4) ownership and identification of equipment and facilities,
5) metering and telemetry equipment and requirements,
6) requirements for communication facilities and methods,
7) operations and maintenance coordination, and
8) planning and operational analyses.

In general, the Interconnection Agreement states that the owner of the equipment will engineer, operate and maintain its own equipment. The Interconnection Agreement establishes that ownership of the transmission system ends at the takeoff towers in the unit switchyards. There are a total of four take-off towers in the unit switchyards. Figures 8.2-207 and 8.2-208 show the take-off towers associated with the 345kV transmission tie lines. For the normal preferred power supply (PPS), H-Frame take-off towers are utilized for both units. For the alternate PPS, A-Frame take-off towers are utilized for both units. Thus the Transmission Service Provider owns the four 345kV tie lines from the takeoff towers to the plant switching station, the plant switching station, and the four outgoing 345kV transmission lines to remote switching stations. The unit switchyards, which include the 345kV Gas-Insulated Substation (GIS) circuit breakers, are owned by CPNPP Units 3 and 4. Control, operation, maintenance, and engineering of the 345kV GIS circuit breakers are the responsibility of CPNPP Units 3 and 4.

Refer to the response to Question 08.02-10 of this RAI for a discussion of inspection, maintenance, calibration, and testing responsibilities.

Communication Protocol

ERCOT directs and ensures reliable and cost-effective operation of the Texas electric grid. ERCOT communicates directly with Oncor and Luminant. ERCOT issues communications in the form of Grid Operating Condition Notices, Advisories, Alerts, and Emergency Electric Curtailment Plan. ERCOT is not directly responsible for operation, maintenance, and engineering of any equipment.

Oncor communicates real-time voltage issues and contingencies, long-term planning, line-outage events, and the black-start plan to CPNNP. Luminant communicates ERCOT notifications, Hands-Off advisories, frequency deviations, and all power changes to CPNPP Units 3 and 4. CPNPP Units 3 and 4 communicate with both Oncor and Luminant regarding degraded safety systems that may increase nuclear safety risk and require a plant power reduction, and MW and MVAR limitations. CPNPP Units 3 and 4 communicate to Luminant power change requests, and High-Risk Activities that may cause plant power reductions or plant shut downs.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-3

NUREG-0800 establishes criteria that the NRC staff intends to use to evaluate whether an applicant meets the NRC's regulations.

In FSAR Section 8.2.1.2.3, Communication with ERCOT/Oncor, the applicant discusses the instrumentation available in the main control room and states: "the instrumentation for monitoring and indicating the status such as breaker positions, bus and line voltages, frequency, watts and vars, etc. of the preferred power system…" Clarify whether this statement refers to components and monitoring devices located in the switchyard or on-site, and whether the components and monitoring devices are downstream of the transformers.

ANSWER:

The statement refers to components and monitoring devices located in the plant switching station as well as the unit switchyards.

For the normal preferred power system (PPS), the medium-voltage Class 1E system is downstream of the reserve auxiliary transformers (RATs). The normal PPS ends at the Class 1E equipment, but does not include the Class 1E equipment. Consequently, the components and monitoring devices for the normal PPS are upstream of the RATs.

For the alternate PPS, the analysis is analogous for the unit auxiliary transformers.

Refer to Table 08.02-3, "Proposed Surveillance & Control Requirements in the Main Control Room for the plant switching station and unit switchyards."

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

Proposed Surveillance & Control Requirements in the Main Control Room(s)
for the Plant Switching Station and Unit Switchyards

Line	Equipment or System	Monitoring & Control			
		Status Indication (Open-Close)	Indication	Alarm	Control
3	**Oncor Plant Switching Station**				
4	Normal & Alternate Preferred Power Supplies (PPS's)				
5	High-Voltage Circuit Breakers - All Breakers	X			
6	High-Voltage Disconnect Switches - All Switches	X			
7	Dc Systems - Bus Undervoltage			X	
8	High-Voltage Main Busses - Voltage and Frequency		X		
9	Independent Transmission Lines - Voltage		X		
10	Transmission Tie Lines - Voltage		X		
11	**CPNPP 3 and 4 Unit Switchyards**				
12	Normal & Alternate Preferred Power Supplies (PPS's)				
13	High-Voltage Circuit Breakers - All Breakers	X			X
14	High-Voltage Disconnect Switches - All Switches	X			X
15	Dc Systems - Bus Undervoltage			X	
16	High-Voltage Main Busses - Voltage and Frequency		X		
17	Transmission Tie Lines - Voltage		X		

References: NUREG 0800 and IEEE 765

Note - The intent of the table is to identify the surveillance and control requirements in the Main Control Room (MCR) for the Plant Switching Station and unit switchyards as identified by NUREG 0800 and IEEE 765, recognizing the fact that Oncor will not permit CPNPP 3 & 4 to control its breakers in the Plant Switching Station. The table does not include all attributes of the unit switchyards to be monitored in the MCR.

Table 08.02-3

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak, Units 3 and 4
Luminant Generation Company LLC
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RAI NO.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-4

NUREG-0800 establishes criteria that the NRC staff intends to use to evaluate whether an applicant meets the NRC's regulations.

FSAR Subsection 8.2.1.2.1.1, Plant Switching Station, discusses the switchyard control stations and states: "The control and protection circuit cables that are routed in the yard and associates with two different control houses are physically separated to avoid a common cause failure of the two control houses and the availability of the associated offsite power circuits." Clarify what "common cause failure of the two control houses" means and explain how the proposed routing of control and protection circuits will prevent such common cause failure.

ANSWER:

"Common cause failure of the two control houses" would be a single event (excluding earthquake, tornado and flood) that caused the failure of the equipment in both control houses simultaneously. However, with the control houses separated by approximately 320 feet or more, a common cause failure of both control houses is extremely unlikely.

There are four transmission lines coming into the Comanche Peak 3 and 4 plant switching station, and they are separated such that each control house contains the controls for two of the lines. In addition, the control and protection circuits associated with these lines take physically separate routes and maintain physical separation. Therefore, if one control house is disabled, two transmission lines will still be available. The transmission lines that are in different control houses are physically separated outside the switchyard to further reduce the likelihood of simultaneous failure of the lines.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)

SRP SECTION: 08.02 – OFFSITE POWER SYSTEM

QUESTIONS for Electrical Engineering Branch (EEB)

DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-5

NUREG-0800 establishes criteria that the NRC staff intends to use to evaluate whether an applicant meets the NRC's regulations.

FSAR Subsection 8.2.1.2.1.1, Plant Switching Station, discusses the design of the switchyard and states that the switching station main buses are constructed of six-inch aluminum tubes. Discuss the continuous ampere rating of the main buses and their short circuit rating, both symmetrical and asymmetrical. Additionally, provide details about the maximum anticipated loads on each bus and the calculated short circuit current available to demonstrate the current carrying capability of the buses.

ANSWER:

The main busses in the plant switching station are six-inch Schedule 80 aluminum tubes that have a continuous current rating of 5000A rms sym. The rigid-bus system is designed for a short-circuit current of 63kA rms sym. In accordance with IEEE 605, "Guide for the Design of Substation Rigid-Bus Structures", the maximum short-circuit force (lb/ft) developed along the rigid bus is a function of the asymmetrical fault current level. Using a decrement factor of 1.6 in accordance with IEEE 605, the bus system can withstand an asymmetrical fault current of approximately 100.8kA rms.

The transmission plan to connect CPNPP Units 3 and 4 uses the "n-1 criteria" for determining the number of lines needed to reliably handle the full output of the plant. The plant switching station is a breaker-and-a-half arrangement and each of the units has a transmission line sharing the same rung and a breaker. Assuming a worst case situation of a DeCordova line fault and subsequent bus side breaker failure at CPNPP Units 3 and 4 that strips the west bus, the following flow could occur in the East bus:

Unit #4 full power at .95 pf.	2889 A
Plus Unit #3 full power at .95 pf.	2889 A
Minus Parker line flow	1004 A
Net flow on East bus	4774 A

The maximum flow on the West bus would be:

Unit #4 full power at .95 pf.	2889 A
Plus Unit #3 full power at .95 pf.	2889 A
Minus DeCordova line flow	1506 A
Minus Parker line flow	1004 A
Net flow on West bus	3268 A

Therefore the design of the bus system with respect to the maximum continuous load is adequate.

The calculated symmetrical short-circuit currents available to demonstrate the current-carrying capability of the main busses at the plant switching station are as follows:

Three-phase fault -	42,718A rms
Line-to-ground fault -	46,127A rms

The worst case asymmetrical fault duty is 71,958A rms.

Therefore the design of the bus system with respect to the short-circuit forces is adequate.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak, Units 3 and 4

Luminant Generation Company LLC

Docket Nos. 52-034 and 52-035

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SRP SECTION: 08.02 – OFFSITE POWER SYSTEM

QUESTIONS for Electrical Engineering Branch (EEB)

DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-6

The regulatory basis for this question is discussed in Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants," C.I.8.2, "Offsite Power System," and NUREG-0800, Standard Review Plan, Chapter 8.2 Offsite Power System.

FSAR Subsection 8.2.1.2.1.1, Plant Switching Station, discusses the "fly-over" of existing circuit. Provide a physical layout of the installation showing the double dead-ending of these circuits.

ANSWER:

FSAR Figure 8.2-206 is the physical layout of the plant switching station and depicts the plan view of the 345kV and 138kV double dead-end structures for the three (3) transmission circuits passing through the switching station (Parker, Comanche Switch, and Stephenville). The figure attached to this response is a typical elevation view of the double dead-end structures.

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

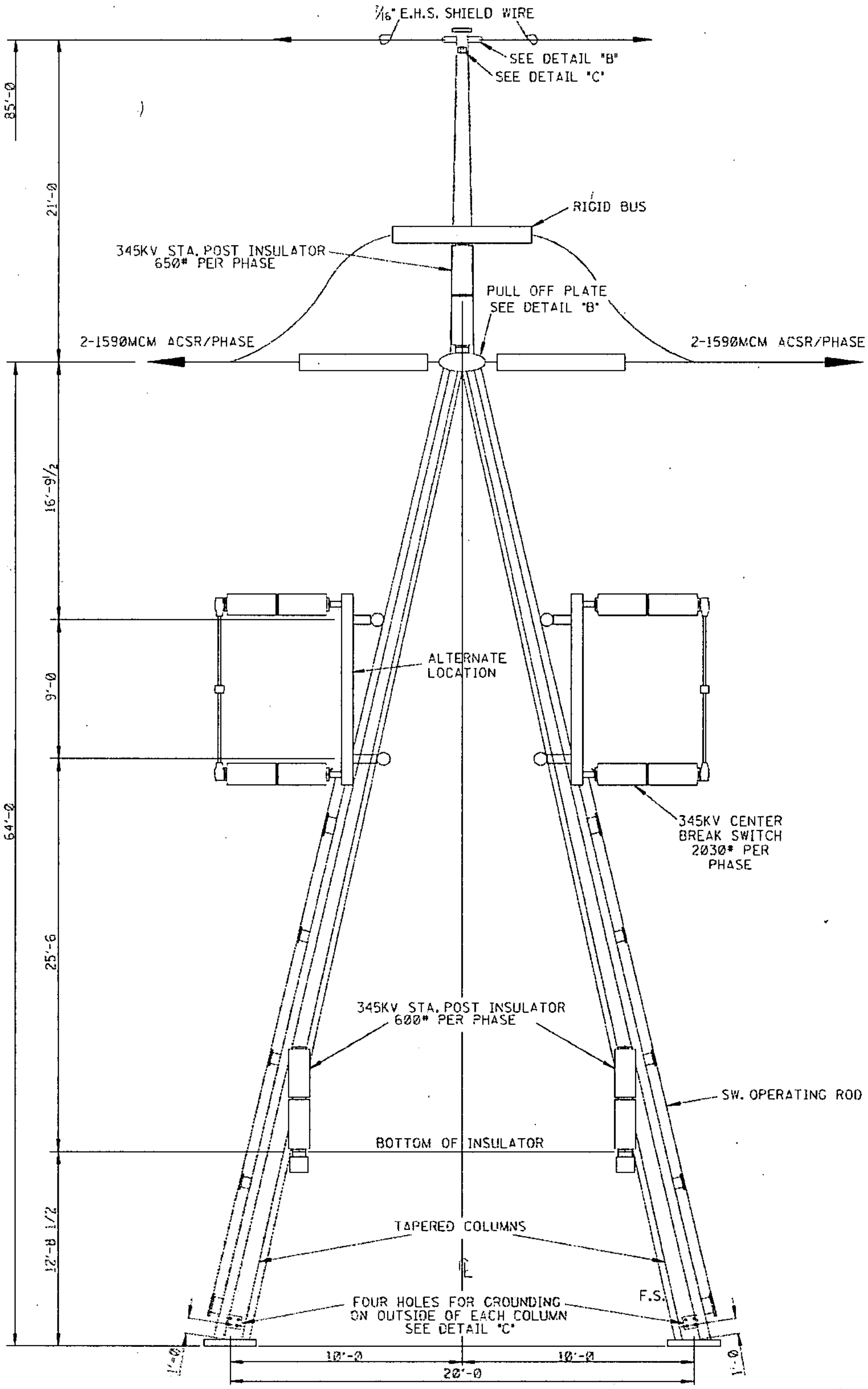
None.

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

None.

<u>Impact on DCD</u>

None.



SIDE ELEVATION

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak, Units 3 and 4
Luminant Generation Company LLC
Docket Nos. 52-034 and 52-035

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SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-7

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2 "Offsite Power System."

FSAR Subsection 8.2.1.2.1.2, Unit Switchyards/Transformer Yards, discusses the fire barriers between transformers and states that there is a minimum one-hour rated fire barrier between all transformers. Discuss the fire protection provided for the transformers and indicate the basis for the one-hour fire barrier and whether such barrier is sufficient to prevent propagation of a fire from one transformer to the other.

ANSWER:

The fire protection provided for the transformers is described in Subsection 9.5.1.2.1 and Appendix 9A, Subsection 9A.3.113. Each of the Main Transformers (MT), Unit Auxiliary Transformers (UAT), reserve auxiliary transformers (RATs) and the main generator excitation transformer is protected with an automatic water spray (deluge) system as required by Section 10.23.2 of National Fire Protection Association (NFPA) 804-2006 Edition. Each system is actuated by an automatic fire detection system (heat detectors) that simultaneously transmits alarms to the plant fire alarm system.

The one-hour fire barrier located between each transformer is required by Section 10.23.1.1 of NFPA 804. A three-hour fire barrier is provided between the transformers and any exposed buildings in conformance with Regulatory Guide (RG) 1.189 Revision 1, position 7.3, which is more conservative and takes precedence over the minimum two-hour fire barrier criterion in Section 10.23.1(2) of NFPA 804. While there are several variables that can influence the spread of a fire (e.g., wind velocity, fuel sources, etc.), there is a reasonable expectation that the one-hour fire barrier will prevent a fire on one side of that barrier from propagating to the other side of the barrier within its fire resistance rating. It is also reasonable to expect that the plant fire brigade will be able to commence manual fire mitigation operations sooner than one hour, which provides defense in depth to limit the spread of a fire to adjacent transformers. In addition, means are provided to contain oil spills as required by Section 10.23.1.2 of NFPA 804 and drainage per Section 8.5.6 of NFPA 804, and per RG 1.189 position 7.3.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak, Units 3 and 4
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SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-8

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2 "Offsite Power System."

FSAR Subsection 8.2.1.2.1.2, Unit Switchyards/Transformer Yards, discusses the isolated phase bus duct. Specify the rating of each bus duct section and confirm the capability of each section to carry maximum full load currents.

ANSWER:

The isolated phase bus is a non-safety-related component that delivers the power produced by the main generator to the power grid through a group of three 26/345 kV step-up transformers. The connection between the generator and each transformer is made through the force-cooled isolated phase bus. In addition, isolated phase bus ducts are used between the main generator and the unit auxiliary transformers (UATs).

The isolated phase bus is rated for the maximum rated generator output at 95% rated voltage per ANSI Standard C37-23. See the table below for the bus rating and load requirement:

Isolated Phase Bus Rating - Main Section (Between Generator and Tap to Main Transformer)

	Generator
Gen Output	1900 MVA
System Voltage	26 kV
Under Voltage	5 %
Peak Load	44.4 kA
Design (Force-Cooled)	44.4 kA

Isolated Phase Bus Rating - UAT Tap Section

	UATs
UATs	236 MVA
System Voltage	26 kV
Under Voltage	5 %
Peak Load	5.5 kA
Design (Self-Cooled)	6.0 kA

The bus rating meets or exceeds the load requirement.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)

SRP SECTION: 08.02 – OFFSITE POWER SYSTEM

QUESTIONS for Electrical Engineering Branch (EEB)

DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-9

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2, "Offsite Power System."

FSAR Subsection 8.2.1.2.1.2, Unit Switchyards/Transformer Yards, discusses the rating of circuit breakers RAT-CB1, RAT-CB2 and MT-CB. Please provide additional information on the rating of all switchyard components, including disconnect switches and circuit breakers and explain why the ratings for circuit breakers and disconnect switches in the switchyard are adequate for the application. In particular, identify the maximum fault available from the system and confirm that the breaker interrupting ratings, both symmetrical and asymmetrical, are consistent with the available fault. Provide the results of the short circuit analysis.

ANSWER:

The ratings of the various unit switchyard components are provided in the following tables.

Voltage Ratings - GIS Equipment		
	RAT Swyd	MT Swyd
Nominal Voltage, Phase-to-Phase, kV rms	345	345
Rated Maximum Voltage, Phase-to-Phase, kV rms	362	362
Rated Basic Insulation Level (BIL) Voltage, kV crest	1050	1050
Low Frequency Withstand Voltage, Phase-to-Ground, kV rms	500	500
Switching Impulse Withstand Voltage, kV crest	825	825

[1] Routine power frequency one-minute withstand tests shall be conducted prior to shipment from the factory at low-frequency withstand voltages.
[2] Disconnect switch open-gap withstand shall be 10% higher than GIS type-test values.

Current Ratings - GIS Equipment		
	RAT Swyd	MT Swyd
Rated Continuous Current, A rms	2000	4000
Rated Short-Circuit and Short-Time Current, kA rms	63	63
Standard Duration for Short-Time Current, sec	3	3
Rated Permissible Tripping Delay Time, sec	1	1
Rated Closing and Latching Current, kA peak	164	164

Voltage Ratings - Conventional Air-Insulated Equipment		
	RAT Swyd	MT Swyd
Nominal Voltage, Phase-to-Phase, kV rms	345	345
Rated Maximum Voltage, Phase-to-Phase, kV rms	362	362
Rated Basic Insulation Level (BIL) Voltage, kV crest	1300	1300

Current Ratings - Conventional Air-Insulated Equipment		
	RAT Swyd	**MT Swyd**
Rated Continuous Current, A rms	600 to 2000 [1]	4000
Short-Time Current-Carrying Capability, kA rms	63	63
Standard Duration for Short-Time Current, sec	3	3
Rated Momentary Current, kA rms	100	100
Rated Momentary Current, kA peak	170	170

[1] The total power rating of the RATs is approximately 236 MVA. This equates to approximately 400A at 345kV. Consequently, the continuous current rating of conventional equipment in the unit switchyards may vary depending on the minimum ratings available for the specified short-time current rating.

GIS Power Circuit Breaker Ratings		
	RAT	MT
Nominal Operating Voltage (phase-to-phase), kV rms	345	345
Rated Maximum Voltage (phase-to-phase), kV rms	362	362
Basic Impulse Level (BIL), kV	1050	1050
Maximum Continuous Current, A	2000	4000
Rated Short-Circuit and Short-Time Current, kA rms	63	63
Rated Interrupting Time (cycles)	2	2

GIS Disconnect Switch Ratings		
	RAT GIS	MT GIS
Nominal Operating Voltage (phase-to-phase), kV	345	345
Rated Maximum Voltage (phase-to-phase), kV	362	362
Basic Impulse Level (BIL), kV	1050	1050
Maximum Continuous Current, A	2000	4000
Short Time Withstand (symmetrical) Current, kA	63kA	63kA
Preferred Configuration Type	N/A	N/A

GIS Voltage Transformers Ratings			
		RAT Swyd	MT Swyd
Nominal Operating Voltage (phase-to-phase), kV		345	345
Rated Maximum Voltage (phase-to-phase), kV		362	362
Primary Voltage, line-ground, kV		199.19	199.19
Basic Impulse Level (BIL), kV crest		1050	1050
Winding Ratio		1800/3000:1	1800/3000:1
Accuracy Class	X Winding	0.3 WXMYZ	0.3 WXMYZ
	Y Winding	0.3 WXMYZ	0.3 WXMYZ

Air Disconnect Switch Ratings and Configuration		
	RAT Swyd	MT Swyd
Nominal Operating Voltage (phase-to-phase), kV rms	345	345
Maximum Operating Voltage (phase-to-phase), kV rms	362	362
Lightning Impulse Withstand Voltage (BIL), kV peak	1300	1300
Power Frequency, Dry 1 Minute, kV rms	610	610
Power Frequency, Wet 10 Second, kV rms	525	525
Switching Impulse Withstand Voltage, to Gnd, kV peak	885	885
Switching Impulse Withstand Voltage, Across Gap, kV peak	885+(295)	885+(295)
Rated Continuous Current, A	2000	4000
Short Time Withstand Current, kA rms sym	63	63
Peak Withstand Current, kA peak	164	164

Preliminary Conventional Air-Insulated Surge Arrester Ratings		
	RAT Swyd	MT Swyd
Maximum System Voltage, Line-to-Line, kV rms	362	362
Maximum System Voltage, Line-to-Ground, kV rms	209	209
Maximum Continuous Operating Voltage (MCOV), kV rms	209	209
Duty Cycle Voltage, kV rms	258	258

These equipment ratings are adequate for the following reasons:

- The voltage ratings are specified in accordance with IEEE standards for the nominal continuous operating voltage of 345kV.
- The 345kV transmission system is designed for the BIL levels specified.
- For the normal 345kV PPS (RAT circuits), the continuous current ratings specified (600A-2000A) exceed the total rating of the RAT's at 1.05 pu voltage (236 MVA, 415A)

- For the alternate 345kV PPS (MT circuit), the continuous current rating specified (4000A) exceeds the output of the plant at 0.95 pu voltage (1900 MVA, 3339A).
- The short-circuit ratings specified (63kA rms sym, 100kA rms asym) exceed the calculated short-circuit values of 42.7kA rms sym (three-phase fault), 46.1 kA rms sym (line-to-ground fault), and the worst case asymmetrical fault duty of 72.0 kA rms.

Based on the above, the calculated three-phase and single-phase bus fault currents on the CPNPP Units 3 and 4 plant switching station are significantly less than the specified short-circuit ratings of the circuit breakers and disconnect switches in the unit switchyards.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-10

The regulatory basis for this question is described in NUREG-0800, Standard Review Plan, Chapter 8.2, "Offsite Power System."

FSAR Subsection 8.2.1.2.2, Plant Switching Station and Transmission Line Testing and Inspection, references an agreement between Luminant and Oncor for inspection, maintenance, calibration, and testing of transmission lines, and plant switching station, which provides the procedure, policy and organization to carry out inspection, maintenance, calibration, and testing of transmission lines and plant switching station. This agreement defines the interfaces and working relationship between Luminant and Oncor. The FSAR further provides that, as a service to Luminant, Oncor performs inspection, maintenance, calibration, and testing of Luminant transformer and circuit breaker assets at CPNPP. List and describe Luminant's and Oncor's responsibilities for inspection, maintenance, calibration, and testing of transformers and circuit breaker assets. Discuss Luminant's approval process and requirements by Luminant Generation for Comanche Peak Nuclear Power Plant.

ANSWER:

Luminant has overall responsibility for the inspection, maintenance, calibration, and testing of transformers and circuit breakers located in the CPNPP Units 3 and 4 unit switchyards/transformer yards. Oncor provides inspection, maintenance, calibration, and testing services to Luminant for these transformers and circuit breakers in accordance with an agreement between Luminant and Oncor as further outlined below. All such work activities are reviewed and approved by Luminant. Engineering and design reviews of changes are performed under the Luminant design control program and include technical advice from Oncor.

Luminant (CPNPP) Responsibilities - General

- Establishing Inspection, Maintenance, Calibration, and Testing activities and frequencies.
- Scheduling all work and obtaining approval.
- Approval and routing of all work instructions.

- Operating equipment as needed, ensuring no impact to plant or grid.
- In an Emergency, operating equipment as necessary to minimize the effects to the plant.
- Administering the clearance and hold process.
- Ordering and stocking parts.

Luminant Switchyard Coordinator Responsibilities

- Ensure all work is reviewed, impacted and scheduled per Luminant procedures.
- Perform reviews and preliminary approval of work instructions for potential plant impacts.
- Ensure scheduling is accomplished to meet Oncor and Luminant needs.
- Ensure required support activities are accomplished per Luminant requirements.
- Observe selected activities.
- Notify Luminant System Engineer of proposed design changes, planned work, completion of work, documentation of preventive maintenance, corrective maintenance and unplanned events.
- Primary point of contact between Luminant and Oncor.
- Update plant data base after completion of work activities.
- Provide for ERCOT a rolling quarterly schedule of forecasted plant and equipment outages that could affect plant power level.

Luminant System Engineering

- Perform reviews of documentation, proposed modifications, or maintenance actions for compliance with licensing documents.
- Perform System Health/Engineering functions as follows: monitor performance parameter trending, use industry operating experience, ensure documentation is accurate and thorough, and review test results to ensure compliance with procedural acceptance criteria and system performance requirements.

Oncor Responsibilities

- Performing Inspection, Maintenance, Calibration, and Testing activities for Luminant owned transformers and circuit breakers identified in the agreement between Oncor and Luminant.
- Documenting all work.
- Record keeping of equipment and component critical attributes.
- Providing a copy of testing and work activities to Luminant.
- Maintain maintenance historical records.
- Ensure working personnel meet training requirements.

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

None.

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

None.

<u>Impact on DCD</u>

None.

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.: 2577 (CP RAI #24)

SRP SECTION: 08.02 – OFFSITE POWER SYSTEM

QUESTIONS for Electrical Engineering Branch (EEB)

DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-11

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2, "Offsite Power System."

FSAR Subsection 8.2.1.2, Offsite Power System, states that the "cables associated with the normal and alternate [preferred power supply] PPS between unit switchyard and the electrical room, in the [turbine building] T/B, are routed in separate underground duct bank... The underground duct bank for these circuits is sealed to prevent degradation in wetted or submerged condition. Temporary sump pumps are available to remove any leakage that may occur." Describe the monitoring program, including periodic testing, inspections, and corrective actions that will be implemented to avoid or arrest the degradation of cable insulation from the effects of moisture for all underground cables, dc and ac at all voltage levels.

ANSWER:

The underground ac and dc cabling in CPNPP Units 3 and 4 is routed through sealed duct banks regardless of voltage. However, there is always a risk of leakage and water intrusion. The cables are waterproof and rated to be installed in underground duct banks. In order to prevent the cables from being exposed to standing water for extended time periods, inspection of underground duct banks for cable in the scope of the maintenance rule (10 CFR 50.65) is performed. The initial periodic inspection frequency is six months. Increased inspection frequency would be initiated if accumulated water is found, with any additional corrective actions to be determined via implementation of the CPNPP maintenance rule and corrective action program. The duct banks are constructed with manholes located at various locations in the unit switchyard. As part of the inspection program, these manholes are opened and the duct work and cables are inspected for signs of deterioration or water intrusion. If water is present, portable sump pumps are used to remove the water. The source of the water is determined and repairs will be made to prevent further water leakage.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-12

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2, "Offsite Power System."

FSAR Subsection 8.2.1.2.1.1, Plant Switching Station, states that "[e]ach transmission line is protected by pilot protection using a directional comparison blocking scheme." The logic diagrams of Figures 8.2-9 and 8.2-10 address this feature. Provide additional information, including additional or revised figures, if necessary, to explain and clarify how the pilot protection is used and which circuit breakers it acts upon.

ANSWER:

Directional Comparison Pilot Blocking:

A directional comparison pilot blocking scheme is used to provide high-speed fault clearing for 100% of a transmission line. The intent of this scheme is to get the response of the distance relay at the other end of the transmission line to speed up the decision making process. For internal faults (faults on the transmission line), the current flows into the line at both terminals, so simultaneous high-speed tripping at the terminals is allowed. For external faults (faults beyond the transmission line) the current flows out at one of the terminals. This information is used to block tripping of all terminals. In general, distance relays for phase faults and directional over-current relays for ground faults are used as fault detectors. The fault detectors must be directional and set to overreach all remote terminals. This overreach allows the protection scheme to differentiate between internal and external faults.

Protection for Line to DeCordova 345 kV Switching Station

The line to DeCordova 345 kV switching station utilizes optical-fiber shield wires to provide relay communications channels between the CPNPP Units 3 and 4 plant switching station and the DeCordova 345 kV switching station. Redundant high-speed pilot protection covering the entire length of the line is provided. The first high-speed pilot protection scheme is a directional comparison blocking

(DCB) scheme operating over a fiber channel and provided by relay 111-1. The fiber provides a channel that is much more reliable than is typically used in DCB schemes and thus provide a high level of security with continuous monitoring of the channel. The second high-speed pilot protection scheme is a line-current differential scheme operating over a separate fiber channel and provided by relay 187L2. Relay 111-1 also provides backup non-pilot step-distance and directional over-current ground protection. Redundant breaker failure transfer-trip channels are provided. The first breaker-failure transfer-trip channel is over the same fiber used for the DCB pilot channel and is accomplished through logic programmed into the associated transmission line relay. The second breaker-failure transfer-trip channel is over a separate dedicated pair of fibers. Redundant breaker-failure protection schemes are provided. The first scheme is provided by internal functions in relay 111-1. The second scheme is provided by relays 150/62 and 250/62. Re-closing is provided by relay 111-1. Manual closing is supervised by relay 111-1, with additional backup supervision provided by relay 187L2.

Fiber-optic shield wire is used between the CPNPP Units 3 and 4 plant switching station and the existing CPNPP Units 1 and 2 switchyard on one of the line sections that "fly through" the CPNPP Units 3 and 4 plant switching station. This will probably be the CPNPP Units 3 and 4 plant switching station to Johnson 345 kV switching station line reconfiguration. This allows use of the fiber from the CPNPP Units 3 and 4 plant switching station to DeCordova 345 kV switching station for pilot relaying on the existing line between the CPNPP Units 1 and 2 switchyard and DeCordova 345 kV switching station.

Protection for Line to Parker 345 kV Switching Station

The line to Parker 345 kV switching station utilizes a single high-speed pilot protection scheme using a directional comparison blocking (DCB) over on-off power line carrier. Both redundant line relays 1011-1 and 1011-2 are capable of providing DCB pilot protection and this capability is switch selectable between the two relays. Both relays 1011-1 and 1011-2 also simultaneously provide redundant non-pilot step-distance and directional over-current ground protection. Redundant breaker-failure transfer-trip channels are provided over separate frequency-shift keying (FSK) power line carrier transmitters. Redundant breaker-failure protection schemes are provided. The first scheme is provided by internal functions in relay 1011-1. The second scheme is provided by relays 1050/62 and 1150/62. Re-closing is provided by relay 1011-1. Manual closing is supervised by relay 1011-1, with additional backup supervision provided by relay 1011-2.

Protection for Line to Johnson 345 kV Switching Station

The line to Johnson 345 kV switching station utilizes a single high-speed pilot protection scheme using a directional comparison blocking (DCB) over on-off power line carrier. Both redundant line relays 1511-1 and 1511-2 are capable of providing DCB pilot protection and this capability is switch selectable between the two relays. Both relays 1511-1 and 1511-2 also simultaneously provide redundant non-pilot step-distance and directional over-current ground protection. Redundant bi-directional breaker-failure transfer-trip channels are provided over separate FSK power line carrier transceivers. Redundant breaker-failure protection schemes are provided. The first scheme is provided by internal functions in relay 1511-1. The second scheme is provided by relays 1450/62 and 1550/62. Re-closing is provided by relay 1511-1. Manual closing is supervised by relay 1511-1, with additional backup supervision provided by relay 1511-2.

Protection for Line to Whitney 345 kV Switching Station

The line to Whitney 345 kV switching station utilizes a single high-speed pilot protection scheme using a directional comparison blocking (DCB) over on-off power line carrier. Both redundant line relays 1811-1 and 1811-2 are capable of providing DCB pilot protection and this capability is switch selectable between the two relays. Both relays 1811-1 and 1811-2 also simultaneously provide redundant non-pilot step-distance and directional over-current ground protection. Redundant bi-directional breaker-failure transfer-trip channels are provided over separate FSK power line carrier transceivers. Redundant breaker-failure protection schemes are provided. The first scheme is provided by internal functions in relay 1811-1. The second scheme is provided by relays 1750/62 and 1850/62. Re-closing is provided by relay 1811-1. Manual closing is supervised by relay 1811-1, with additional backup supervision provided by relay 1811-2.

As depicted in FSAR Figure 8.2-201, the bus configuration at each end of the 345kV transmission lines that connect CPNPP Units 3 and 4 to the remote switching stations is one of the following:

- Breaker-and-a-half
- Double-breaker
- Ring-bus

Therefore, at the end of each transmission line, the two circuit breakers that connect the transmission line to the plant switching station are tripped to clear faults within the zone of protection of the relays. This does not include breaker failure relaying.

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

None.

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

None.

<u>Impact on DCD</u>

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-13

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2, "Offsite Power System."

FSAR Subsection 8.2.1.2.1.1, Plant Switching Station, states that the "[t]he relay protection schemes for independent transmission lines are designed so that any single failure or incident, such as control house fire or cable dig-in, will not cause loss of two independent transmission lines." Clarify specifically what "cable dig-in" means.

ANSWER:

"Cable dig-in" refers to any external action (e.g. backhoe, auger, etc) that disturbs the soil covering the underground cable that causes damage to an underground cable, either a directly-buried cable, cable in conduit, or cable in a duct bank.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-14

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2 "Offsite Power System."

FSAR Subsection 8.2.1.2.1.2 indicates that surge arresters are provided both at the transformer side and at the transmission tie line side to protect the equipment from damage due to lightning and switching surges. Identify the Basic Insulation Level (BIL) levels specified for the 345 kV transmission lines, the switchyards, and substations listed in this section, and provide a comparison with the BIL levels that are utilized by other transmission lines in the general area for existing and proposed 345 kV transmission lines. Also, describe design features such as surge protection devices, grounding, and lightning protection provided for the switchyard and transmission lines and indicate how these systems will be periodically maintained and tested to assure their functionality.

ANSWER:

<u>345kV Insulation Levels - Transmission Lines</u>

The applicable lightning impulse-withstand voltage (BIL) for transmission lines is defined as the Positive Critical Impulse Flashover Voltage. For new 345kV transmission lines designed, installed, operated, and maintained by Oncor, the specified Positive Critical Impulse Flashover Voltage is as follows:

345kV Insulation Levels - Transmission and Tie Lines		
Type of Structure	Critical Impulse Flashover, Positive, kV	
	Porcelain Insulation*	Polymer Insulation
Tangent	1585	1430
Swing-Angle	1745	1590
Dead-End	1745	1590
* The critical Impulse level for porcelain insulators allows for a reduction due to broken or damaged insulators.		

345kV Insulation Levels – Comparison to Existing and Proposed Lines

The Oncor standard for 345kV transmission lines specifies the use of polymer insulators with a minimum rating of 1430kV BIL for tangent structures and a minimum rating of 1590kV BIL for angle and dead-end structures. In those locations where porcelain insulators are used in place of polymer, insulators have a minimum rating of 1585kV BIL for tangent structures and a minimum rating of 1745kV BIL for angle and dead-end structures.

345kV Transmission Lines – Surge Protection, Grounding, and Lightning Protection

Oncor standard 345kV switching station Surge Arresters – 276kV duty cycle, 215kV Minimum Continuous Operating Voltage (MCOV), lightning protection – fully shielded station.

345kV Insulation Levels - Switchyards and Substations

The BIL levels specified for the remote substations, the plant switching station, and the unit switchyards are as follows:

345kV Insulation Levels - Switchyards and Substations		
Type of Yard	Basic Impulse Insulation Level, kV	
	Air-Insulated Equipment	Gas-Insulated Equipment
Remote Substations	1300	-
Plant Switching Station	1300	-
Unit Switchyards	1300	1050*
* BIL level for GIS equipment is In accordance with ANSI/IEEE C37.06 and ANSI/IEEEC37.122		

345kV Switchyards and Substations – Surge Protection

Surge arresters are installed on all transmission lines entering or leaving the switchyards and substations and on the 345kV terminals of all power transformers. Surge arresters are installed on all three phases and are solidly-connected to the ground grid in each yard. All new surge arresters are the metal-oxide type that complies with ANSI/IEEE C62.11, "Standard for Metal-Oxide Surge Arresters for AC Power Circuits." Selection of all new surge arresters complies with ANSI/IEEE C62.22, "IEEE Guide for the Application of Metal-Oxide Surge Arresters for AC Systems."

Surge arresters require only minimal periodic maintenance and testing, which includes the following:

- Visual and Mechanical Inspections – Inspect physical and mechanical condition, inspect all bolted connections for high resistance and verify tightness, verify that the ground lead is connected to the grounding system, and verify that the stroke counter (if present) is correctly mounted and electrically connected.
- Electrical Tests – Perform resistance measurements through all bolted connections, perform insulation-resistance tests per manufacturer's recommendation, and test the grounding connection.

345kV Switchyards and Substations – Grounding Systems

Grounding systems are provided in all switchyards and substations. The grounding systems consist of a grid of horizontal buried conductors and vertical ground rods. This combination is installed around the perimeter loop of the grid as well as in some of the inside grid conductors to control local gradients (step and touch potentials) inside the yard. All new grounding systems comply with IEEE Std 80 – "IEEE Guide for Safety in AC Substation Grounding."

The essential design features of a grounding system are:

(a) Low ground resistance for safe transfer potentials
(b) Arrangement of grounding grid conductors for safe step and touch potentials
(c) Proper sizing of cable taps to avoid fusing due to high ground faults
(d) Connection of all metallic structures and equipment to the ground system
(e) Connection of the plant and switchyard grounding grids

The buried conductors and grounding rods of the grounding system require no maintenance. The above-ground portions of the system, such as the grounding straps and cables, and the cables tied into the equipment and metallic structures, will be periodically inspected and any damage will be subject to corrective action. The straps, cables, or cable connections can be inspected in conjunction with the related equipment.

As a form of preventative maintenance, periodic functional tests will be performed on the grounding system as follows:

(a) Resistance to remote earth measurements to determine if any substantial change has occurred on the system resistance over time.
(b) Electrical continuity tests on major grounding loops and equipment.
(c) Examination of all isolating equipment (isolating and neutral transformers, isolating metallic structure circuits (pipelines, cables, etc.) leaving the yard area, as applicable.

For the other Oncor facilities, pre-commissioning and post commissioning are as follows:

Pre-Commissioning

Station Equipment – Physical (Installation and Testing)

1. Circuit Breakers (CBs) - 362 kV CBs will have a manufacturer's service representative or manufacturer-certified Company employee on site during installation to oversee the installation of the CB.
   a. CB is inspected upon receipt to be free of damage during transit.
   b. At installation, once the CB is set on its foundation, the CB is installed according to manufacturer's instruction book installation procedures, which include specified measurement checks, stored energy system functional settings, gas purity and dielectric test, etc.
   c. Wiring connections for the control power, protection and metering circuits are completed.
   d. CB is electrically operated.
   e. Diagnostic test personnel will perform timing test, power factor test, etc. and compare to manufacturer factory test results.
   f. CB is released to Protection & Control Technicians for protection circuit integrity tests and checks.

2. Air Switches
   a. The air switch is inspected upon receipt to be free of damage during transit.
   b. At installation, once the air switch is set on its stand, the air switch is installed according to manufacturer's instruction book installation procedures.
   c. We require on air switches to have a Company-certified installation person (Contractor or Company) on site over-seeing the installation of the switch and complete an installation checklist. NOTE: If a contractor installs the switch, a Company person certified in switch installation and check-out will then inspect the switch and functionally operate it 25 consecutive times before accepting the switch from the contractor.
   d. Once the checklist is completed and a Company-certified switch installation person inspects and obtains 25 successful functional sequential operations of the switch, the Company person will place the switch in the preferred position (designated by Transmission Grid Operations) and releasing the switch to the Transmission Grid Operations Controller.

3. Instrument Transformers, Lightning Arresters
   a. Inspect for physical damage
   b. Perform necessary external electrical tests (ratio - if applicable, external dielectric tests - power factor, megger, etc.)

Post-Commissioning

When any new current-carrying equipment is commissioned (placed in service), Company personnel will follow-up with a post-commissioning infrared inspection with the equipment under load to check the integrity of the new construction.

<u>345kV Switchyards and Substations – Lightning Protection</u>

Lightning -protection is provided in all switchyards and substations. Various methods are used to provide lightning protection in the yards. These consist of lightning masts, lightning rods, and shield wires. Where provided, these systems comply with IEEE 998, "IEEE Guide for the Direct Lightning Stroke Shielding of Substations." The main design features include:

(a) All transmission conductors are included in the zone of protection.

(b) All metallic structures and equipment are electrically connected to the grounding system, thereby eliminating the danger of arcing or hazardous potentials between lightning conductors and adjacent metallic structures.

(c) The lightning protection system is grounded through the station grounding system, which is capable of dissipating to earth the transient currents associated with lightning discharges without creating hazardous step or touch potentials.

When structures adjacent to a unit switchyard have sufficient height, the lightning protection system installed on the structure may be used as an alternate to providing a separate dedicated lightning protection system for the unit switchyard.

Periodic maintenance includes inspection of components for damage and loose or corroded connections. Periodic testing is described above for the "345kV Switchyards and Substations – Grounding Systems," which provides grounding of the lightning protection system.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)

SRP SECTION: 08.02 – OFFSITE POWER SYSTEM

QUESTIONS for Electrical Engineering Branch (EEB)

DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-15

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2, "Offsite Power System."

FSAR Subsection 8.2.1.2.1.1, Plant Switching Station, states that: "To reduce the cable lengths of the dc supplies in one control building to panels in the other control building, a set of fused cables are brought from the dc source in each control building to the dc box in the relay panel room of the other control building." Describe the control sources in this subsection and the location of the control and protection equipment in subsection 8.2.1.2, and explain how the protection scheme for each line is physically wired. Please also explain whether the failure of one control house, for any reason, will assure that either the primary or the backup protection system will operate to isolate a fault. Clarify the physical design and provide a wiring diagram of the two breakers associated with the same transmission line showing physical location of components.

ANSWER:

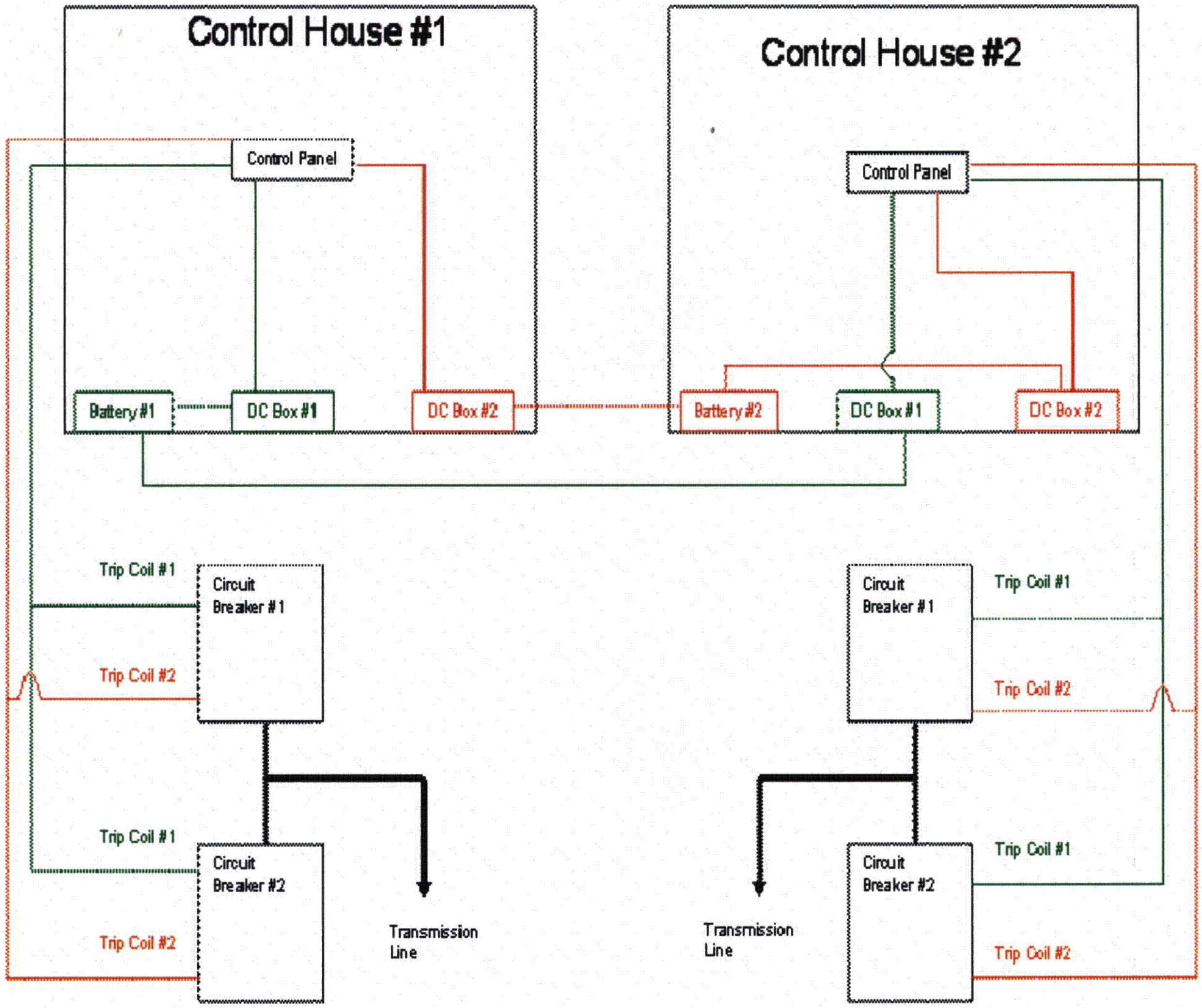
There are two transmission lines protected and controlled from each control house. Control house #1 contains the protection and control equipment for the DeCordova and Johnson lines. Control house #2 contains the protection and control equipment for the Parker and Whitney lines.

There are two independent control sources with one control source in each control house. One control source powers all the primary protection in both control houses. The other control source powers all the backup protection in both control houses. Loss of one control source will not affect the other control source. Since primary and backup protection and control equipment is located in both control houses, the control sources for both primary and backup protection and control equipment must be brought to both control houses.

The control sources are designed such that given the loss of one control house, the primary or backup protection and control equipment in the other control house will continue to function.

Refer to the diagram below for the control source configuration for primary and back-up relay protections.

Attached Oncor Drawing E-67760-001 Sheet # 2 represents a typical Relay Functional Diagram of an outgoing transmission line from the plant switching station (Note – the Relay Functional Diagram does not show the physical location of components).



Impact on R-COLA

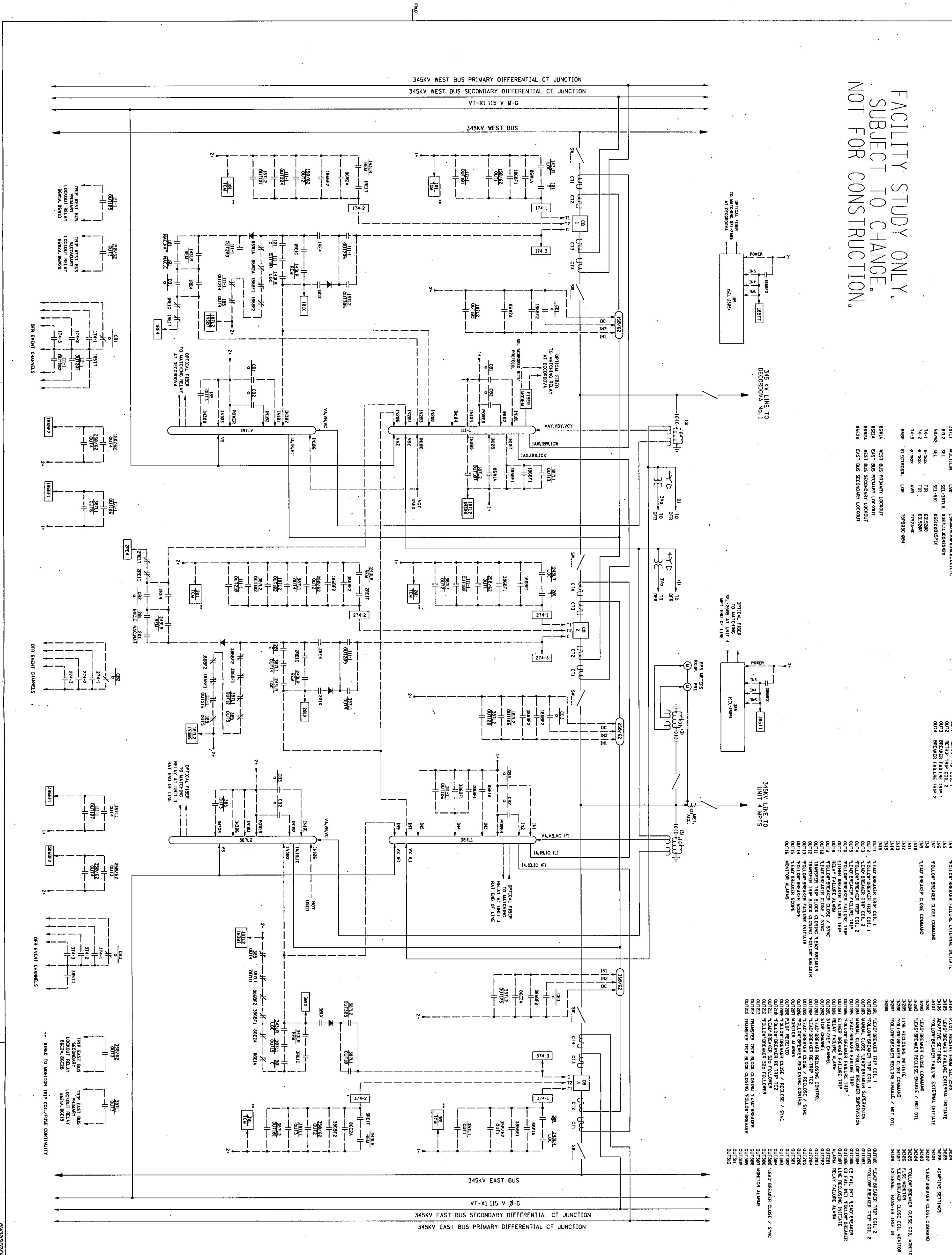
None.

Impact on S-COLA

None.

Impact on DCD

None.



FACILITY STUDY ONLY. SUBJECT TO CHANGE. NOT FOR CONSTRUCTION.

SCALE NONE	UNIT ID	LIST OF DRAWINGS	W.A.	REGION	DISTRICT	STD NO.	DATE

GIR15INR0002 FACILITY STUDY
RELAY FUNCTIONAL DIAGRAM
DECORDOVA & UNIT 4 MPT LINE

DATE 03-07-08	DWN. MAC	CH.	ENG.	APP.	APP.	W.A.	NO.	DATE	REVISION DESCRIPTION	DRAWN	CH.	APP.	APP.

ONCOR
TRANSMISSION ENGINEERING

CD 677600102

E67760-001
SHEET NO. 002

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.: 2577 (CP RAI #24)

SRP SECTION: 08.02 – OFFSITE POWER SYSTEM

QUESTIONS for Electrical Engineering Branch (EEB)

DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-16

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2, Offsite Power System.

FSAR Subsection 8.2.1.2.1.2, Units Switchyards/Transformer Yards, states that each unit switchyard has two sets of 125V dc batteries and two separate dc power distribution systems. Clarify the physical location of these batteries, and specify whether they are located in control houses #1 and #2, described in subsection 8.2.1.2, or in another location. Additionally, address the periodic surveillance and maintenance tests that will be performed on all the batteries and the criteria that are established for battery replacement.

ANSWER:

The batteries associated with the unit switchyards are separate and independent from the batteries in the Plant switching station. The batteries associated with the unit switchyards are located in the gas-insulated switchgear (GIS) Buildings (adjacent to the Turbine Buildings) as follows.

Location of Batteries in the Unit Switchyards

Unit	Preferred Power Supply	Location
3	Normal	Unit 3 RAT GIS Bldg
3	Alternate	Unit 3 MT GIS Bldg
4	Normal	Unit 4 RAT GIS Bldg
4	Alternate	Unit 4 MT GIS Bldg

The locations of the GIS Buildings are shown in Figures 8.2-207 and 8.2-208.

Periodic surveillance and maintenance tests for all batteries associated with the unit switchyards will comply with the recommendations of IEEE 450, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications." This includes the monthly inspections, and the quarterly and yearly tests outlined in Section 5.2 of IEEE 450. The criteria used for battery replacement is included in Section 8 of IEEE 450.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-17

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2, "Offsite Power System."

FSAR Subsection 8.2.1.2.1.2, Units Switchyards/Transformer Yards, states that primary and a backup relay protection schemes are provided for each of the transmission tie lines to the plant switching station. Describe the physical location of the primary and backup protective relays provided for each transmission tie line to the plant switching station, and explain whether they are located in control houses #1 and #2, as described in subsection 8.2.1.2, or in another location. The applicant should ensure that the physical location of all equipment is clearly identified.

ANSWER:

The physical location of the primary and back-up protective relays associated with the unit switchyards (including the tie line protective relays on the unit switchyard end) are in the control rooms located in each GIS Building as follows.

Location of Protective Relays in the Unit Switchyards

Unit	Preferred Power Supply	Location
3	Normal	Unit 3 RAT GIS Bldg
3	Alternate	Unit 3 MT GIS Bldg
4	Normal	Unit 4 RAT GIS Bldg
4	Alternate	Unit 4 MT GIS Bldg

The GIS Buildings are shown in Figures 8.2-207 and 8.2-208.

The physical location of the primary and back-up protective relays associated with the plant switching station (including the tie line protective relays on the plant switching station end) is in Control Building #1 and #2 of the plant switching station.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-18

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2, Offsite Power System.

FSAR Subsection 8.2.1.2.1.2, Units Switchyards/Transformer Yards, states that, "The normal PPS and the alternate PPS unit switchyards, the normal PPS and the alternate PPS transmission tie lines to the plant switching station, the low-voltage dc and ac power systems in the unit switchyards, are physically separated and do not share any common equipment. Hence, no [failure modes and effects analysis] FMEA is warranted for the equipment and circuits associated with the unit switchyards. " Please clarify whether protective relays for primary and backup protection are also physically separate. If this is not the case, provide an FMEA or justify why such analysis is not warranted. Clarify whether or not the protective relays for primary and backup protection are physically separate, and if so, provide the corresponding FMEA.

ANSWER:

In each unit switchyard, the primary and back-up protective relays are physically separate from one another. This is accomplished by providing separate relay panels for primary protection and separate relay panels for back-up protection. Primary and back-up protective relay panels are not located adjacent to one another. Since all equipment associated with the Normal PPS is completely separate from all equipment associated with the Alternate PPS for each unit, no FMEA is necessary. The physical separation of the normal and alternate PPS is depicted in Figures 8.2-207 and 8.2-208.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)

SRP SECTION: 08.02 – OFFSITE POWER SYSTEM

QUESTIONS for Electrical Engineering Branch (EEB)

DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-19

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2 "Offsite Power System."

FSAR Subsection 8.2.1.2 describes the transformer protection related to sudden pressure. Indicate whether transformer isolation occurs in conjunction with the other protection features described in the same subsection paragraph of the US-APWR DCD. Additionally, indicate whether protection schemes have addressed lessons learned from the event described in Information Notice 2005-15, "Three-Unit Trip and Loss of Offsite Power at Palo Verde Nuclear Generating Station." Lastly, indicate whether transformers undergo periodic testing and describe the testing plan.

ANSWER:

In addition to sudden pressure, transformer isolation occurs in conjunction with the other protection features described in FSAR Subsection 8.2.1.2. FSAR Figures 8.2-209 and 8.2-210 show tripping of the 345kV high side breakers via the transformer primary and backup lockout relays. DCD Figure 8.3.1-2 shows tripping of the medium voltage switchgear circuit breakers via the lockout relays.

The following points describe how the lessons learned at Palo Verde were incorporated into the design of CPNPP.

At Palo Verde, upon receipt of a transfer trip tripping signal, the receiver activated one relay to trip two breakers. The relay was defective and only tripped one of the two breakers. At Palo Verde, they are now using two relays that each trip both breakers. Figures 8.2-209 and 8.2-210 show the design for CPNPP incorporates features which encompass the lessons learned from Palo Verde. In Figure 8.2-209, the primary and backup line protections activate separate auxiliary relays that open the RAT breakers. Each one of these auxiliary relays operates a separate trip coil in the breaker. Figure 8.2-210 shows how the primary and backup protections operate separate auxiliary relays that in turn operate the independent trip coils on the breakers.

The high voltage breakers at CPNPP are all equipped with dual trip coils and dual protection (primary and back-up) to assure that the breaker will open when required.

All transformers between the Oncor Takeoff towers and the Main Turbine are owned by Luminant, who is responsible for the maintenance, design and reliability of these items. As detailed in the response to Question 08.02-10, Oncor is utilized to provide some transformer-related services. Below is a typical list of planned preventative maintenance activities and frequencies for transformers. The final requirements will be identified in plant procedures.

- Weekly visual inspection to check equipment condition
- Every 54 months perform power factor testing
- Every year perform load tap changer oil analysis
- Every 2 years perform a dissolved gas-in-oil and full screen oil test
- Every 54 months or 15,000 operations of load tap changer (whichever is first) perform an internal inspection

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-20

The regulatory basis for this question is described in 10 CFR 50.65(a)(4), NUREG-0800, Chapter 8.2 "Offsite Power System," and NRC Generic Letter 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power," February 1, 2006.

FSAR Subsection 8.2.2.2, Grid Reliability and Stability Analysis, states that, "The study indicates that neither proposed nor existing nearby generators experience transient instability for the selected planning criteria contingencies that have been considered." The subsection also indicates that the study and its conclusions are based on preliminary data. Indicate which reasonably expected contingencies were not evaluated. Additionally, provide the assumptions, results, and conclusions when the study is revised using final data.

ANSWER:

The following reasonably expected contingencies were not evaluated because they are not the most severe (worst case) contingencies. These omitted scenarios are enveloped by those evaluated for the stability study.

- L-G fault with delayed clearing near CPNPP Units 3 and 4 on CP3 and 4 to Whitney
- L-G fault with delayed clearing near CPNPP Units 3 and 4 on CP3 and 4 to Parker
- L-G fault with delayed clearing near CPNPP Units 3 and 4 on CP3 and 4 to DeCordova
- L-G fault with delayed clearing near CPNPP Units 3 and 4 on CP3 and 4 to Unit 3
- L-G fault with delayed clearing near CPNPP Units 3 and 4 on CP3 and 4 to Unit 4
- L-G fault with delayed clearing near CPNPP Units 3 and 4 on CP3 and 4 to Preferred Normal 3
- L-G fault with delayed clearing near CPNPP Units 3 and 4 on CP3 and 4 to Preferred Normal 4

The study will be revised as necessary when both final as built equipment data and as built transmission system circuit configurations are received.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-21

The regulatory basis for this question is described in 10 CFR 50.65(a)(4), NUREG-0800,Chapter 8.2, "Offsite Power System," and NRC Generic Letter 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power," February 1, 2006.

FSAR Subsection 8.2.2.2, Grid Reliability and Stability Analysis, states that, "The study was conducted in accordance with the ERCOT Generation Interconnection or Change Request Procedure using a 2015 summer peak case projected from the 2012 ERCOT summer peak base case. The ERCOT dynamics database associated with the 2010 summer peak base case was modified for compatibility with the 2015 base case." Explain why the summer of 2015 was selected as the peak base and state whether maximum winter loads were considered.

ANSWER:

The summer of 2015 was selected as the peak case to study since this transmission in-service timeframe supports the planned fuel load and commercial operation dates for CPNPP Units 3 and 4. Winter maximum loads were not considered because ERCOT and Oncor are summer peaking systems and summer presents the most severe conditions.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-22

The regulatory basis for this question is described in 10 CFR 50.65(a)(4), NUREG-0800, Chapter 8.2, "Offsite Power System," and NRC Generic Letter 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power," February 1, 2006.

FSAR Subsection 8.2.2.2, Grid Reliability and Stability Analysis, indicates that one of the contingencies evaluated is the simultaneous trip of CPNPP, Units 3 and 4. Indicate whether the loss of all four CPNPP units is a reasonable contingency to be evaluated. If not, explain how you reached this conclusion.

ANSWER:

The loss of all four CPNPP units was not considered a reasonable contingency to be evaluated for this study. CPNPP Units 1 and 2 are connected to the transmission system through a 345kV switchyard that is independent of the 345kV plant switching station that connects CPNPP Units 3 and 4 to the transmission system.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-23

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2 "Offsite Power System."

FSAR Subsection 8.2.2.2, Grid Reliability and Stability Analysis, indicates that the voltage low point is 0.976 pu and that the frequency deviation is 0.24 Hz at the lowest point. Explain how these values were determined.

ANSWER:

A contingency was evaluated in the Stability Study to illustrate the effect of loss of the largest generation source. Loss of CPNPP Units 3 and 4 was simulated. The results for this contingency show the voltage at 0.976 pu and frequency deviation of 0.24 Hz.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

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.: 2577 (CP RAI #24)
SRP SECTION: 08.02 – OFFSITE POWER SYSTEM
QUESTIONS for Electrical Engineering Branch (EEB)
DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-24

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 8.2 "Offsite Power System."

FSAR Subsection 8.2.2.2, Grid Reliability and Stability Analysis, states that the transmission system is evaluated "almost same as" Comanche Peak Nuclear Power Plant, Units 1 and 2. Provide the assessment methods, analysis and results used to evaluate the reliability of Units 3 and 4.

ANSWER:

The assessment methods, analysis, and results used to evaluate the reliability of Units 3 and 4 are contained in FSAR Section 8.2.2.2 – Grid Reliability and Stability Analysis. The FSAR statement that the transmission system reliability is evaluated "almost same as" Comanche Peak Nuclear Power Plant, Units 1 and 2 considers the following facts:

- The analysis for Units 1 and 2 was performed successfully as confirmed by the operating experience of Units 1 and 2 from 1986 to 2007.
- The analysis for Units 3 and 4 was performed by the same organization that analyzed Units 1 and 2 and used similar criteria.
- Units 3 and 4 are connected to the same Oncor transmission grid as Units 1 and 2, and
- Units 3 and 4 are associated with the same power pool (ERCOT) as Units 1 and 2.

Impact on R-COLA

FSAR Revision 0 page 8.2-12 will be revised to reflect this response. See attached page 8.2-12.

Because of text additions and deletions, the page numbers on the marked-up FSAR pages may not be the same as the page numbers in FSAR Revision 0.

Impact on S-COLA

None.

Impact on DCD

None.

The addition of the proposed CPNPP Units 3 and 4 at the Comanche Peak facility does not adversely impact the stability of the existing units and the new units in the area. The Comanche Peak generation remains stable for reasonably expected contingencies. These study cases include loss of the most heavily loaded transmission circuit connected to the plant switching station, loss of the largest capacity transmission circuit connected to the plant switching station and removal of the largest load from the system. In addition, in case of loss of the largest supply, i.e. CPNPP Units 3 and 4, the transmission system remains stable with slight voltage and frequency variation. The voltage low point is about 0.976 pu and frequency deviation from 60 Hz is only 0.24 Hz at the lowest point. In addition, the maximum frequency decay rate does not exceed 5 Hz/second that is assumed in the reactor coolant system flow analysis in Chapter 15.

Grid stability is evaluated on an ongoing basis based on load growth, addition of new transmission lines, addition of new generation capacities and for planned system changes.

The plant switching station and associated outgoing transmission lines and tie lines are newly constructed in CPNPP site and the transmission lines are connected to the four independent and separate local switching station. The transmission system reliability is evaluated ~~almost same~~in a similar manner as the CPNPP Units 1 and 2. CPNPP Units 1 and 2 have not experienced any LOOP event caused by both the transmission system accepting the unit's output and the transmission system providing the preferred power for the unit's loads, from 1986 to 2007. According to this experience data, the transmission system is expected to be highly reliable. RCOL2_08.02-24 RCOL2_08.02-24

8.2.3 Design Bases Requirements

CP COL 8.2(11) Replace the first sentence of the second paragraph in DCD Subsection 8.2.3 with the following.

A failure modes and effects analysis is provided in Subsection 8.2.1.2.1.1 and the offsite power system conforms to the following requirements.

CP COL 8.2(11) Replace the last sentence of the third paragraph in DCD Subsection 8.2.3 with the following.

A grid stability analysis is provided in Subsection 8.2.2.2 and the grid stability conforms to this requirement.

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.: 2577 (CP RAI #24)

SRP SECTION: 08.02 – OFFSITE POWER SYSTEM

QUESTIONS for Electrical Engineering Branch (EEB)

DATE OF RAI ISSUE: 07/29/2009

QUESTION NO.: 08.02-25

The regulatory basis for this question is described in NUREG-0800, Standard Review Plan, Chapter 8.2, "Offsite Power System."

With respect to FSAR Table 8.2-203, Failure Modes and Effects Analysis for Offsite Power Sources, pertaining to structural failure of a tower, clarify the following items:

a) The table states that "One or more of these circuits may share transmission circuits with other circuits." Clarify which circuits share the same structure and why the failure of one structure would not constitute a loss of more than one circuit.

b) CPNPP uses the words "under normal conditions" and in other areas "under normal operating conditions". Clarify what is meant by such statements and why abnormal events or conditions should not be considered in the FMEA.

c) CPNPP states that, "The actual routing of some or all of these four circuits will be subject to the approval of the [Public Utility Commission of Texas] PUCT. Final design of circuits subject to PUCT approval will take place after such the PUCT approval is received." Provide a revised FMEA if the current analysis is affected by the routing of the circuits after PUCT approval.

ANSWER:

a. The statement refers to the routing of the four new 345kV transmission tie lines between the plant switching station and the unit switchyards. These tie lines are part of the normal and alternate PPS for Comanche Peak 3 and 4. For each unit, these tie lines are separate and independent (there is physical and electrical separation such that the loss of one of these lines will not impact the other). The tie line to the Unit 3 MT (Alternate PPS) may share one or more transmission structures with the existing 345kV Parker Transmission Line that serves

Comanche Peak 1 and 2. The failure of one of these double-circuit structures may cause the loss of two circuits. However, one circuit would be associated with the Unit 3 Alternate PPS and the other would be associated with one of five outgoing 345kV transmission lines for Comanche Peak 1 and 2.

Regarding the four outgoing 345kV transmission lines for Comanche Peak 3 and 4, none of these transmission lines share structures with one another. As these lines leave the property, the lines are routed in different directions and the distance between the lines increases. Thus the closest these lines get to one another is at the plant switching station. At the plant switching station, these lines have sufficient distance between them such that the loss of one of the lines will not impact any of the remaining three lines.

As indicated in FSAR Figure 8.2-201, some of these outgoing 345kV transmission lines may share structures with other existing transmission lines that are routed within the same ROW (transmission lines associated with the grid, none of which are directly associated with Comanche Peak 3 and 4). Should one of these double-circuit transmission structures fail, two transmission lines may be lost, but only one would be associated with Comanche Peak 3 and 4.

b. "Normal operating conditions" means that there are no outages before the fault or event occurs. This would exceed the number of contingencies in the design standard. For instance, if the preferred normal supply were out-of-service for maintenance, the failure of the alternate supply would cause an interruption. The FMEA addresses events that are unplanned failures. Taking a line out-of-service is an elective procedure and a corresponding manual action would be taken to respond to the loss of the remaining source. "Normal operating conditions" and "normal conditions" are the same.

c. A revised FMEA will be provided if the current analysis is affected by the routing of the circuits after PUCT approval.

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

None.

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

None.

<u>Impact on DCD</u>

None.

Attachment 2

Response to Request for Additional Information No. 2581 (CP RAI #23)

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.: 2581 (CP RAI #23)

SRP SECTION: 08.03.01 - AC POWER SYSTEMS (ONSITE)

QUESTIONS for Electrical Engineering Branch (EEB)

DATE OF RAI ISSUE: 7/27/2009

QUESTION NO.: 08.03.01-1

The regulatory basis for this question is discussed in Regulatory Guide 1.9, "Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants," Revision 4, March 2007 and NUREG-0800, Standard Review Plan, Chapter 8.3.1, "AC Power Systems (ONSITE)."

FSAR Table 8.3.1-4R, Electrical Load Distribution - Class 1E [gas turbine generator] GTG Loading, shows the addition of two Essential Service Water Pump Cooling Tower Fans on each of the four buses. Additionally, the Table shows a reduction of the kW load on each of the gas turbine generators from the Essential Service Water Pumps and the Motor Control Centers. These changes result in a slight net increase of the total load on the gas turbine generators.

(1) Please explain the reason for the load reductions, in consideration of the slight net increase of the total load.

(2) Indicate whether the GTG design is such that at no time during the loading sequence will the frequency decrease be less than 95 percent of nominal, nor the voltage decrease be less than 75 percent of nominal, as specified in Regulatory Guide 1.9.

(3) Explain why the rating of the two GTGs affected by the load changes is not increased.

(4) Lastly, describe the controls that will be put in place to assure that design changes and the addition of manual loads will not cause the continuous emergency generator rating to be exceeded.

ANSWER:

(1) The differences between DCD Table 8.3.1-4 and FSAR Table 8.3.1-4R are the capacity associated with Essential Service Water Pumps (ESWPs) and motor control centers (MCCs), and the addition of ESWP Cooling Tower Fans, as follows.

The motor rating of the CPNPP ESWPs is 650 kW instead of 720 kW. The ESWP capacity provided in DCD Table 8.3.1-4 is conservatively assumed based on the standard US-APWR design (DCD COL item 9.2(6) requires plant-specific design details for the ESWPs). FSAR Table 8.3.1-4R provides the plant-specific loads for the ESWPs.

In DCD Table 8.3.1-4, the MCCs include the assumed capacity for the Ultimate Heat Sink (UHS) based on the standard US-APWR design, which does not include cooling tower fans. However, in FSAR Table 8.3.1-4R, based on plant-specific design, the UHS cooling tower fans are added. The UHS cooling tower fan capacity is greater than the assumed UHS capacity on the MCCs provided for in the DCD. The UHS cooling tower fan was not added to the MCC loads because this capacity exceeds the capacity of the MCC. The UHS cooling tower fan is reassigned to Load Centers. With the assumed UHS capacity removed, the total capacity of the MCC is reduced.

The GTG load changes are the result of the differences between the standard US-APWR design (DCD Table 8.3.1-4) and the CPNPP plant-specific design (FSAR Table 8.3.1-4R).

GTG Load Comparison between DCD and COLA

	ESWPs	UHS Load On MCCs	UHS Cooling Tower Fan Load	Sum Total Load
Site-Specific Load	686 kW	0 kW (reassigned to the Load Centers)	336 kW (two 168 kW)	1022 kW
DCD Load	760 kW	230 kW (assigned to the MCCs)	0 kW	990 kW
Net Difference	(74 kW)	(230 kW)	336 kW	32 kW

(2) The class 1E GTGs meet the requirements of Regulatory Guide 1.9. See Subsection C.2.1.3 of DCD Reference 8.3.1-13 (Qualification and Test Plan of Class 1E Gas Turbine Generator System, MUAP-07024-P) for specific performance criteria.

(3) While the maximum loading on trains B and C has increased slightly to 4246 kW, it is still well within the 4500 kW nominal rating of the GTGs. Thus no rating increase is necessary.

(4) Design changes and the addition of manual loads will not cause the continuous emergency generator rating to be exceeded. Design changes are subject to QA-controlled procedures. The design change process requires that the impact of a design change be evaluated for all affected safety systems, including the loading on the GTGs. As such, any design changes which results in changes to the GTG load would be appropriately controlled.

In the event that additional manual loads are required by operator decision, the abnormal operating procedure would control the total loading on the GTGs such that the continuous emergency generator rating would not be exceeded.

Impact on R-COLA

Left margin notation of Table 8.3.1-4R is revised as shown in the attached FSAR markup pages (four sheets).

Impact on S-COLA

None.

Impact on DCD

None.

Table 8.3.1-4R (Sheet 1 of 4)

Electrical Load Distribution - Class 1E GTG Loading

A Class 1E GTG

	Load	Quantity Installed	Rated Output [kW]	Load Input [kW]	Efficiency [%]	Power Factor [%]	Load Factor [%]	LOCA Concurrent with a LOOP				LOOP								
												Hot Shutdown				Cold Shutdown				
								Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	
	A Safety Injection Pump	1	900	950	90	85	95	1	950	589	1118	0	-	-	-	0	-	-	-	
	A Component Cooling Water Pump	1	610	644	90	85	95	1	644	400	758	1	644	400	758	1	644	400	758	
CP COL 9.2(6)	A Essential Service Water Pump	1	650	686	90	85	95	1	686	427	808	1	686	427	808	1	686	427	808	RCOL2_08.03.01-1
	A Containment Spray/Residual Heat Removal Pump	1	400	422	90	85	95	1	422	263	497	0	-	-	-	1	422	263	497	
	A Charging Pump	1	820	866	90	85	95	0	-	-	-	1	866	537	1019	1	866	537	1019	
	A Class 1E Electrical Room Air Handling Unit Fan	1	80	89	85	80	95	1	89	68	112	1	89	68	112	1	89	68	112	
	A Essential Chiller Unit	1	290	324	85	80	95	1	324	243	405	1	324	243	405	1	324	243	405	
	A Spent Fuel Pit Pump	1	230	257	85	80	95	0	-	-	-	1	(257)	(193)	(322)	1	(257)	(193)	(322)	
	A Class 1E Electrical Room Air Handling Unit Electrical Heater	1	250	250	100	100	100	0	-	-	-	0	-	-	-	0	-	-	-	
	A Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-	
CP COL 9.2(20)	A Essential Service Water Pump Cooling Tower Fan	2	150	168	85	80	95	2	336	252	420	2	336	252	420	2	336	252	420	
CP COL 9.2(20)	Motor Control Centers (A&A1)	2						2	320	199	377	2	270	168	318	2	270	168	318	
	Total								3771	2441	4495		3777	2095	4402		3637	2358	4337	RCOL2_08.03.01-1

( ):This load is started by manually if GTG has necessary margin after completing automatic load sequence.

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

Table 8.3.1-4R (Sheet 2 of 4)
Electrical Load Distribution - Class 1E GTG Loading
B Class 1E GTG

	Load	Quantity Installed	Rated Output [kW]	Load Input [kW]	Efficiency [%]	Power Factor [%]	Load Factor [%]	LOCA Concurrent with a LOOP				LOOP								
												Hot Shutdown				Cold Shutdown				
								Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	
	B Safety Injection Pump	1	900	950	90	85	95	1	950	589	1118	0	-	-	-	0	-	-	-	
	B Component Cooling Water Pump	1	610	644	90	85	95	1	644	400	758	1	644	400	758	1	644	400	758	
CP COL 9.2(6)	B Essential Service Water Pump	1	650	686	90	85	95	1	686	427	808	1	686	427	808	1	686	427	808	RCOL2_08.03.01-1
	B Containment Spray/Residual Heat Removal Pump	1	400	422	90	85	95	1	422	263	497	0	-	-	-	1	422	263	497	
	B Emergency Feed Water Pump	1	590	475	90	85	73	1	475	295	559	1	475	295	559	0	-	-	-	
	B Class 1E Electrical Room Air Handling Unit Fan	1	80	89	85	80	95	1	89	68	112	1	89	68	112	1	89	68	112	
	B Essential Chiller Unit	1	290	324	85	80	95	1	324	243	405	1	324	243	405	1	324	243	405	
	A Spent Fuel Pit Pump	1	230	257	85	80	95	0	-	-	-	1	(257)	(193)	(322)	1	(257)	(193)	(322)	
	B Class 1E Electrical Room Air Handling Unit Electrical Heater	1	250	250	100	100	100	0	-	-	-	0	-	-	-	0	-	-	-	
	B Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-	
CP COL 9.2(20)	B Essential Service Water Pump Cooling Tower Fan	2	150	168	85	80	95	2	336	252	420	2	336	252	420	2	336	252	420	
CP COL 9.2(20)	Motor Control Centers (B&A1)	2						2	320	199	377	2	270	168	318	2	270	168	318	
	Total								4246	2736	5054		3386	1853	3942		2771	1821	3318	RCOL2_08.03.01-1

( ): This load is started by manually if GTG has necessary margin after completing automatic load sequence.

Table 8.3.1-4R (Sheet 3 of 4)

Electrical Load Distribution - Class 1E GTG Loading

C Class 1E GTG

	Load	Quantity Installed	Rated Output [kW]	Load Input [kW]	Efficiency [%]	Power Factor [%]	Load Factor [%]	LOCA Concurrent with a LOOP				LOOP								
												Hot Shutdown				Cold Shutdown				
								Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	
	C Safety Injection Pump	1	900	950	90	85	95	1	950	589	1118	0	-	-	-	0	-	-	-	
	C Component Cooling Water Pump	1	610	644	90	85	95	1	644	400	758	1	644	400	758	1	644	400	758	
CP COL 9.2(6)	C Essential Service Water Pump	1	650	686	90	85	95	1	686	427	808	1	686	427	808	1	686	427	808	RCOL2_08.0 3.01-1
	C Containment Spray/Residual Heat Removal Pump	1	400	422	90	85	95	1	422	263	497	0	-	-	-	1	422	263	497	
	C Emergency Feed Water Pump	1	590	475	90	85	73	1	475	295	559	1	475	295	559	0	-	-	-	
	C Class 1E Electrical Room Air Handling Unit Fan	1	80	89	85	80	95	1	89	68	112	1	89	68	112	1	89	68	112	
	C Essential Chiller Unit	1	290	324	85	80	95	1	324	243	405	1	324	243	405	1	324	243	405	
	B Spent Fuel Pit Pump	1	230	257	85	80	95	0	-	-	-	1	(257)	(193)	(322)	1	(257)	(193)	(322)	
	C Class 1E Electrical Room Air Handling Unit Electrical Heater	1	250	250	100	100	100	0	-	-	-	0	-	-	-	0	-	-	-	
	C Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-	
CP COL 9.2(20)	C Essential Service Water Pump Cooling Tower Fan	2	150	168	85	80	95	2	336	252	420	2	336	252	420	2	336	252	420	
CP COL 9.2(20)	Motor Control Centers (C&D1)	2						2	320	199	377	2	270	168	318	2	270	168	318	
	Total								4246	2736	5054		3386	1853	3942		2771	1821	3318	RCOL2_08.0 3.01-1

( ):This load is started by manually if GTG has necessary margin after completing automatic load sequence.

Table 8.3.1-4R (Sheet 4 of 4)

Electrical Load Distribution - Class 1E GTG Loading

D Class 1E GTG

	Load	Quantity Installed	Rated Output [kW]	Load Input [kW]	Efficiency [%]	Power Factor [%]	Load Factor [%]	LOCA Concurrent with a LOOP				LOOP								
												Hot Shutdown				Cold Shutdown				
								Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	
	D Safety Injection Pump	1	900	950	90	85	95	1	950	589	1118	0	-	-	-	0	-	-	-	
	D Component Cooling Water Pump	1	610	644	90	85	95	1	644	400	758	1	644	400	758	1	644	400	758	
<u>CP COL 9.2(6)</u>	D Essential Service Water Pump	1	650	686	90	85	95	1	686	427	808	1	686	427	808	1	686	427	808	RCOL2_08.03.01-1
	D Containment Spray/Residual Heat Removal Pump	1	400	422	90	85	95	1	422	263	497	0	-	-	-	1	422	263	497	
	D Charging Pump	1	820	866	90	85	95	0	-	-	-	1	866	537	1019	1	866	537	1019	
	D Class 1E Electrical Room Air Handling Unit Fan	1	80	89	85	80	95	1	89	68	112	1	89	68	112	1	89	68	112	
	D Essential Chiller Unit	1	290	324	85	80	95	1	324	243	405	1	324	243	405	1	324	243	405	
	B Spent Fuel Pit Pump	1	230	257	85	80	95	0	-	-	-	1	(257)	(193)	(322)	1	(257)	(193)	(322)	
	D Class 1E Electrical Room Air Handling Unit Electrical Heater	1	250	250	100	100	100	0	-	-	-	0	-	-	-	0	-	-	-	
	D Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-	
CP COL 9.2(20)	D Essential Service Water Pump Cooling Tower Fan	2	150	168	85	80	95	2	336	252	420	2	336	252	420	2	336	252	420	
<u>CP COL 9.2(20)</u>	Motor Control Centers (D&D1)	2						2	320	199	377	2	270	168	318	2	270	168	318	
	Total								3771	2441	4495		3777	2095	4402		3637	2358	4337	RCOL2_08.03.01-1

( ): This load is started by manually if GTG has necessary margin after completing automatic load sequence.