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June 24, 2010

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

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 3 AND 4
DOCKET NUMBERS 52-034 AND 52-035
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION NO. 4619 AND 4638

Dear Sir:

Luminant Generation Company LLC (Luminant) submits herein the response to Request for Additional Information (RAI) No. 4619 and 4638 for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. Both RAIs involve the probabilistic risk assessment.

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

There are no commitments in this letter.

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

Executed on June 24, 2010.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachments: 1. Response to Request for Additional Information No. 4619 (CP RAI #165)
2. Response to Request for Additional Information No. 4638 (CP RAI #166)

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NRO

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Attachment 1

Response to Request for Additional Information No. 4619 (CP RAI #165)

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.: 4619 (CP RAI #165)

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

QUESTIONS for PRA and Severe Accidents Branch (SPRA)

DATE OF RAI ISSUE: 5/19/2010

QUESTION NO.: 19-9

The NRC staff needs the following additional information or clarification related to your response to RAI Question 19-1 (RAI Number 26), dated September 22, 2009:

(1) Include in the Combined License (COL) FSAR a brief discussion of the rationale provided in the response for not considering other initiating events beyond loss of offsite power (LOOP) or combined effects.

(2) The modified Table 19.1-203, included in your September 22, 2009 RAI response, shows three scenarios while the discussion of this table on page 19.1-7 of the COL FSAR states that "tornado induced accident scenarios were categorized into four scenarios." Please clarify.

(3) The scenario "loss of offsite power (LOOP) with loss of alternate component cooling water (CCW) induced by tornadoes of enhanced F-scale intensity F1 and F2" has been added in the revised Table 19.1-203. This scenario should be also discussed on page 19.1-7 of the COL FSAR where the other two dominant tornado scenarios are discussed.

(4) A description of the scenario "tornado strike induced loss of offsite power (LOOP) and turbine building (T/B) damage combined with failure of four emergency gas turbine generators" is provided on page 19.1-7 of the COL FSAR. This description should be revised to include the enhanced F-scale intensity range of a tornado strike that would induce the described scenario.

(5) The third scenario listed in the revised Table 19.1-203 of the COL FSAR appears to associate the enhanced F-scale intensity F5 range with wind speeds above 230 mph. This information is in conflict with information provided in Table 19.1-201 of the FSAR where the enhanced F-scale intensity F5 range is shown as associated with wind speeds between 200 mph and 230 mph. Please clarify.

ANSWER:

(1) A brief discussion of the rationale has been added to FSAR Subsection 19.1.5.

(2) There was a typographical error in the mark-up file of the response to RAI Question 19-1. The description "tornado induced accident scenarios were categorized into three scenarios" is correct and was reflected on FSAR Revision 1 page 19.1-8.

(3) A description of the LOOP plus loss of CCW accident scenario has been added to FSAR Subsection 19.1.5.

(4) The description of the LOOP plus T/B damage accident scenario in FSAR Subsection 19.1.5 has been revised.

(5) FSAR Table 19.1-201 has been revised to clarify that the category for the tornado intensity of wind speed exceeding 230 mph is also F5.

Impact on R-COLA

See attached marked-up FSAR Revision 1 pages 19.1-8 and 19.1-13

Impact on S-COLA

None.

Impact on DCD

None.

- Alternative ac power supply system (this is a mitigation system for LOOP events, which is initiating event potentially caused by a tornado strike)

LOOP is the most severe initiating event for tornado strikes with enhanced F-scale intensity of F3 or greater and dominates the plant risk profile. LOOP event is applied to the tornado PRA as the most limiting case. RCOL2_19-9

Based on the results of the plant vulnerability analysis and the discussion above, tornado~~-~~-induced accident scenarios were categorized into three scenarios as shown in Table 19.1-203. The frequency of each scenario derived from the hazard fragility analysis of the T/B is also shown. RCOL2_19-9

- Quantification

For the tornado induced accident scenarios, the CDF was calculated based on the internal event PRA results. The dominant core damage scenarios were the following:

- Enhanced F-scale intensity F1 and F2 tornado strike-induced LOOP and plant switchyard damaged combined with failure of all four CCW or ESW pumps. RCOL2_19-9

The plant switchyard is assumed to be damaged by the tornado strike of enhanced F-scale intensity F1 and F2. A LOOP occurs and CCW or ESW pumps fail to re-start due to common cause failure. Since there is no function to cool reactor coolant pump (RCP), RCP seal loss-of-coolant accident (LOCA) occurs, which results in the core damage. The CDF for this scenario is 2.1E-08/RY.

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

The plant switchyard and the T/B are assumed to be damaged by the tornado strike with wind speed between 136 mph and 230 mph. A LOOP occurs and the emergency gas turbine generators fail to operate due to common cause failure. The alternative power source is unavailable since the T/B is damaged and total loss of ac power occurs. Offsite power cannot be recovered due to damage of the T/B. ~~Reactor coolant pump (RCP) seal loss-of-coolant accident (LOCA)~~RCP seal LOCA occurs and eventually the core is damaged. The CDF for this scenario is 2.2E-08/RY. RCOL2_19-9 RCOL2_19-9

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

CP COL 19.3(4)

Table 19.1-201

Tornado Strike and Exceedance Frequency for the Comanche Peak Site

Enhanced F-Scale Tornado Intensity	Wind Speed (mph)	Description	Strike Frequency (/yr)	Strike Exceedance Frequency (/yr)
F0	65-85	Light Damage	1.3E-04	2.8E-04
F1	86-110	Moderate Damage	1.0E-04	1.5E-04
F2	111-135	Considerable Damage	3.7E-05	5.1E-05
F3	136-165	Severe Damage	1.2E-05	1.4E-05
F4	166-200	Devastating Damage	2.1E-06	2.4E-06
F5	200-230	Incredible Damage	2.0E-07	2.3E-07
F5	230>	Beyond Design Base	2.5E-08	2.5E-08

RCOL2_19-9

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.: 4619 (CP RAI #165)

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

QUESTIONS for PRA and Severe Accidents Branch (SPRA)

DATE OF RAI ISSUE: 5/19/2010

QUESTION NO.: 19-10

Please provide the following additional information or clarification related to your response to RAI Question 19-2 (RAI Number 26), dated September 22, 2009:

(1) The following statement is made in the response: "For Comanche Peak Units 3 and 4, a value of 1E-7 for the annual frequency of occurrence is used as a more conservative quantitative screening criterion. If the criterion of $1x10^{-6}$ per year CDF were used, the results would be a lower risk to plant when compared to using the $1x10^{-7}$ annual frequency of occurrence criterion." Please clarify why the criterion of $1x10^{-6}$ per year CDF results in a lower risk to the plant than the $1x10^{-7}$ annual frequency of occurrence criterion.

(2) It is stated in the response that a qualitative screening of external events has been performed, in accordance with the five qualitative criteria provided in ANSI/ANS-58.21-2007 supporting technical requirement EXT-B1, and a quantitative screening of those external events that could not be eliminated by the qualitative screening was performed. However, the staff believes that the underlying rationale of the ANSI/ANS-58.21-2007 qualitative criteria (which apply mainly to operating reactors) need to be examined when these criteria are applied to new reactor designs. An external event "with equal or less damage potential than a design basis event" can be a significant contributor to the core damage frequency (CDF) of a new reactor because of the features of new light water reactors designs which contribute to the lower risk of such reactors from internal events as compared to operating reactors. For example, while an external event that contributes just below $1x10^{-6}$ per year to the CDF of an operating reactor can be screened out from the quantitative analysis, this may not be the case for a new reactor where the CDF from all other sources can be the same order of magnitude or even smaller. Therefore, the five qualitative criteria provided in ANSI/ANS-58.21-2007 should be complemented by appropriate qualitative or quantitative arguments (e.g., the frequency of the analyzed design basis flooding event is smaller than $1x10^{-7}$ per year, the explosion occurs far from the plant and it is physically impossible to impact it) to show that each eliminated external event is indeed an insignificant contributor to the total CDF of the new reactor. Such qualitative or quantitative arguments can be discussed in Table 19.1-205 of Revision 1 of the COL FSAR where the use of the qualitative screening criteria to eliminate external events from further analysis is documented. For

example, justification or clarification is needed for several statements made or conclusions reached in Table 19.1-205 of Revision 1 of the CPNPP Units 3 and 4 COL FSAR, such as the following:

(a) It is stated that the maximum flood elevation at CPNPP Units 3 and 4 is 793.46 ft msl and this elevation provides more than 28 feet of freeboard under the worst potential flood considerations. It is further stated that the maximum flood elevation is the sum of the maximum flood level that results from a probable maximum precipitation (PMP) on the Squaw Creek watershed (788.9 ft) and the maximum coincident wind waves (4.56 ft). These statements do not provide any indication regarding the magnitude of the frequency of the calculated maximum flood elevation or any information about the assumptions used in the calculation (e.g., it is not clear why the PMP is associated with "the worst potential flood considerations"). Qualitative or quantitative arguments are needed, in conjunction with the evaluation of plant design bases, to show that external flooding is indeed an insignificant contributor to the total CDF (i.e., the frequency of a flooding event that would reach the safety-related plant elevation is less than 10^{-7} per year or its contribution to CDF is a small fraction of the total CDF from all initiating events).

(b) Please clarify the description of probable maximum flood (PMF) in Table 19.1-205 of Revision 1 of the CPNPP Units 3 and 4 COL FSAR. It is stated that the PMF and maximum coincident wind wave activity results in a flood elevation of 809.28 ft msl and the top elevation of the retaining wall is 805 ft msl. What is the location of the flood elevation of 809.28 ft msl and that of the retaining wall? Qualitative or quantitative arguments are needed, in conjunction with the evaluation of plant design bases, to show that the probable maximum flood is indeed an insignificant contributor to the total CDF from all initiating events.

(c) The following statements are made: "There are no surface water impoundments other than small farm ponds that could impact the [Squaw Creek Reservoir] SCR," "Failure of downstream dams, including Squaw Creek Dam, would not affect the CPNPP Units 3 and 4," and "The critical dam failure event is the assumed domino-type failure of the Hubbard Creek Dam, the Morris Sheppard Dam and the De Cordova Bend Dam coincident with the PMF." It is not clear how these statements are used to conclude that "[t]here are no safety-related structures that could be affected by flooding due to dam failures." Please clarify the description of dam failures in Table 19.1-205 of Revision 1 of the CPNPP Units 3 and 4 FSAR. In addition, qualitative or quantitative arguments are needed, in conjunction with the evaluation of plant design bases, to show that a dam failure event is indeed an insignificant contributor to the total CDF from all initiating events.

(d) It is stated that there is no threat from brush or forest fires because "... the nuclear island is situated sufficiently clear of trees and brush. The distance exceeds the minimum fuel modification area requirements of 30 ft, per NFPA-1144." However, brush and forest fires have been known to jump fairly wide "fire lines." In addition, it is conceivable that a large fire burning only 30 feet from the nuclear island on a hot summer day could effectively raise the local air temperature above the "maximum safety" temperature listed in Table 2.0-1R of the FSAR. Qualitative and/or quantitative arguments are needed, in conjunction with the evaluation of plant design bases, to show that an external fire event is indeed an insignificant contributor to the total CDF from all initiating events. Also, a commitment to assure that requirements assumed in the screening analysis, if any, will be met after the plant is built needs to be established (e.g., NFPA-1144 requirements). Please discuss.

(e) For aircraft hazards it is stated: "The probability of aircraft-related accidents for CPNPP Units 3 and 4 is less than an order of magnitude of 10^{-7} per year for aircraft, airway, and airport information reflected in Subsection 2.2.2.7." Please clarify this statement and justify the applicability of the ANSI/ANS-58.21-2007 qualitative criterion number 2 (i.e., an aircraft hazards event has a significantly lower frequency and no worse consequences than another event that was analyzed).

(f) For turbine missiles it is stated: "The probability of turbine failure resulting in the ejection of turbine rotor (or internal structure) fragments through the turbine casing, P1, as less than 10-5 per year. The acceptable risk rate P4 = P1xP2xP3 is therefore maintained as less than 10^{-7} per year." Please clarify this statement, define P2 and P3, and justify the applicability of the ANSI/ANS-58.21-2007 qualitative criteria 2 and 3 to a turbine missile event.

ANSWER:

(1) A screening criteria of $1x10^{-6}$ per year results in a lower risk to the plant than the $1x10^{-7}$ annual frequency of occurrence screening criteria because the higher screening value ($1x10^{-6}$ per year) screens out more events (those between 10^{-6} and 10^{-7}). When fewer events are considered, the risk will be reduced. A value of $1x\ 10^{-7}$ for the annual frequency of occurrence is used as a quantitative screening criterion for CPNPP Units 3 and 4. If the screening criterion of $1x10^{-6}$ per year CDF or annual frequency of occurrence were used, the events lower than these screening criteria would be eliminated and would not be taken into account in the quantitative risk. Therefore, the lower criterion of $1x10^{-7}$ for the annual frequency of occurrence is used.

(2) External event preliminary screening criteria defined in ANSI/ANS-58.21-2007 are universal screening criteria without regard for plant types. Therefore, the preliminary screening criteria are applicable for CPNPP Units 3 and 4. This is because each screening criteria has the following characteristics:

- Lower damage potential than a design basis event

  Safety-related SSCs are contained in seismic category I structures. Those SSCs are designed to prevent significant impact from design basis hazards. Therefore, those events that have a lower damage potential than a design basis event would not cause significant events or degradation in safety-related systems. Those events are covered in the internal events PRA or in design analysis.

- Lower event frequency of occurrence than another event

  The events that have similar impact on the plant would result in similar accident sequences. Therefore, those events are represented by one event scenario. If the frequency of an event has a lower magnitude than another event, the contribution to risk from the event with the higher frequency envelopes the contribution from event with lowers frequency.

- Cannot occur close enough to the plant to have an affect

  The event that cannot affect the plant does not need to be taken into consideration.

- Included in the definition of another event

  An event that is included in another event definition does not need to be taken into consideration.

- Sufficient time to eliminate the source of the threat or to provide an adequate response

  If there is sufficient time during an event to eliminate the source of the threat or to provide an adequate response and the event has very low risk compared to other events, the event can be screened out.

US-APWR is an advanced LWR with enhanced safety. The plant risk such as core damage frequencies are one order of magnitude lower than conventional LWRs. Therefore, the lower value of 10^{-7} per year is applied for a quantitative screening criterion. Additionally, the qualitative screening criteria noted above are applicable for advanced plants because those qualitative criteria assure no hazardous potential exist or the effect of hazards have lower damage potential than enhanced design basis.

Additional discussions of the basis for qualitative or quantitative screening in response to parts (2)(a) to (f) are provided below. FSAR Table 19.1-205 has been revised to reflect this response.

(a) The PMP distributions used as input for determining the Probable Maximum Flood (PMF) for the CPNPP Units 3 and 4 were developed using Hydrometerological Report (HMR) 51 and HMR 52.

The PMP distributions were calculated for the following scenarios:

- Overall PMP for storm centers within the Squaw Creek watershed
- Overall PMP for storm centers within the Paluxy River watershed
- Squaw Creek Reservoir PMP for storm centers within the Squaw Creek watershed.

The critical storm center within the Paluxy River watershed (Basin 4) results in the maximum PMP for the overall watershed (Basins 1, 2, 3 and 4 combined) at the confluence of Paluxy River and Squaw Creek. Additionally, when the storm center was kept in the Squaw Creek watershed (Basin 1), it resulted in a higher PMP for the Squaw Creek watershed. A higher PMP for the Squaw Creek watershed can result in a higher water surface elevation at CPNPP Units 3 and 4. The PMP for the critical storm center for each basin in the scenarios above was analyzed individually to determine the resulting peak runoff and the water surface elevation.

The 6-hour incremental PMP estimates for the Squaw Creek Reservoir (Basin 1) used to determine the PMF are in Table 1 below.

Table 1 Squaw Creek Watershed 6-hr Incremental PMP Estimates

Duration (hr)	Incremental PMP (in)
6	0.61
12	0.74
18	0.94
24	1.28
30	2.02
36	5.01
42	24.93
48	2.87
54	1.57
60	1.08
66	0.82
72	0.66
Total	42.53

The precipitation for each of the 6-hour periods is less than 5.01 inches with the exception of one period which is 24.93 inches. Thus, in order to obtain the precipitation that results in a PMF, one of the 6-hour periods must be on the order of 25 inches or more. The frequency of the PMF thus can be determined by estimating the frequency of a 25-inch rainfall in a 6-hour period. Such an estimate would be conservative because there must be additional rainfall in very close time frames to obtain the total precipitation that result in a PMF.

Reference 1 lists extreme rainfall events worldwide for the time period of about 1819 to about 1949[1], a period of 130 years. This source documents several extreme rainfall events in the U.S. that could have included a 6-hour 25-inch rainfall. Reference 2, which includes data through 1996 (an additional 47 years), identifies events in addition to those included in Reference 1. Table 2 is a listing of the events from both sources.

Table 2 U.S. Extreme Rainfall Events (6 to 24 hr Duration)

Location	Date	Duration (hr)	Rainfall (in)	Source
Smethport, PA	7/18/1942	4.5	30.8+	Ref 1
Smethport, PA	7/17-18/1942	15	34.5	Ref 1
Thrall, TX	9/9/1921	18	36.5	Ref 1
Smethport, PA	7/18/1942*	3	28.50 estimated	Ref 2
Smethport, PA	7/18/1942*	4.5	30.70	Ref 2
Smethport, PA	7/18/1942*	12	34.30	Ref 2
Thrall, TX	9/9/1921	18	36.40	Ref 2
Alvin, TX	7/25-26/1979	24	43.00	Ref 2

The two sources agree for most of the events with the following exceptions. The Smethport, PA event, which occurred on 7/17-18/1942, is recorded as two events in Reference 1 and three events in Reference 2. According to Reference 3, this was actually a single event that lasted 18 hours with a total rainfall of 34.3 inches. There was one 6-hour period where 30.7 inches fell. Therefore, the Smethport rainfall will be treated as one event. The only other difference between the two sources is the inclusion of the Alvin, TX event. This event extended 24 hours with a total rainfall of 43 inches. It is assumed that it includes one 6-hour period with at least 25 inches of rainfall. The Thrall, TX event lasted for 18 hours with 36.4 inches of rainfall. It is also assumed that this event included one 6-hour period with 25 inches of rainfall. Therefore, based on this data, there are three events which potentially had or did have 25 inches of rainfall or greater in a 6-hour period during the data period of 177 years. It is also assumed that these three events affected at least 10-sq-mi areas.

The three locations for the rainfall events considered in the estimation of PMF frequency (Smethport, PA, Thrall, TX and Alvin, TX) are superimposed on Figure 18 from Reference 4 (below). This figure includes isopleths for various PMPs. The isopleth for 25-inch rainfall passes near Smethport and includes both Thrall and Alvin. The area enclosed by this 25-inch contour is the area of the U.S. that could experience extreme rainfall events equal to or greater than the three events identified above.

Figure 18 shows that there are many states that are completely included in the PMP area. Note that there are two bands of shading from the original map, a north-south band on the west of the PMP region, and a southwest-northeast band along the Appalachian Mountains that indicate areas not included in the PMP calculations. Portions of states that are not totally enclosed in the PMP area are indicated with dark shading. The cross-hatched areas are part of the PMP area but are not included in the calculation of total PMP area to compensate for the two areas (shaded and dark shaded) discussed above. It can be seen that the shaded and

[1] The earliest event in the Ref. 1 data is in 1819; it is likely that the record goes back farther than that. The manuscript was received for publication in Dec 1949, so it likely includes data up to about 1949; e.g., an event in 1947 is identified in the paper.

cross-hatched areas approximately balance. Table 3 provides the areas of the included states taken from the U.S. Census Bureau's QuickFacts (Ref. 5).

Table 3 Land Area of States in PMP Area

State	Land Area (sq-mi)
Rhode Island	1,045
Connecticut	4,845
New Jersey	7,417
Delaware	1,954
Maryland	9,774
Pennsylvania	44,817
Ohio	40,948
Indiana	35,867
Illinois	55,584
Missouri	68,886
Kansas	81,815
Virginia	39,594
West Virginia	24,078
Kentucky	39,728
Oklahoma	68,667
Arkansas	52,068
Tennessee	41,217
North Carolina	48,711
South Carolina	30,109
Georgia	57,906
Florida	53,927
Alabama	50,744
Mississippi	46,907
Louisiana	43,562
Texas	261,797
Total	1,211,967

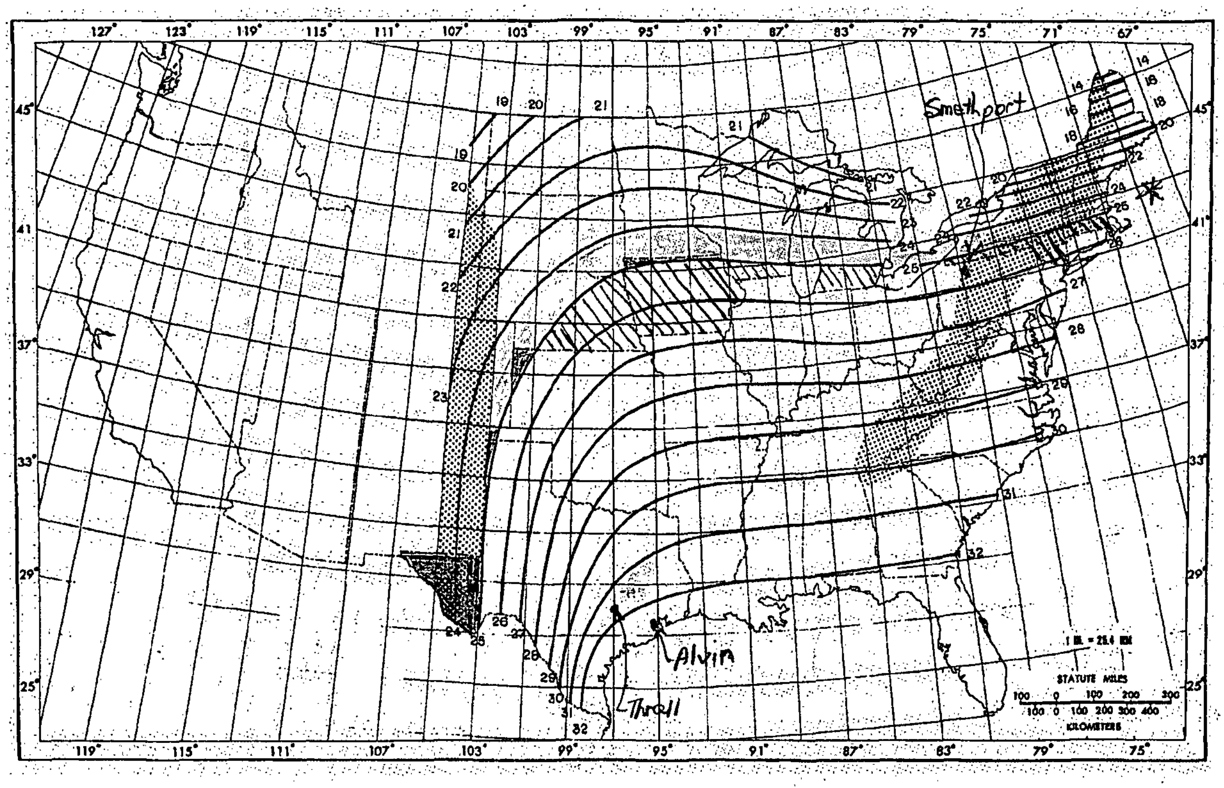

Figure 18.--All-season PMP (in.) for 6 hr 10 mi^2 (26 km^2).

With the above information, the frequency of a 6-hour 25-inch PMP at any given point can be calculated. The overall frequency of a 6-hour, 25-inch PMP event for the U.S. is determined by dividing the number of events by the duration of the historical record. The areal frequency of a PMP event is calculated by dividing the U.S. PMP frequency by this total area over which a PMP could occur and multiplying this amount by the area of a PMP, 10 sq-mi. Thus the PMP frequency is:

$$f_{PMP} = \left(\frac{No.\ of\ PMP\ Events}{Duration\ of\ Historical\ \text{Record}}\right)\left(\frac{A_{PMP\ Event}}{A_{Total\ PMP\ \text{Region}}}\right)$$

$$= \left(\frac{3}{177\ yrs}\right)\left(\frac{10\,mi^2}{1{,}211{,}967\,mi^2}\right)$$

$$= 1.4\times10^{-7}\,/\,yr$$

Therefore, the frequency of a PMP of 25 inches over 10 square miles is estimated to be $1.4\text{x}10^{-7}$ per year. This is a conservative estimate of the frequency of the PMP that results in a PMF for CNNPP Units 3 and 4 because additional periods of significant rainfall must also occur in close temporal proximity to the 25-inch 6-hour rainfall event. Given the calculated PMF is not projected to reach the safety-related elevation of the plant and the estimated PMP and PMF frequency of $1.4\text{x}10^{-7}$/year, the frequency of a flooding event that would reach the safety-related elevation of the plant is projected to be well below 10^{-7} per year.

(b) The PMF elevation has been revised due to RAI No. 4310 (CP RAI #143) Question 02.04.03-5, the response for which has not been submitted to the NRC yet. The revised PMF elevation is 793.66 ft. This elevation represents the maximum still water elevation of Squaw Creek Reservoir during the PMF. The coincident wind wave activity has also been revised due to RAI 143 Question 02.04.03-11. The revised PMF with coincident wind wave activity runup elevation is 810.64 ft. The site grading plan has been revised and the top of the retaining wall is now at elevation 795 ft. The revised PMF with coincident wind wave activity elevation exceeds the top elevation of the retaining wall.

The retaining wall is located approximately 555 ft. northeast from the center point of CPNPP Unit 3 on the slopes of the Squaw Creek Reservoir. Above the retaining wall, a 2:1 (horizontal to vertical) slope continues up to elevation 820 ft. The coincident wind wave activity analysis result is based on the runup on a continuous vertical wall. Comparative analysis for runup on adjacent slopes concludes it is conservative to assume that runup above the top elevation of the retaining wall rises vertically, because runup evaluated for the 2:1 slope would result in a lower elevation. It is assumed that the PMF with coincident wind wave activity elevation of 810.64 ft is applicable to the entire rim of the Squaw Creek Reservoir.

As indicated in the response to (2)(a) above, the estimated frequency of a PMF capable of reaching the plant grade elevation is estimated to be less than 10^{-7} per year. Consideration of the maximum coincident wind wave activity along with the PMF would tend to lower the overall frequency.

(c) The dam failure analysis has been revised due to RAI No. 4311 (CP RAI #140) Questions 02.04.04-5 and -7, the response for which has not been submitted to the NRC yet. The revised qualitative analysis considers both existing and future conditions and is performed based on comparison of distance from the confluence of the Paluxy River with the Brazos River, reservoir storage, dam height, and drainage area. Domino-type failures and simultaneous failures are postulated when applicable. The qualitative analysis resulted in two potential scenarios that were evaluated further by quantitative analysis.

The quantitative analysis results in the critical dam failure event of the assumed domino-type failure of Fort Phantom Hill Dam, the proposed Cedar Ridge Reservoir, Morris Sheppard Dam, and De Cordova Bend Dam. In addition, Lake Stamford Dam is assumed to fail simultaneous with the Cedar Ridge Reservoir Dam. Dam failures are assumed coincident with the PMF. The resulting water surface elevation at the confluence of the Paluxy River and the Brazos River is 760.71 ft. CPNPP Units 3 and 4 safety-related facilities are located at elevation 822 ft. There are no safety-related facilities that could be affected by flooding due to dam failures.

As noted above, this analysis is based on dam failures coincident with the PMF; therefore, the frequency of the event is estimated to be less than 10^{-7} per year.

(d) The guidance in NFPA 1144 identifies that buildings located closer than 9.14 m (30 ft) to a vegetated slope shall require special mitigation measures as determined by the authority having jurisdiction. The 30-ft distance is the minimum distance which should be cleared of vegetation in order to prevent continued propagation of a wildfire. Regarding CDF, the CPNPP Units 3 and 4 reactor buildings will be well in excess of this minimum distance from any concentrated vegetation. The entire site will be surrounded by a perimeter security fence which will employ an isolation zone of a minimum 20 feet. This isolation zone will be void of any vegetation and will have a layer of crushed stone. The perimeter fence is positioned a distance away from the power block which well exceeds the minimum 30 feet as described in NFPA 1144.

The area between the perimeter fence and the plant makes up the Protected Area. This area will not have a concentration of vegetation that will maintain a flame front or propagate a wildfire. The combination of the isolation zone (20 ft) and the Protected Area distance between the isolation zone and the power block will provide a sufficient separation from any forest or grassland that may be in the vicinity of CPNPP Units 3 and 4.

The area outside the perimeter fence is identified as the Owner Controlled Area (OCA). This area is where vegetation may be present. Luminant will procedurally maintain the NFPA 1144 minimum setback distance in the OCA. Also, the OCA adjacent to the isolation zone will be cleared of any concentration of vegetation for security reasons as well.

Therefore, based on the CPNPP Units 3 and 4 site configurations, the protected area distance from the perimeter fence to the power block, the security isolation zone of 20 feet and the setback distance in accordance with the guidance in NFPA 1144 of minimum 30 feet, a minimum total distance in excess of 100 ft will be obtained. This distance is significantly greater that the NFPA 1144 requirements. Therefore, a wildfire in the vicinity of the site will not continue to propagate onto the Protected Area. Furthermore, this combined distance will ensure that the power block will not experience temperatures from a wildfire that would affect the CDF established in the PRA. Due the significant distance from concentrated vegetation that can fuel wild fires, and the fact that wild fires cannot occur frequently because the event itself will eliminate concentrated vegetation, qualitative screening criteria Criterion 3 can be applied. Table 19.1-205 has been revised to provide the commitment to procedurally maintain the NFPA 1144 setback distance in the OCA.

(e) The description in Table 19.1-205 for aircraft hazards has been revised to provide a brief summary of the screening analysis performed in FSAR Subsection 3.5.1.6. The analysis of FSAR Subsection 3.5.1.6 demonstrates that to maintain the probability of an aircraft crashing into the plant below $1x10^{-7}$ per year, the estimated annual number of aircraft operations must be less than 19,300. FSAR Subsection 2.2.2.7 states only one military training route, Victor air route VR-158, passes within 10 mi of the CPNPP site, and it only has "300-400 annual sorties or aircraft deployments."

Thus the probability of aircraft-related hazards is less than 10^{-7} per year, and criterion 2 of the ANSI/ANS-58.21-2007 screening criteria can be applied.

(f) The definition of P2 and P3 can be found in the DCD Revision 2 Subsection 3.5.1.3.2, which states,

> The probability of unacceptable damage resulting from turbine missiles, *P4*, is expressed as the product of (a) the probability of turbine failure resulting in the ejection of turbine rotor (or internal structure) fragments through the turbine casing, *P1*; (b) the probability of ejected missiles perforating intervening barriers and striking safety-related SSCs, *P2*; and (c) the probability of struck SSCs failing to perform their safety function, *P3*.

The justification for applying ANSI/ANS-58.21-2007 qualitative criterion 2 is found in FSAR Revision 1 Subsection 3.5.1.3.2, which states,

> Mathematically, $P4 = P1 \times P2 \times P3$, where RG 1.115 considers an acceptable risk rate for *P4* as less than 10^{-7} per year. For unfavorably oriented T/Gs determined in Subsection 3.5.1.3, the product of *P2* and *P3* is estimated as 10^{-2} per year, which is a more conservative estimate than for a favorably oriented single unit. CPNPP Units 3 and 4 procedures will be implemented 6 months prior to delivery of the T/G to require inspection

> intervals established in Technical Report, MUAP-07028-NP, "Probability of Missile Generation From Low Pressure Turbines", and to require a turbine valve test frequency per Technical Report, MUAP-07029-NP, "Probabilistic Evaluation of Turbine Valve Test Frequency", and other actions to maintain *P1* within acceptable limits as outlined in NUREG-0800 Subsection 3.5.1.3, Table 3.5.1.3-1. These inspection intervals maintain the probability of turbine failure resulting in the ejection of turbine rotor (or internal structure) fragments through the turbine casing, *P1*, as less than 10^{-5} per year. The acceptable risk rate $P4 = P1 \times P2 \times P3$ is therefore maintained as less than 10^{-7} per year.

The justification for applying ANSI/ANS-58.21-2007 qualitative criterion 3 is found in FSAR Revision 1 Subsection 3.5.1.3,1 which states,

> The CPNPP site plan (Figure 1.2-1R) reflects the placement of CPNPP Units 3 and 4 in relation to existing Units 1 and 2. The location of CPNPP Units 3 and 4 is such that CPNPP Units 1 and 2 are outside the low-trajectory turbine missile strike zone inclined at 25 degrees to the turbine, and therefore no postulated low-trajectory turbine missiles affect CPNPP Units 1 and 2. Similarly, no postulated low trajectory turbine missiles from CPNPP Units 1 and 2 will affect CPNPP Units 3 and 4. The placement of CPNPP Units 3 and 4, however, does generate an unfavorable orientation, as defined in NUREG-0800, Section 3.5.1, of the turbine generator (T/G) in relationship with safety-related SSCs of the adjacent US-APWR Unit.

Therefore, through site layout criterion 3 is applied to screen CPNPP's existing and new units from producing a turbine missile that could affect the other units. Also, through the use of operational programs the probability of a turbine missile being created at CPNPP Units 3 or 4 that affect safety-related SSCs is maintained below 10^{-7} per year and criterion 2 is applied.

<u>References</u>

1. Jennings, A. H., "World's Greatest Observed Point Rainfall," *Monthly Weather Review*, vol. 78, pp. 4-5, 1950. Available online at http://docs.lib.noaa.gov/rescue/mwr/078/mwr-078-01-0004.pdf.
2. "USA Record Point Precipitation Measurements," Hydrometeorological Design Studies Center, NOAA's National Weather Service Website. Available online at http://www.nws.noaa.gov/oh/hdsc/record_precip/record_precip_us.html.
3. Burt, Christopher C., and Mark Stroud, "Extreme Weather: A Guide and Record Book—Climate Change Edition," W. W. Norton & Company, New York, NY, 2007.
4. Schreiner, L. C., and J. T. Riedel, "Probable Maximum Precipitation Estimates, United States East of the 105th Meridian," Hydrometeorological Report No. 51, National Weather Service, Office of Hydrology, Hydrometeorological Branch, June 1978. (Published by U.S. Commerce Department, National Oceanic and Atmospheric Administration, and U.S. Department of the Army, Corps of Engineers.) Available online at http://www.weather.gov/oh/hdsc/PMP_documents/HMR51.pdf.
5. U.S. Census Bureau, State & County QuickFacts. Available online at http://quickfacts.census.gov/qfd/.

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

See marked-up FSAR Revision 1 page 19.1-51. See also Table 19.1-205 included in the response to RAI No. 4638 (CP RAI #166) Question 19-13 found in Attachment 2 of this letter.

Impact on S-COLA

None.

Impact on DCD

None.

CP COL 19.3(4)

Table 19.1-206

Site-specific Key Assumptions

Key Insights and Assumptions	Disposition	
Site-Specific Design Features and Assumptions Design features and assumptions that contribute to high reliability of continuous operation after the 24 hour mission time are the followings.		
- The normal makeup water to the UHS inventory is from Lake Granbury via the circulating water system.	FSAR 9.2.5.2.2	
- UHS transfer pumps and the ESW pumps located in each basin are powered by the different Class 1 E buses. UHS transfer pump operates to permit the use of three of the four basin water volumes.	FSAR 9.2.5.2.2, 9.2.5.3	
- The transfer line is a high integrity line, regularly tested and inspected for corrosion.	FSAR 9.2.1.2.1, 9.2.5.4	
- There are adequate low-level and high-level alarms to provide rapid control room annunciation of a level problem and to allow adequate time to confirm the level and take effective action to address it.	FSAR 9.2.5.5	
- Two basins contain enough water to supply water to remove decay heat for at least 24 hours after plant trip.	FSAR 9.2.5	
Overfill protection will be provided to prevent overfilling the basin and failing the pump(s). This feature is important to prevent degradation of the ESWS when the basin is overfilled due to failure in the transfer pump or circulation system.	FSAR 13.5 Prepare operational procedures to monitor the water level of basin at main control room.	RCOL2_19-11
Backup actions can avoid excessive room heat up in the event of loss of ESW room ventilation. Based on this assumption, loss of ESW room ventilation is not modeled in the PRA model. Operational procedures to avoid excessive room heat up will be prepared.	FSAR 13.5 Prepare operational procedures to monitor the water level of basin at main control room.	RCOL2_19-11
Plant specific SSCs that potentially impact plant safety are seismically designed and thus will not impact the plant HCLPF. HCLPF values for the plant specific SSCs, such as cooling towers, will be confirmed with calculation using EPRI TR-103959 methodology after completion of seismic design and stress analysis of the SSCs.	FSAR 19.1.2.4 FSAR 19.1.5.1 DCD Tier 1 ITAAC #24	RCOL2_19-11
NFPA 1144 minimum setback distance in the Owner Controlled Area will be procedurally maintained. Also, the Owner Controlled Area adjacent to the isolation zone will be cleared of any concentration of vegetation for security reasons.	FSAR 9.5 NFPA 1144 minimum setback distance will be procedurally maintained	RCOL2_19-10

Attachment 2

Response to Request for Additional Information No. 4638 (CP RAI #166)

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.: 4638 (CP RAI #166)

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

QUESTIONS for PRA and Severe Accidents Branch (SPRA)

DATE OF RAI ISSUE: 5/20/2010

QUESTION NO.: 19-11

The staff requests the following additional information or clarification related to Luminant's response to RAI Number 28 (3214), Question 19-5, dated September 24, 2009:

(1) Luminant, in its response dated September 24, 2009, submitted a revision to Table 19.1-206 of the Combined License (COL) FSAR. The last three site-specific key insights and assumptions listed in Table 19.1-206 of the CPNPP Units 3 and 4 COL FSAR (i.e., overfill protection, backup actions to avoid excessive room heat up in the event of loss of essential service water (ESW) room ventilation, and plant high confidence of low probability of failure (HCLPF) values of structure, system, and components (SSCs)) require action by the COL licensee. As such, the reference to these specific COL licensee actions is requested to be shown in the disposition column of Table 19.1-206.

(2) The following statement is made in Part 3 of the response and in the last item of Table 19.1-206: "Plant-specific SSCs that potentially impact plant safety are seismically designed and will not impact the plant high confidence of low probability of failure (HCLPF)." This statement does not address the staff's question regarding any changes to the seismic margins analysis results, assumptions and insights (documented in the referenced US-APWR DCD) that result from site specific design changes. The PRA-based seismic margins analysis has additional objectives beyond estimating the plant's HCLPF value, such as the identification of dominant seismic sequences and associated major contributors (see Section 19.1.5.1.2 of the US-APWR DCD).

ANSWER:

(1) FSAR Table 19.1-206 has been revised to include the COL action item information for the last three site-specific key insights and assumptions.

(2) The site-specific SSE for CPNPP Units 3 and 4 is less than the 0.3g SSE for US-APWR standard design. Therefore the seismic analysis of US-APWR standard design is applicable for CPNPP Units 3 and 4.

At the design certification phase, specific design data such as material properties, analysis results, qualification test information, etc. were not available. Therefore, generic fragility data were used for the component fragilities of US-APWR standard design components. The generic data used for US-APWR were based on the fragilities provided by the Electric Power Research Institute (EPRI) Utility Requirements Document. A conservative HCLPF value of 0.5g was assumed for components for which generic data were not available or not appropriate, including the ESWS. Seismic fragilities of standard design structures were developed using the methodology in EPRI TR-103959.

The PRA related SSCs are generally designed to have adequate margin to both the DCD condition and CPNPP Units 3 and 4 site-specific conditions because the site-specific SSE is less than the 0.3g SSE for US-APWR standard design. Therefore, the results and insights of SMA in the DCD are applicable to CPNPP Units 3 and 4.

The site-specific seismic margin analysis using the design specific in-structure response and the results of stress analysis will be performed as part of the design ITAAC #24 to confirm that the HCLPF values meets the SMA criteria (no less than 1.67 times SSE). This will include CPNPP Units 3 and 4 site-specific PRA related SSCs such as UHRSR.

FSAR Subsection 19.1.5.1.1 has been revised to specify the SSE of CPNPP Units 3 and 4.

Impact on R-COLA

See attached marked-up FSAR Revision 1 pages 19.1-10 and 19.1-51.

Impact on S-COLA

None.

Impact on DCD

None.

19.1.5.1.1 Descriptions of the Seismic Risk Evaluation

RCOL2_19-1 1

Replace the last sentence of the first paragraph after the first bullet "Selection of review level earthquake" in DCD Subsection 19.1.5.1.1 page 19.1-63 with the following.

The seismic margin analysis of the DCD is incorporated by reference although the RLE of CPNPP is less than the DCD RLE of 0.5g, which is 1.67 times the SSE (0.3g).

19.1.5.1.2 Results from the Seismic Risk Evaluation

RCOL2_19-1 1

Add a paragraph after the last paragraph in DCD Subsection 19.1.5.1.2 page 19.1-73 with the following.

The plant-specific HCLPFs of CPNPP Units 3 and 4 that are not less than 1.67 times SSE will be confirmed using the design specific in-structure response and the results of the stress analysis of the US-APWR standard design.

19.1.5.2.2 Results from the Internal Fires Risk Evaluation

CP COL 19.3(4) Add the following text at the beginning of DCD Subsection 19.1.5.2.2.

The only site-specific design that has potential effect on internal fires risk is the site-specific UHS.

Four-train separation is maintained in the site-specific UHS design. Modeling of the site-specific UHS shows a small effect on the reliability of CCWS for internal fire events. As was the case with the results of the Level 1 PRA for operations at power (Subsection 19.1.4.1.2), it has been determined that consideration of the site-specific UHS would have no discernible effect on the fire PRA results that are based on the standard US-APWR design. Therefore, the results described below are considered sufficient and applicable.

19.1.5.3.2 Results from the Internal Flooding Risk Evaluation

CP COL 19.3(4) Add the following text at the beginning of DCD Subsection 19.1.5.3.2.

The only site-specific design that has potential effect on internal flooding risk is the site-specific UHS.

CP COL 19.3(4)

Table 19.1-206

Site-specific Key Assumptions

Key Insights and Assumptions	Disposition	
Site-Specific Design Features and Assumptions Design features and assumptions that contribute to high reliability of continuous operation after the 24 hour mission time are the followings.		
- The normal makeup water to the UHS inventory is from Lake Granbury via the circulating water system.	FSAR 9.2.5.2.2	
- UHS transfer pumps and the ESW pumps located in each basin are powered by the different Class 1 E buses. UHS transfer pump operates to permit the use of three of the four basin water volumes.	FSAR 9.2.5.2.2, 9.2.5.3	
- The transfer line is a high integrity line, regularly tested and inspected for corrosion.	FSAR 9.2.1.2.1, 9.2.5.4	
- There are adequate low-level and high-level alarms to provide rapid control room annunciation of a level problem and to allow adequate time to confirm the level and take effective action to address it.	FSAR 9.2.5.5	
- Two basins contain enough water to supply water to remove decay heat for at least 24 hours after plant trip.	FSAR 9.2.5	
Overfill protection will be provided to prevent overfilling the basin and failing the pump(s). This feature is important to prevent degradation of the ESWS when the basin is overfilled due to failure in the transfer pump or circulation system.	FSAR 13.5 Prepare operational procedures to monitor the water level of basin at main control room.	RCOL2_19-11
Backup actions can avoid excessive room heat up in the event of loss of ESW room ventilation. Based on this assumption, loss of ESW room ventilation is not modeled in the PRA model. Operational procedures to avoid excessive room heat up will be prepared.	FSAR 13.5 Prepare operational procedures to monitor the water level of basin at main control room.	RCOL2_19-11
Plant specific SSCs that potentially impact plant safety are seismically designed and thus will not impact the plant HCLPF. HCLPF values for the plant specific SSCs, such as cooling towers, will be confirmed with calculation using EPRI TR-103959 methodology after completion of seismic design and stress analysis of the SSCs.	FSAR 19.1.2.4 FSAR 19.1.5.1 DCD Tier 1 ITAAC #24	RCOL2_19-11
NFPA 1144 minimum setback distance in the Owner Controlled Area will be procedurally maintained. Also, the Owner Controlled Area adjacent to the isolation zone will be cleared of any concentration of vegetation for security reasons.	FSAR 9.5 NFPA 1144 minimum setback distance will be procedurally maintained	RCOL2_19-10

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak, Units 3 and 4

Luminant Generation Company LLC

Docket Nos. 52-034 and 52-035

RAI NO.: 4638 (CP RAI #166)

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

QUESTIONS for PRA and Severe Accidents Branch (SPRA)

DATE OF RAI ISSUE: 5/20/2010

QUESTION NO.: 19-12

The staff requests the following additional information or clarification related to Luminant's response to RAI Number 28 (3214), Question 19-6, dated September 24, 2009:

(1) Assumptions and important design features regarding the plant-specific essential service water system (ESWS) and ultimate heat sink (UHS) are listed in Section 19.1.4.1.2 (page 19.1-3) and Table 19.1-206 of Revision 1 of the CPNPP Unit 3 and 4 COL FSAR and Luminant's response to the RAI dated September 24, 2009. One assumption states: "Should the plant trip, the basins can be effective in removing decay heat more than 24 hours." This assumption needs to be clarified to state that two basins are effective in removing decay heat for more than 24 hours without replenishment or transferring water from another basin.

(2) It is stated in item (3) of the response: "The PRA considers that the assumption related to the effectivity of basins for the 24 hours can also be applied under the maximum ambient temperature of CPNPP site described in FSAR Chapter 2." Please provide the basis for this statement. Is the design basis calculation based on the maximum ambient temperature for the CPNPP site described in FSAR Chapter 2?

ANSWER:

(1) The UHS design assumption in FSAR Subsection 19.1.4.1.2 has been revised.

(2) The maximum ambient temperature assumed in this statement is the wet-bulb temperature of 83 °F based on 0% annual exceedance as described in FSAR Chapter 2. The calculation that supports this statement is described in the response to RAI No. 3762 (CP RAI #121) Question 09.02.05-5 (ML093520667).

Impact on R-COLA

See attached marked-up FSAR Revision 1 page 19.1-3.

Impact on S-COLA

None.

Impact on DCD

None.

Adoption of CTWs to the UHS for the ESWS raises an additional failure mode for the ESWS, which is the failure of CTW fans. Failure of the CTW fans would cause degradation of heat release from the ESWS to the atmosphere, which would result increase of the ESWS temperature in the faulted train. Failure of both fans in a single CTW train is considered a potential failure mode of the ESWS.

Failures of CTW fans were modeled in ESWS fault tree to address the effect of site-specific UHS. The reliability of ESWS affects both the initiating event frequency of loss of CCW and the reliability of ESWS after the initiating event. Therefore, the initiating event frequency given later in this subsection based on the US-APWR design was re-quantified based on the site-specific ESWS designs along with re-quantification of post-initiating event ESWS reliability.

Assumptions and important design features regarding the UHS and ESWS are as follows:

- A drain line is provided as an overfill protection from overfilling the basin and failing the pump(s).
- There are adequate low-level and high-level alarms to provide rapid control room annunciation of a level problem and to allow adequate time to confirm the level and take effective action to address it.
- On failure of the fans during normal plant operation, operating status of each fan is indicated in the main control room (MCR).
- Should the plant trip, ~~the basins can be effective in removing decay heat more than 24 hours.~~two basins are effective in removing decay heat for more than 24 hours without replenishment or transferring water from another basin. RCOL2_19-12
- The transfer line is a high integrity line, regularly tested and inspected for corrosion.
- Failure of the transfer line will not drain any CTW basin.
- The basin water is tested regularly and maintained in a condition to preclude corrosion and organic material from plugging strainers.
- Ventilation of the ESWP room is reliable not to significantly degrade the unavailability of ESWP.

The internal event core damage frequency (CDF) was found to be numerically the same as reported later in this subsection with an actual increase in the CDF due to the site-specific designs of less than 1 percent. The initiating event frequency for loss of component cooling water (CCW), as reported later in this subsection in Tables 19.1-2 and 19.1-20, increases from 2.3E-05/reactor-year (RY) to 2.4E-05/RY due to the site-specific ESWS designs. The effect of the site-specific ESWS designs on the internal CDF is very small. Therefore, any discrepancy of cutsets, and dominant sequences from that documented for the standard US-APWR design is considered negligible. Changes in importance are the basic events related to the site-specific design shown in Table 19.1-204. The results

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.: 4638 (CP RAI #166)

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

QUESTIONS for PRA and Severe Accidents Branch (SPRA)

DATE OF RAI ISSUE: 5/20/2010

QUESTION NO.: 19-13

The staff requests the following additional information or clarification related to Luminant's response to RAI Number 28 (3214), Question 19-7, dated September 24, 2009:

(1) It is stated in the response that a qualitative screening of external events has been performed, in accordance with the five qualitative criteria provided in ANSI/ANS-58.21-2007 supporting technical requirement EXT-B1, and a quantitative screening of those external events that could not be eliminated by the qualitative screening was performed. As stated in the staff's follow-up RAI related to the response to RAI Question 19-2, the staff believes that the underlying rationale of the ANSI/ANS-58.21-2007 qualitative criteria (which apply mainly to operating reactors) needs to be examined when these criteria are applied to new reactor designs. The five qualitative criteria provided in ANSI/ANS-58.21-2007 should be complemented by appropriate qualitative or quantitative arguments to show that each eliminated external event is indeed an insignificant contributor to the total CDF of the new reactor. Such qualitative or quantitative arguments can be discussed in Table 19.1-205 of Revision 1 of the COL FSAR, where the use of the qualitative screening criteria to eliminate external events from further analysis is documented.

(2) It is stated that Table 19.7-1, of Luminant's response, dated September 24, 2009, does not involve external hazards, such as seismic, "because [they] are already described in DCD chapter 19.1.5 using seismic margin method or PRA method." However, the analysis of the seismic events described in DCD chapter 19.1.5 does not address seismically-induced accidents beyond the plant itself, such as flooding due to failure of upstream dams or release of hazardous materials due to the collapse of nearby industrial, transportation and military facilities. Please discuss.

(3) For hurricanes it is stated: "The Probable Maximum Hurricane (PMH) for the CPNPP site, the PMH sustained (10-minute average) wind speed at 30 ft above ground is 81 mph." Based on this statement hurricanes are screened out from the quantitative analysis since all structures are designed to withstand winds up to 90 mph. The staff believes that this event cannot be screened out without considering the frequency of hurricanes that reach the CPNPP site with wind speed above 90 mph. For example, a hurricane event that strikes the CPNPP site with wind speed above

90 mph once every 100 years is more risk significant than tornadoes of enhanced F-scale intensity F1 since it causes the same plant failures with a significantly higher frequency.

(4) For extreme winds it is stated: "The 3-second gust wind speed for a 100-yr return period [at the CPNPP site] is 96 mph..... This event is not significant impact than hurricanes and tornadoes." Please explain the reason why this event is not more significant than tornadoes of enhanced F-scale intensity F1 given that it can cause the same plant failures (plant switchyard, fire protection system and non-essential chilled water system) with a significantly higher frequency (i.e., once every 100 years vs. 1.4×10^{-4} per year).

ANSWER:

(1) The discussion on the basis of qualitative or quantitative screening for each external event has been supplemented in the FSAR Table 19.1-205. The revision incorporates the response to RAI No. 4619 (CP RAI #165) Question 19-10.

(2) Other external hazards in FSAR Revision 1 Table 19.1-205 such as flooding due to failure of upstream dams or release of hazardous material due to the collapse of nearby industrial, transportation and military facilities are screened out by considering the maximum hazardous conditions without regard for the cause of such accidents. Arguments applied to screen out such hazards are also applicable under seismic event conditions.

(3) The determination of the frequency that hurricanes, with wind speed above 90 mph, could reach the CPNPP site depends on the frequency of hurricanes striking this section of the Texas coast, the hurricane wind speed at landfall, the attenuation of wind speed while traveling inland, and the probability of a hurricane striking the CPNPP site.

As stated in FSAR Subsection 2.3.1.2.2, thirty-nine tropical storms or hurricanes have struck the Texas coast between 1899 through 2006. For major hurricanes (Category 4 or higher), the return period is 17.7 yr (annual frequency of 5.7×10^{-2}). The minimum wind speed for a Category 4 hurricane on the Saffir/Simpson scale is 131 mph. FSAR Figure 2.3-212 gives the number of hurricanes as a function of wind speed based on the entire U. S. coast not only the Gulf coast. As expected, the hurricane frequency of occurrence decreases as wind speed increases. This figure gives a return period of 1000 years for a wind speed of 175 knots (201 mph). The shape of the wind speed versus return period curve in Figure 2.3-212 shows that there is a maximum probable wind speed. This has been investigated by Jagger and Elsner (Reference 1) who determined that the maximum possible near-coastal hurricane wind speed is estimated to be 183 kt (211 mph) using a maximum likelihood approach and 208 kt (240 mph) using a Bayesian approach. The Gulf coast model presented in this paper gives a mean 1000-year return level of 173 kt (199 mph) with a 95% confidence limit of 191 kt (220 mph). In the following evaluations, the hurricane wind speed will be assumed to be the maximum possible wind speed of 240 mph with a recurrence interval of zero.

Tropical cyclones including hurricanes lose strength rapidly as they move inland. FSAR Figure 2.3-214 shows the decay of tropical cyclone winds after landfall. As seen, only the fastest moving storms will maintain any significant wind speed by the time they reach the CPNPP site. In a paper by Kaplan and Demaria (Reference 2), the decay of tropical cyclone winds after landfall was evaluated. The wind speed after landfall is given by the following inland wind decay model:

$$V(t) = V_b + (RV_0 - V_b)e^{-\alpha t} - C$$

Where:

V(t) is the wind speed as a function of time,

V_b is 26.7 kt,

R is 0.9,

α is 0.095 hr^{-1},

t is the time after landfall, and

C is a correction factor to account for the inland distance. Where:

$$C = m\left[ln\left(\frac{D}{D_0}\right)\right] + b$$

Where:

D in the inland distance in kilometers,

D_o is 1 km,

$m = c_1 \cdot t(t_0 - t)$,

$b = d_1 \cdot t(t_0 - t)$,

$c_1 = 0.0109$ kt/hr^2,

$d_1 = -0.0503$ kt/hr^2, and

$t_o = 50$ hr.

Assuming a maximum landfall wind speed or 208 kt (~240 mph), a translational velocity of 16 kt (18.4 mph), and a distance of 400 miles from the CPNPP site to Galveston, gives a maximum possible wind speed of 61 mph at the CPNPP site. This should be considered as the upper bound of possible hurricane wind speed at the CPNPP site.

The number of tropical storms passing within 50 statute mi of the CPNPP site are listed on FSAR Table 2.3-208 and shown on Figure 2.3-213. These data, obtained from the NOAA Coastal Services Center, show that only one hurricane, in 1900, passed within 50 mi of the site during the period 1851 – 2006. This gives a frequency of 1/156 yr = 6.4×10^{-3} per yr of a hurricane striking the CPNPP site.

As shown above, the probability of a major hurricane striking the Texas coast is small (5.7×10^{-2} per year) and the probability of a major hurricane passing within 50 miles of the CPNPP site is also small (6.4×10^{-3} per yr). Even if a major hurricane is assumed to strike the CPNPP site, the maximum wind speed would be 61 mph based on the maximum possible hurricane landfall wind speed. Therefore, hurricane winds can be screened out as not risk significant because the frequency of hurricanes reaching the CPNPP site with a wind speed above 90 mph is exceedingly small.

(4) DCD Subsection 3.3.1.1 states that the design wind for the standard plant has a basic speed of 155 mph, corresponding to a 3-second gust at 33 ft above ground for exposure category C (open terrain). For all seismic category I and II SSCs, the basic wind speed is multiplied by an importance factor of 1.15 correlating to essential facilities in hurricane-prone regions as defined in ASCE/SEI 7-05 Tables 1-1 and 6-1.

FSAR Subsection 3.3.1.1 states that the site-specific basic wind speed of 90 mph corresponds to a 3-second gust at 33 ft. above ground for exposure category C, which is enveloped by the basic wind speed used for the design of the standard plant. Site-specific structures, systems, and components (SSCs) are designed using the site-specific basic wind speed of 90 mph, or higher.

The maximum wind speed by extreme winds is not greater than the F-scale intensity F1 of tornadoes for CPNPP. Also all seismic category I and II SSCs including fire suppression systems are designed for the wind load and are not damaged by the extreme winds. Although, a loss of offsite power is a hazardous potential from extreme winds, it is included in the loss of offsite power (LOOP) event of internal event PRA in a single weather-related LOOP category.

Thus an extreme wind event does not have a hazardous potential greater than a hazard from a F1 scale of tornado.

References

1. Climatology Models for Extreme Hurricane Winds Near the United States, Thomas H. Jagger and James B. Elsner, January 19, 2006.
2. A Simple Empirical Model for Predicting the Decay of Tropical Cyclone Winds after Landfall, John Kaplan and Mark Demaria, JOURNAL OF APPLIED METEOROLOGY, Volume 34, November, 1995.

Impact on R-COLA

See attached marked-up of FSAR Revision 1 pages 2.3-13, 19.1-12, 19.1-18, 19.1-20, 19.1-22, 19.1-23, 19.1-24, 19.1-25, 19.1-26, 19.1-27, 19.1-28, 19.1-30, 19.1-31, 19.1-32, 19.1-35, 19.1-36, 19.1-37, 19.1-39, 19.1-40, 19.1-41, 19.1-42, 19.1-43, 19.1-44, 19.1-45, 19.1-46, 19.1-47, 19.1-48, 19.1-49, and 19.1-50.

Impact on S-COLA

None.

Impact on DCD

None.

In a paper by Kaplan and Demaria, the decay of tropical cyclone winds after landfall was evaluated. The wind speed after landfall is given by the following inland wind decay model: RCOL2_19-13

$$V(t) = V_b + (RV_o - V_b)e^{-\alpha t} - C$$

Where:
V(t) is the wind speed as a function of time,
V_b is 26.7 kt,
R is 0.9,
α is 0.095 hr^{-1},
t is the time after landfall, and
C is a correction factor to account for the inland distance. Where:

$$C = m\left[ln\left(\frac{D}{D_o}\right)\right] + b$$

Where:
D in the inland distance in kilometers,
D_o is 1 km,
$m = c_1*t(t_0 - t)$,
$b = d_1*t(t_0 - t)$,
$c_1 = 0.0109$ kt/hr^2,
$d_1 = -0.0503$ kt/hr^2, and
$t_o = 50$ hr.

Assuming a maximum landfall wind speed or 208 kt (~240 mph), a translational velocity of 16 kt (18.4 mph), and a distance of 400 miles from the CPNPP site to Galveston, gives a maximum possible wind speed of 61 mph at the CPNPP site. This should be considered as the upper bound of possible hurricane wind speed at the CPNPP site.

The Probable Maximum Hurricane (PMH) is discussed in CPNPP UFSAR Subsection 2.3.1.2.2. For the CPNPP site, the PMH sustained (10-minute average) wind speed at 30 ft aboveground is 81 mph (Reference 2.3-205).

2.3.1.2.3 Tornadoes

During the period January 1, 1950 through July 31, 2006, 158 tornadoes (mean annual frequency of 2.8/yr) occurred within Somervell County and the surrounding counties (Bosque, Erath, Hood, and Johnson) (Reference 2.3-225). It should be noted that statistical data on severe local storms, tornadoes particularly, are highly dependent on human observation. For example, as population density increases, the number of tornado occurrences observed and accurately reported generally increases. However, tornadoes that cross county lines may be counted twice due to this increase in reporting.

19.1.9 References

Add the following references after the last reference in DCD Subsection 19.1.9.

19.1-201 *Risk-Informed Method for Control of Surveillance Frequencies*, NEI 04-10, Rev. 1, Nuclear Energy Institute, Washington DC, April 2007.

19.1-202 *Climatology Models for Extreme Hurricane Winds Near the United States*, Thomas H. Jagger and James B. Elsner, January 19, 2006. RCOL2_19-13

19.1-203 *A Simple Empirical Model for Predicting the Decay of Tropical Cyclone Winds after Landfall*, John Kaplan and Mark Demaria, JOURNAL OF APPLIED METEOROLOGY, Volume 34, November, 1995.

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Table 19.1-205 (Sheet 2 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			- On-site Explosion Hazards (2.2.3.1.1.3) Gas explosions from on-site sources outside containment at CPNPP Units 3 and 4 are not credible sources of missile generation per DCD Subsection 3.5.1.1.2.1. The chemicals used for the Makeup Water Treatment System are not flammable or explosive. - Gas Wells - Explosion (2.2.3.1.1.4) One technique used to control wellhead fires is the use of explosives to remove the oxygen from the air and thereby suffocate the fire. Potential wellhead fires in the Barnett Shale formation do not have sufficient flow rates to warrant the use of explosives to extinguish them. Thus, explosions from transportation routes, nearby industrial facilities, on-site explosion hazards and gas wells cannot affect the plant because of the safe distance (criterion 3) or the insignificance of the potential hazards (criterion 1).			
	Flammable Vapor Clouds	2.2.3.1.2	- Transportation Routes (2.2.3.1.2.1) For the evaluation of the potential effects of accidents on FM 56, a single tanker truck volume of 9600 gal was assumed along with assumed rupture sizes of 4.5 square meters (m2) and 1 m2 located at the bottom of the tank. The release rates, puddle formation, and evaporation rates were calculated by the ALOHA code. These evaluations determined that for all cases there is a negligible overpressure at the site resulting from ignition of a vapor cloud, and the concentrations remain below the lower explosive limit at CPNPP Units 3 and 4.	1, 3	None	No

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Table 19.1-205 (Sheet 4 of 34) Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria[1]	Freq. (/yr)	Site Appl.
			For the small breaks, a leak rate of 0.62 cfs was assumed for a period of 32 hours (hr). The concentration at the CPNPP Units 3 and 4 control room intakes is below 8680 ppm, which is below the LEL of 13,000 ppm. The Sunoco crude oil pipeline does not represent an explosion or flammable vapor cloud hazard at CPNPP Units 3 and 4. - Gas Wells (2.2.3.1.2.4) The closest functioning natural gas well, owned and ogerated by XTO Energy Inc., is 1.2 mi from the center point of CPNPP Units 3 and 4. For the purposes of evaluating the consequences of breaching a well, a gas release rate of 15.6 million cu ft/day was assumed. The analysis shows that, at the assumed release rate, the area of flammability is less than 0.1 mi downwind from a gas well release. The results show that the maximum concentration at the CPNPP Units 3 and 4 control room intakes is 346 ppm, which is well below the LEL concentration of 44,000 ppm. The maximum overpressure at the closest safety-related structure resulting from ignition of the natural gas cloud is negligible. The analysis also shows the overpressure from a gas explosion does not exceed 1 psig at a distance less than 0.1 mi from the cloud. It is concluded that the delayed ignition of vagor clouds from nearby transportation routes, pipelines, and facilities does not pose a hazard to CPNPP Units 3 and 4. Thus, flammable vapor clouds from transportation routes, nearby industrial facilities, pipelines and gas wells cannot affect the plant because of the safe distance (criterion 3) or insignificance of the potential hazards (criterion 1).			

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Table 19.1-205 (Sheet 6 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			- Stationary Sources (2.2.3.1.3.2.2) The fixed facilities that could not be initially screened out based on the chemicals stored at the facility are: Wolf Hollow I, LP; Cleburne Propane; DeCordova SES; and Glen Rose WWTP. Table 2.2-214 summarizes the chemicals that do not meet the Regulatory Guide 1.78 screening criteria, and the quantity and distance to the nearest CPNPP Units 3 and 4 MCR inlets to be considered for the control room habitability analysis in Section 6.4. Section 6.4.4.2 performed the analysis on the design based control room habitability to specific toxic chemicals of mobile and stationary sources. Using conservative assumptions and input data for chemical source term, CPNPP Units 3 and 4 control room parameters, site characteristics, and meteorology inputs, postulated chemical releases are analyzed for maximum value concentration to the MCR using the HABIT code, version 1.1. RG 1.78 specifies the use of HABIT 1.1 software for evaluating control room habitability. Instrumentation to detect and alarm a hazardous chemical release in the vicinity of CPNPP Units 3 and 4, and to automatically isolate the control room envelope (CRE) from such releases is not required based on analyses described in Subsection 6.4.4.2. No hazardous chemicals concentrations in the MCR exceeded the IDLH criteria of RG 1.78. Thus, the main control room is habitable for toxic chemicals from mobile or stationary sources because no hazardous chemical concentration in the main control room exceeds the criteria of RG 1.78 (criterion 1).			

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Table 19.1-205 (Sheet 7 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
	Fires	2.2.3.1.4	Fires originating from accidents at any of the facilities or transportation routes discussed previously would not endanger the safe operation of the station because of the distance between potential accident locations and CPNPP Units 3 and 4. The location of CPNPP Units 3 and 4 is at least 0.25 mi awall from any potential accident location. The nuclear island is situated sufficiently clear of trees and brush. The distance exceeds the minimum fuel modification area reguirements of 30 ft. per NFPA-1144. NFPA 1144 minimum setback distance in the Owner Controlled Area (OCA) will be procedurally maintained. Also, the OCA adjacent to the isolation zone will be cleared of any concentration of vegetation for security reasons as well. There is no threat from brush or forest fires. Based on the CPNPP Units 3 and 4 site configuration, the Protected Area distance from the perimeter fence to the power block, the security isolation zone of 20 feet and the setback distance in accordance with the guidance in NFPA 1144 of minimum 30 feet, a wildfire in the vicinity of the site will not continue to propagate onto the Protected Area. Furthermore, this combined distance will ensure that the power block will not experience temperatures from a wildfire that would affect the CDF established in the PRA.	1, 3	None	No

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Table 19.1-205 (Sheet 8 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			Fire and smoke from accidents at nearby homes, industrial facilities. transportation routes, or from area forest or brush fires, do not jeopardize the safe operation of the plant due to the distance of potential fires from the plant. Any potential heavy smoke problems at the MCR air intakes would not affect the plant operators. A potential gas well fire was analyzed using the ALOHA code. This heat flux is sufficiently low as to not result in exceeding any of the thermal acceptance criteria of the structures . On-site fuel storage facilities are designed in accordance with applicable fire codes. and plant safety is not jeopardized by fires or smoke in these areas. A detailed description of the plant fire protection system is presented in DCD Subsection 9.5.1. Thus, fire and smoke from accidents at nearby facilities and transportation routes, forest or brush fires, and on-site fuel storage facilities can not affect the plant because of the safe distance from (criterion 3) or the insignificance of the potential hazards (criterion 1).			

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Table 19.1-205 (Sheet 9 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
	Collision with Intake Structure	2.2.3.1.5	~~The only waterway near CPNPP is SCR, which does not provide public access to the site. There is no commercial or recreational traffic on SCR. There are no navigable rivers within 5 mi of the site. Thus, collisions with the intake structure are not considered to be credible.~~The ESWS and the CWS draw make up water from the intake structure on Lake Granbury. The ESWS is supplied with water from the ultimate heat sink (UHS) and returns water to the UHS. The UHS is designed to assure sufficient cooling water inventory to mitigate the consequences of a design basis accident for a minimum of 30 days without makeup. The intake structure is not safety related. Thus, collision with the intake structure is of equal or lesser damage potential than the events for which the plant has been designed (criterion 1).	~~3~~1	None	No
	Liquid spills	2.2.3.1.6	~~The only source of liquid spills in the vicinity of CPNPP is the crude oil pipeline. The accidental release of petroleum products into SCR would not affect operation of the plant. Normal operation of the water intake structure pumps requires submergence. Liquids with a specific gravity less than unity, such as petroleum products, would float on the surface of the river and consequently are not likely to be drawn into the makeup water system.~~ The accidental release of petroleum products into Lake Granbury, the most likely material released, would not affect operation of the plant. The normal water level in Lake Granbury is El. 696.00 ft, with the pump intake screen at 656.00 ft. Liquids with a specific gravity less than unity, such as petroleum products, would float on the surface of the lake and are not likely to be drawn into the makeup water system. Liquids with a specific gravity greater than unity would disperse and be diluted before reaching the pump intake. Thus, liquid spills cannot affect the plant because no potential for it to be drawn into the makeup water system. (criterion 1).	1, 3	None	No

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Table 19.1-205 (Sheet 10 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria[1]	Freq. (/yr)	Site Appl.
	Aircraft Hazards	3.5.1.6	~~The probability of aircraft-related accidents for CPNPP Units 3 and 4 is less than an order of magnitude of 10^{-7} per year for aircraft, airway, and airport information reflected in Subsection 2.2.2.7.~~ Thus, the probability of aircraft-related hazards for CPNPP Units 3 and 4 is less than 10-7 per year (criterion 2). There are no commercial airports within 5 mi of CPNPP site. Only one military training route, Victor air route VR-158, passes within 10 mi of CPNPP site. The probability of an aircraft crashing into the plant (PFA) is estimated in the following manner: *PFA = C x N x A/w* Where *C* = In-flight crash rate per mile for aircraft using the airway (4×10^{-10}) *w* = Width of airway, plus twice the distance from the airway edge to the site, conservatively provided in statute miles, equals 10 statute miles + (2 x 2 statute miles) *N* = Estimated annual number of aircraft operations *A* = Effective area of plant in square miles (0.0907) In order to maintain *PFA* less than the order of 10^{-7}, the above equation is rearranged to solve for N using values of C, A, and w given above: *N = PFA /(C x A/w)* = 19,300 operations per year	2	$<10^{-7}$	No

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Table 19.1-205 (Sheet 11 of 34) Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			The annual number of aircraft operations on military training route VR-158 are less than 19,300 operations per year. Thus the probability of aircraft-related hazards for CPNPP Units 3 and 4 is less than 10^{-7} per year (criterion 2).			
	Site Proximity Missle	3.5.1.5	~~No potential site-proximity missile hazards.~~Externally initiated missiles considered for design are based on tornado missiles as described in DCD Subsection 3.5.1.4. As described in Section 2.2, no potential site-proximity missile hazards are identified except aircraft, which are evaluated in Subsection 3.5.1.6. Thus, no site proximity missile hazard is identified (criterion 3).	3	None	No

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Table 19.1-205 (Sheet 12 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
	Turbine Missile	3.5.1.3.1 3.5.1.3.2	The probability of turbine failure resulting in the ejection of turbine rotor (or internal structure) fragments through the turbine casing, P1, as less than 10^{-5} per year. The acceptable risk rate *P4 = P1 x P2 x P3* is therefore maintained as less than 10^{-7} per year. The CPNPP site plan shows the location of CPNPP Units 3 and 4 is such that no postulated low trajectory turbine missiles from CPNPP Units 1 and 2 can affect CPNPP Units 3 and 4 (Criterion 3). The probability of of turbine missile accidents for CPNPP Units 3 and 4 is less than 10^{-7} per year is analyzed in FSAR Subsection 3.5.1.3.2. Mathematically, *P4 = P1 x P2 x P3*, where RG 1.115 considers an acceptable risk rate for *P4* as less than 10^{-7} per year. For unfavorably oriented T/Gs determined in Subsection 3.5.1.3, the product of *P2* and *P3* is estimated as 10^{-2} per year, which is a more conservative estimate than for a favorably oriented single unit. The probability of turbine failure resulting in the ejection of turbine rotor (or internal structure) fragments through the turbine casing, *P1*, as less than 10^{-5} per year. CPNPP Units 3 and 4 procedures will require inspection intervals and a turbine valve test frequency to maintain *P1* within acceptable limits. The acceptance risk rate *P4 = P1 x P2 x P3* is therefore maintained as less than 10^{-7} per year (criterion 2).	2, 3	$<10^{-7}$	No

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Table 19.1-205 (Sheet 14 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			The determination of the frequency that hurricanes, with wind speed above 90 mph, could reach the CPNPP site depends on the frequency of hurricanes striking this section of the Texas coast, the hurricane wind speed at landfall, the attenuation of wind speed while traveling inland, and the probability of a hurricane striking the CPNPP site. As stated in FSAR Subsection 2.3.1.2.2, thirty-nine tropical storms or hurricanes have struck the Texas coast between 1899 through 2006. For major hurricanes (Category 4 or higher), the return period is 17.7 yr (annual frequency of 5.7×10^{-2}). The minimum wind speed for a Category 4 hurricane on the Saffir/Simpson scale is 131 mph. FSAR Figure 2.3-212 gives the number of hurricanes as a function of wind speed. These results were based on the entire U. S. coast not only the Gulf coast. As expected, the hurricane frequency of occurrence decreases as wind speed increases. This figure gives a return period of 1000 years for a wind speed of 175 knots (201 mph). The shape of the wind speed versus return period curve in Figure 2.3-212 shows that there is a maximum probable wind speed. This has been investigated by Jagger and Elsner (Reference 19.1-202) who determined that the maximum possible near-coastal hurricane wind speed is estimated to be 183 kt (211 mph) using a maximum likelihood approach and 208 kt (240 mph) using a Bayesian approach. The Gulf coast model presented in this paper gives a mean 1000-year return level of 173 kt (199 mph) with a 95% confidence limit of 191 kt (220 mph). In the following evaluations, the hurricane wind speed will be assumed to be the maximum possible wind speed of 240 mph with a recurrence interval of zero.			

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Table 19.1-205 (Sheet 15 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			In a paper by Kaplan and Demaria (Reference 19.1-203), the decay of tropical cyclone winds after landfall was evaluated. The wind speed after landfall is given by the following inland wind decay model: $V(t) = V_b + (RV_o - V_b)e^{-\alpha t} - C$ Where: V(t) is the wind speed as a function of time, V_b is 26.7 kt, R is 0.9, α is 0.095 hr^{-1}, t is the time after landfall, and C is a correction factor to account for the inland distance. Where: $C = m\left[ln\left(\frac{D}{D_0}\right)\right] + b$ Where: D in the inland distance in kilometers, D_o is 1 km, $m = c_1 * t(t_0 - t)$, $b = d_1 * t(t_0 - t)$, $c_1 = 0.0109$ kt/hr^2, $d_1 = -0.0503$ kt/hr^2, and $t_o = 50$ hr.			

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Table 19.1-205 (Sheet 16 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			Assuming a maximum landfall wind speed or 208 kt (~240 mph), a translational velocity of 16 kt (18.4 mph), and a distance of 400 miles from the CPNPP site to Galveston, gives a maximum possible wind speed of 61 mph at the CPNPP site. This should be considered as the upper bound of possible hurricane wind speed at the CPNPP site. Only one hurricane, in 1900, passed within 50 mi of the site during the period 1851 – 2006. This gives a frequency of 1/156 yr = $6.4x10^{-3}$ per yr of a hurricane striking the CPNPP site. As shown above, the probability of a major hurricane striking the Texas coast is small ($5.7x10^{-2}$ per year) and the probability of a major hurricane passing within 50 miles of the CPNPP site is also small ($6.4x10^{-3}$ per yr). Even if a major hurricane is assumed to strike the CPNPP site, the maximum wind speed would be 61 mph based on the maximum possible hurricane landfall wind speed. Therefore, hurricane winds can be screened out as not risk significant because the frequency of hurricanes reaching the CPNPP site with a wind speed above 90 mph is exceedingly small (criterion 1).			

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Table 19.1-205 (Sheet 19 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			Compliance with Regulatory Guide 1.76 is discussed in Section 1.9. Tornado loadings are discussed in Subsection 3.3.2. It is easily lost when stand alone. This event is not screened out. Perform a bounding analysis.			
	Thunder-storms	2.3.1.2.4	Thunderstorms, from which damaging local weather can develop (tornadoes, hail, high winds, and flooding), occur about eight days each year based on data from the counties surrounding the site. The maximum frequency of thunderstorms and high wind events occurs from April to June, while the months from November through February have few thunderstorms. The monthly and regional distributions of thunderstorms and high wind events are displayed in Table 2.3-211. ~~Impact of this event is less than by hurricanes or tornadoes.~~Thus, thunder storms cannot affect the plant because of the insignificance of the potential hazards (criterion 1) and the impact is less than hurricanes or tornadoes (criterion 4).	1, 4	Not determined	No
	Lightnings	2.3.1.2.5	The annual mean number of thunderstorm days in the site area is conservatively estimated to be 48 based on interpolation from the isokeraunic map; therefore it is estimated that the annual lightning stroke density in the CPNPP site area is 25 strikes/sg mi/yr. Recent studies based on data from the National Lightning Detection Network (NLDN) indicate that the above strike densities are upper bounds for the CPNPP site. ~~Impact of this event is less than by hurricanes or tornadoes.~~The lightning cannot affect the plant because of the insignificance of potential hazards (criterion 1) , and the impact is less than that of hurricanes and tornadoes (criterion 4).	1, 4	None	No

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Table 19.1-205 (Sheet 20 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
	Hails	2.3.1.2.6	Almost all localities in Texas occasionally experience damage from hail. While the most commonly reported hailstones are 1/2 to 3/4 inch in diameter, hailstones 3 to 3-1/2 inch in diameter are reported in Texas several times a year. Fortunately, recurrence of damaging hail at a specific location is very infrequent. The monthly and seasonal breakdown of large-hail occurrences (3/4 in diameter or larger) for the area around the CPNPP site is given in Table 2.3-212. ~~Impact of this event is less than by hurricanes or tornadoes.~~Hail cannot affect the plant because of the insignificance of the potential hazard (criterion 1). Also, the impact is less than from hurricanes or tornadoes (criterion 4)	1, 4	None	No
	Air Pollution Potential	2.3.1.2.7	The Clean Air Act, which was last amended in 1990, requires the U.S. Environmental Protection Agency (EPA) to set National Air Quality Standards for pollutants considered harmful to the Public health and the environment. The EPA Office of Air Quality Planning and Standards has set National Ambient Air Quality Standards for six principle pollutants, which are called "Criteria" pollutants. The newly promulgated EPA 8-hour ozone standard (62 FR 36, July 18, 1997) is 0.08 ppm in accordance with 40 CFR 50.10 (Reference 2.3-226). Somervell County is in attainment for all criteria pollutants (carbon monoxide, lead, nitrogen dioxide, particulate matter ([PM10, particulate matter less than 10 micron], [PM2.5, particulate matter less than 2.5 micron]), ozone, and sulfur oxides.	1, 4	None	No

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Table 19.1-205 (Sheet 21 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			The ventilation rate is a significant consideration in the dispersion of pollutants. Higher ventilation rates are better for dispersing pollution than lower ventilation rates. The atmospheric ventilation rate is numerically equal to the product of the mixing height and the wind speed within the mixing layer. Conditions in the region generally favor turbulent mixing. Two conditions which reduce mixing, increasing the air pollution potential, are surface inversions and stable air layers aloft. The surface inversion is generally a short-term effect and surface heating on most days creates a uniform mixing layer by mid-afternoon. The air stagnation trend for this general area is negative (Figure 2.3-246) over the 50-yr period of record. ~~This event is not significant impact than toxic chemicals.~~Thus, air pollution is not a significant site hazard (criterion 1), and is less severe than the impact from toxic chemicals (criterion 4).			
	Precipitation	2.3.1.2.8 2.3.2.1.5	Probable Maximum Precipitation (PMP), sometimes called maximum possible precipitation, for a given area and duration is the depth which can be reached but not exceeded under known meteorological conditions. For the site area, using a 100-yr return period, the PMP for 6, 12, 24, and 48 hours is 6.9, 8.3, 9.5, and 11.0 in, respectively (Table 2.3-217).	1	None	No

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Table 19.1-205 (Sheet 23 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability			
				Criteria(1)	Freq. (/yr)	Site Appl.	
			As stated in the US-APWR DCD Subsection 3.4.1.2, if PMWP was to occur, US-APWR safety-related systems and components would not be jeopardized. US-APWR seismic category I building roofs are designed as a drainage system capable of handling the probable maximum winter precipitation (PMWP). The US-APWR DCD also states that seismic category I structures have sloped roofs designed to preclude roof ponding. This is accomplished by channeling rainfall expeditiously off the roof. Also in subsection 3.4.1.2, the design-basis flooding level (DBFL) listed in Section 2.4, and adequate sloped site grading and drainage prevents flooding caused by probable maximum precipitation (PMP) or postulated failure of non safety-related, non seismic storage tanks located on site. Thus, precipitation cannot affect the plant because of the insignificant potential hazard (criterion 1).				RCOL2_19-13
	Dust Storms	2.3.1.2.9	Blowing dust or sand may occur occasionally in West Texas where strong winds are more freguent and vegetation is sparse. While blowing dust or sand may reduce visibility to less than five mi over an area of thousands of sg mi, dust storms that reduce visibility to one mi or less are quite localized and depend on soil type, soil condition, and vegetation in the immediate area. The NCDC Storm Event database did not report any dust storms in Somervell County between January 1,1950 and August 31,2007. ~~This event is not significant impact to the plant.~~Thus, dust storms cannot affect the plant because of the insignificant potential hazard (criterion 1).	1	None	No	RCOL2_19-13

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Table 19.1-205 (Sheet 24 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

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

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Table 19.1-205 (Sheet 25 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			The design basis wind velocity is based on the data from ANSI/ASCE 7-05. From Figure 6-1 of ANSI/ASCE 7-05, the 3 second gust wind speed at 33 ft (10m) aboveground for the CPNPP site is 90 mph (40 m/sec). The 3-second gust wind speed for a 100-yr return period is 96 mph. The importance factor is 1.15 and the exposure category is C. Wind loadings for the site are discussed in Subsection 3.3.1. This event is not significant impact than hurricanes and tornadoes. The design wind has a basic speed of 155 mph, corresponding to a 3-second gust at 33 ft above ground for exposure category C (open terrain). For all seismic category I and II SSCs, the basic wind speed is multiplied by an importance factor of 1.15 correlating to essential facilities in hurricane-prone regions as defined in ASCE/SEI 7-05 Tables 1-1 and 6-1. Site-specific structures, systems, and components (SSCs) are designed using the site-specific basic wind speed of 90 mph, or higher. Therefore, the maximum wind speed by extreme winds is not greater than the F-scale intensity F1 of tornadoes for CPNPP. Also all seismic category I and II SSCs including fire suppression systems are designed for the wind load and are not damaged by the extreme winds. Although only loss of offsite power is the hazardous potential by extreme winds, it is considered as the loss of offsite power (LOOP) event for internal event PRA as weather-related LOOP. Thus, extreme winds are insignificant potential hazards (criteria 1 and 4).			

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Table 19.1-205 (Sheet 26 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
	Surface Winds	2.3.2.1.2	Annually, the prevailing surface winds in the region are from the south to southeast while the average wind speed is about 10 mi per hour (mph) based on-site data from 2001 through 2006. As shown on Figures 2.3-208 through 2.3-210, the annual resultant wind vectors for the Dallas Fort Worth Airport, Mineral Wells, and CPNPP are 149°, 138°, and 153°, respectively. The annual average wind speeds for Dallas Fort Worth Airport, Mineral Wells, and CPNPP are 10.3, 9.0, and 9.8 mi per hour, respectively. In winter there is a secondary wind direction maximum from the north to northwest due to frequent outbreaks of polar air masses (Figures 2.3-274 and 2.3-306). Monthly and seasonal wind roses for the lower level CPNPP data are provided on Figures 2.3-278 through 2.3-293. On a monthly basis, these figures show the dominant south south-southeast wind direction. The seasonal wind rose plots show a significant additional north and north-northwest component in the winter and fall. The annual wind rose plot for CPNPP is provided on Figure 2.3-210. Monthly and seasonal wind roses for the upper level CPNPP data are provided on Figures 2.3-294 through 2.3-309. On a monthly basis, these figures show the dominant south-southeast wind direction. The seasonal wind rose plots show that the only significant north and north-northwest component is in the winter. The annual wind rose plot for CPNPP is provided on Figure 2.3-310. ~~This event is not significant impact than hurricanes and tornadoes.~~Thus, surface winds cannot severely affect the plant because of the insignificant potential hazards (criterion 1).	1	None	No

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Table 19.1-205 (Sheet 27 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria[1]	Freq. (/yr)	Site Appl.
Hydrologic Engineering	Floods	2.4.2	The maximum flood level at CPNPP Units 3 and 4 is elevation ~~788.9~~793.66 ft msl. This elevation would result from a probable maximum precipitation (PMP) on the Squaw Creek watershed. Coincident wind waves would create maximum waves of ~~4.56~~4.59 ft (trough to crest), resulting in a maximum flood elevation of ~~793.46~~810.64 ft msl. CPNPP Units 3 and 4 safety-related plant elevation is 822 ft msl, providing more than ~~28~~11 ft of freeboard under the worst potential flood considerations. The Probable Maximum Precipitation (PMP) distributions used as input to the determination of the Probable Maximum Flood (PMF) for the CPNPP Units 3 and 4 were developed using Hydrometerological Report (HMR) 51 and HMR 52. The PMP distributions were calculated for the following scenarios: • Overall PMP for storm centers within the Squaw Creek watershed • Overall PMP for storm centers within the Paluxy River watershed • Squaw Creek Reservoir PMP for storm centers within the Squaw Creek watershed.	1, ~~3~~2	~~None~~≤ 10^{-7}	No

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Table 19.1-205 (Sheet 28 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			The critical storm center within the Paluxy River watershed (Basin 4) results in the maximum PMP for the overall watershed (Basins 1, 2, 3 and 4 combined) at the confluence of Paluxy River and Squaw Creek. Additionally, when the storm center was kept in the Squaw Creek watershed (Basin 1) it resulted in a higher PMP for the Squaw Creek watershed. A higher PMP for the Squaw Creek watershed can result in a higher water surface elevation at CPNPP Units 3 and 4. The PMP for the critical storm center for each basin for the above mentioned scenarios was analyzed individually to determine the resulting peak runoff and the water surface elevation. No. of PMP Events The overall frequency of a 6-hour, 25-inch PMP event for the U.S. is determined by dividing the number of events by the duration of the historical record. The areal frequency of a PMP event is calculated by dividing the U.S. PMP frequency by this total area over which a PMP could occur and multiplying this amount by the area of a PMP, 10 mi^2. Thus the PMP frequency is: $f_{PMP} = \left(\frac{No.\ of\ PMP\ Events}{Duration\ of\ Historical\ Record}\right)\left(\frac{A_{PMP\ Event}}{A_{Total\ PMP\ Region}}\right)$ $= \left(\frac{3}{177\ yrs}\right)\left(\frac{10\ mi^2}{1{,}211{,}967\ mi^2}\right)$ $= 1.4\times10^{-7}/yr$			

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Table 19.1-205 (Sheet 29 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability			
				Criteria[1]	Freq. (/yr)	Site Appl.	
			Therefore, the frequency of a PMP of 25 inches over a 10 square mile is estimated to be 1.4 X 10^{-7} per year. This is a conservative estimate of the frequency of the PMP that results in a PMF for CNNPP Units 3 and 4 because additional periods of significant rainfall must also occur in close temporal proximity to the 25-inch 6-hour rainfall event. Given the calculated PMF is not projected to reach the safety-related elevation of the plant (criterion 1) and the estimated PMP and PMF frequency of 1. 4 X 10^{-7}/year, the frequency of a flooding event that would reach the safety-related elevation of the plant is projected to be well below 10^{-7} per year (criterion 2).				RCOL2_19-10
	Probable Maximum Flood	2.4.3	The probable maximum flood (PMF) was determined for the Squaw Creek watershed and routed through the Squaw Creek Reservoir (SCR) to determine a water surface elevation of ~~788.9~~793.66 ft msl. The CPNPP Units 3 and 4 safety-related facilities are located at elevation 822 ft msl. Therefore, PMF on rivers and streams does not present any potential hazards for CPNPP Units 3 and 4 safety-related facilities. The PMF and maximum coincident wind wave activity results in a flood elevation of ~~809.28~~810.64 ft msl. The top elevation of the retaining wall is ~~805~~795 ft msl. The CPNPP Units 3 and 4 safety-related structures are located at elevation 822 ft msl and are unaffected by flood conditions and coincident wind wave activity. Thus, the probable maximum flood cannot affect the plant because of the insignificance of the potential hazards (criterion 1) and the frequency of the PMP is less than 10^{-7} per year (criterion 2).	1, ~~3~~2	~~None~~< 10^{-7}	No	RCOL2_19-10 RCOL2_19-10 RCOL2_19-10 RCOL2_19-13

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Table 19.1-205 (Sheet 30 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			The retaining wall is located approximately 555 ft. northeast from the center point of CPNPP Unit 3 on the slopes of the Squaw Creek Reservoir. Above the retaining wall, a 2:1 (horizontal to vertical) slope continues up to elevation 820 ft. The coincident wind wave activity analysis result is based on the run up on a continuous vertical wall. Comparative analysis for run up on adjacent slopes concludes it is conservative to assume that run up above the top elevation of the retaining wall rises vertically, because run up evaluated for the 2:1 slope would result in a lower elevation. It is assumed that the PMF with coincident wind wave activity elevation of 810.64 ft is applicable to the entire rim of the Squaw Creek Reservoir. The estimated frequency of a PMF capable of reaching the plant grade elevation is estimated to be less than 10-7 per year. Consideration of the maximum coincident wind wave activity along with the PMF would tend to lower the overall frequency.			

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Table 19.1-205 (Sheet 31 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
	Dam Failures	2.4.4	~~There are no surface water impoundments other than small farm ponds that could impact the SCR. The small farm ponds have negligible storage capacity and a breach would have no measurable effect. Failure of downstream dams, including Squaw Creek Dam, would not affect the CPNPP Units 3 and 4. The critical dam failure event is the assumed domino-type failure of the Hubbard Creek Dam, the Morris Sheppard Dam and the De Cordova Bend Dam coincident with the PMF.~~Qualitative analysis considers both existing and future conditions and is performed based on comparison of distance from the confluence of the Paluxy River with the Brazos River, reservoir storage, dam height, and drainage area. Domino-type failures and simultaneous failures are postulated when applicable. The qualitative analysis resulted in two potential scenarios that were evaluated further by quantitative analysis. The quantitative analysis results in the critical dam failure event of the assumed domino-type failure of Fort Phantom Hill Dam, the proposed Cedar Ridge Resevoir, Morris Sheppard Dam, and De Cordova Bend Dam. In addition, Lake Stamford Dam is assumed to fail simultaneous with the Cedar Ridge Reservoir Dam. Dam failures are assumed coincident with the PMF. The resulting water surface elevation at the confluence of the Paluxy River and the Brazos River is 760.71 ft. CPNPP Units 3 and 4 safety-related facilities are located at elevation 822 ft. There are no safety-related structures that could be affected by flooding due to dam failures. Thus, there are no safety-related structures that could be affected by flooding due to dam failures (criteria 1 and 3).	1, 3	None	No

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**Table 19.1-205 (Sheet 32 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability**

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
	Surge and Seiche Flooding	2.4.5	CPNPP Units 3 and 4 are located approximately 275 mi inland from the Gulf of Mexico. CPNPP Units 3 and 4 safety-related facilities are located at elevation 822 ft msl. A surge due to a probable maximum hurricane (PMH) event would not cause flooding at the site. SCR does not connect directly with any of the water bodies considered for such meteorological events associated with surge and seiche flooding. Because of the inland location and elevation characteristics, CPNPP Units 3 and 4 safety-related facilities are not at risk from surge and seiche flooding. Thus, surge and seiche flooding cannot affect the plant because of the location (criterion 3). RCOL2_19-13	3	None	No
	Tsunami	2.4.6	CPNPP Units 3 and 4 are located approximately 275 mi inland from the Gulf Coast. CPNPP Units 3 and 4 safety-related facilities are located at elevation 822 ft msl. Because of their inland location and elevation, CPNPP Units 3 and 4 safety related facilities would not be at risk from tsunami flooding. Thus, tsunami cannot affect the plant because of the safe distance (criterion 3). RCOL2_19-13	3	None	No

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Table 19.1-205 (Sheet 33 of 34)
Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
	Ice Effects	2.4.7	The USACE ice jam database reports that Brazos River was obstructed by rough ice at Rainbow near Glen Rose, Texas, on January 22-23 and January 25-28, 1940, with flood stage of 20 ft. CPNPP Units 3 and 4 safety-related facilities are located at elevation 822 ft msl. The SCR spillway elevation is 775 ft msl. The maximum water surface elevation during a probable maximum flood event is at ~~788.9~~793.66 ft msl, which is more than ~~30~~28 ft below the CPNPP Units 3 and 4 safety-related facilities. The possibility of inundating CPNPP Units 3 and 4 safety-related facilities due to an ice jam is remote. The climate and operation of SCR prevent any significant icing on the Squaw Creek. There are no safety related facilities that could be affected by ice induced low flow. Thus, ice effects cannot affect the plant because of the location (criterion 3).	3	None	No
	Cooling Water Canals and Resevoirs	2.4.8	There are no current or proposed safety-related cooling water canals or reservoirs required for CPNPP Units 3 and 4. The ultimate heat sink (UHS) is part of the essential (sometimes called emergency) service water system (ESWS). The UHS does not rely on cooling water canals or reservoirs and is not dependent on a stream, river, estuary, lake, or ocean (criterion 3).	3	None	No
	Channel Diversions	2.4.9	There is no evidence suggesting there have been significant historical diversions or realignments of Squaw Creek or the Brazos River. The topography does not suggest potential diversions. The streams and rivers in the region are characterized by traditional shaped valleys with no steep, unstable side slopes that could contribute to landslide cutoffs or diversions. There is no evidence of ice-induced channel diversion.	3	None	No

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Comanche Peak, Units 3 and 4 External Events Screening and Site Applicability

Category	Event	FSAR Section 'Disposition	Description	Screening and Applicability		
				Criteria(1)	Freq. (/yr)	Site Appl.
			The UHS is part of the ESWS. Each unit's ESWS consists of four wet mechanical draft cooling towers, each providing 50 percent cooling capacity. Therefore, channel diversion can not adversely affect CPNPP Units 3 and 4 safety-related structures or systems (criterion 3).			
	Low Water	2.4.11	There are no safety-related facilities that could be affected by low-flow or drought conditions, since the UHS does not rely on the rivers and streams as a source of water (criterion 3).	3	None	No
	Groundwater	2.4.12	Groundwater is not used as an operational or safety-related source of water for CPNPP Units 3 and 4. CPNPP Units 3 and 4 are to be constructed on the Glen Rose Formation. According to the Design Control Document (DCD) for the US-APWR, the design maximum groundwater elevation is 1 ft below plant grade. The CPNPP plant grade elevation is 822 ft msl; therefore, the design maximum groundwater elevation is 821 ft msl relative to the current elevation of the Glen Rose Formation. Thus, ground water cannot affect the plant because of its location (criterion 3).	3	None	No

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NOTES
(1) Screening criteria categories
"1" Lower damage potential than a design basis event
"2" Lower event frequency of occurrence than another event
"3" Cannot occur close enough to the plant to have an affect
"4" Included in the definition of another event
"5" Sufficient time to eliminate the threat or to provide an adequate response