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January 19, 2010

Ann Marshall Young, Chair
Dr. Gary S. Arnold
Dr. Alice C. Mignerey
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Luminant Generation Company LLC (Comanche Peak Nuclear Power Plant, Units 3 and 4), Docket Nos. 52-034 and 52-035

Dear Licensing Board Members:

The purpose of this letter is to provide notification that Luminant Generation Company LLC and Comanche Peak Nuclear Power Company LLC, applicants in the above-captioned matter (jointly, Luminant), recently filed the attached letter, dated January 19, 2010, with the NRC on the docket for Comanche Peak Units 3 and 4. The attached letter revises information that Luminant sent to the NRC on January 15, 2010, which was the subject of a notification to the Licensing Board filed that same day. The attached letter relates to Contention 13, which was admitted by the Board in LBP-09-17.

Sincerely,

Signed (electronically) by Jonathan M. Rund
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Counsel for Luminant

Attachment

cc: Service List

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	Docket Nos. 52-034-COL
LUMINANT GENERATION COMPANY LLC	)	52-035-COL
	)	
(Comanche Peak Nuclear Power Plant Units 3 and 4)	)	January 19, 2010
	)	

CERTIFICATE OF SERVICE

I hereby certify that on January 19, 2010, a copy of a letter dated January 19, 2010 from Jonathan M. Rund to the Members of the Licensing Board was served by the Electronic Information Exchange on the following recipients:

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Signed (electronically) by Jonathan M. Rund

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CP-201000078
Log # TXNB-10003

Ref. # 10 CFR 52

January 19, 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
CORRECTION FOR COL APPLICATION PART 3, ENVIRONMENTAL REPORT,
UPDATE TRACKING REPORT

REFERENCE: Letter, R. Flores to D. B. Matthews, "COL Application Part 3, Environmental Report, Update Tracking Report," TXNB-10002 dated January 15, 2010

Dear Sir:

In the referenced letter, Luminant Generation Company LLC (Luminant) submitted an Update Tracking Report (UTR) for the Comanche Peak Nuclear Power Plant Units 3 and 4 Combined License (COL) Application, Part 3, Environmental Report. The marked-up pages provided information that addressed Contention 13 presented before the ASLB Panel. Luminant has discovered an error in the calculation that supported the UTR and submits herein a complete revision of the UTR. The attached UTR (Revision 2) replaces the UTR (Contention 13 – Revision 1) submitted in the referenced letter in its entirety.

Should you have any questions regarding this correction, 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 January 19, 2010.

Sincerely,

Luminant Generation Company LLC

RDBird for

Rafael Flores

Attachment: COL Application Part 3, Environmental Report Revision 1, Update Tracking Report Revision 2

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Attachment

COL Application Part 3, Environmental Report Revision 1, Update Tracking Report Revision 2

[This attachment includes marked-up Environmental Report (ER) pages 7.5-1 through 7.5-14. Because of text additions and deletions, the page numbers on the marked-up pages may not coincide with the page numbers in ER Revision 1.]

January 19, 2010

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

Part 3

Environmental Report Revision 1

Update Tracking Report

Revision 2

Revision History

Revision	Date	Update Description
-	11/20/2009	COLA Revision 1 Transmittal See Luminant Letter no. TXNB-09074 Date 11/20/2009
0	12/7/2009	Updated Chapters: Ch. 9
1	1/13/2010	Updated Chapters: Ch. 7
2	1/19/2010	Updated Chapters: Ch. 7

Chapter 7

Chapter 7 Tracking Report Revision List

Change ID No.	Section	ER Rev. 1 Page	Reason for change	Change Summary	Rev. of ER T/R
CTS-01101	7.5	7.4-8	Address ASLB Contention 13	Added Section 7.5 to provide description of impacts of a severe accident in one unit on other Comanche Peak units.	1
CTS-01103	7.5	7.5-1	Editorial	Change “the distance between the center point between Units 3 and 4 and the center point between Units 1and 2 is approximately 1700ft” to “the distance between the center point between Units 3 and 4 and the center point between Units 1 and 2 is approximately 1700ft” by adding a space between “Units 1” and ”and”.	2
CTS-01103	7.5	7.5-3	Editorial	Change “The following table presentes the release frequencies” to “The following table presents the release frequencies”.	2
CTS-01103	7.5	7.5-11	Editorial	Change “CONCLUSION” to “CONCLUSIONS”	2
CTS-01104	7.5	7.5-11	Cost change	Change “$402,747” to “$400,073”. Change “$584,533” to “$692,576” at two places.	2

7.5 SEVERE ACCIDENT IMPACTS ON OTHER CPNPP UNITS CTS-01101

This section evaluates the impact of a severe accident at any one of the US-APWR units on the other US-APWR unit and on CPNPP Units 1 and 2. This section also evaluates the impact of a severe accident at Unit 1 or Unit 2 on Units 3 and 4. In addition, this section discusses the environmental impacts of severe accidents at all four units.

The evaluation considers whether post-accident radiation releases could interrupt the safe shutdown of an unaffected unit either by interfering with necessary operator actions or by damaging equipment required to perform a post-accident safety function. The evaluation also considers the economic impact of a service disruption due to potential delays in returning the unaffected units to service as a result of repair, refurbishment, decontamination, or possible corrective action.

The impact of a severe accident at Unit 1 or Unit 2 on its sister unit is not relevant to this Environmental Report whose scope is the environmental impacts of adding Units 3 and 4.

7.5.1 BACKGROUND

There is no direct mechanism for a severe accident at one unit to propagate and cause an accident at an adjacent unit. There are no shared safety systems between units which would allow accident propagation from one unit to another. The only possible impact on an adjacent unit would be the result of radiological releases and the subsequent potential impact on the plant operators and equipment operability. Severe accidents do not result in explosive overpressures or other physical damage that would impact the safe condition of the adjacent units. The distances between the CPNPP units prevent accident propagation from one unit to another. The distance between Units 3 and 4 is approximately 1000 feet and the distance between the center point between Units 3 and 4 and the center point between Units 1 and 2 is approximately 1700 feet. CTS-01103

As discussed in DCD Subsection 3.5.1.1.3, gas explosions from on-site sources outside containment at CPNPP Units 3 and 4 are not credible sources of missile generation and therefore do not need to be considered in evaluating severe accidents. In addition, potential design basis events associated with accidents at nearby facilities and transportation routes have been analyzed and the effects of these events on the safety-related components of Units 3 and 4 are insignificant as discussed in FSAR Subsection 2.2.3.1. All units on site are designed to comply with the requirements of 10 CFR 50, Appendix A, General Design Criterion (GDC) 3, Fire Protection, which minimizes the probability and effect of fires and explosions. As discussed in FSAR Subsection 3.5.1.6, unintentional aircraft-related accidents at CPNPP Units 3 and 4 are not credible and therefore do not need to be considered in evaluating severe accidents. Furthermore, Unit 3 and 4 are required by 10 CFR 50.150 to withstand a large fire or explosion at each unit due to an airplane crash and therefore would also be able to withstand the effects of an airplane crash at an adjacent unit. Although Units 1 and 2 are not within the scope of 10 CFR 50.150, they are sufficiently separated from Units 3 and 4 such that fires and explosions from an aircraft impact at Unit 3 or 4 would not prevent the safe shutdown of Unit 1 and 2; e.g., the distance from Units 3 and 4 to Units 1 and 2 is greater than the standoff distance provided in NEI-06-12. Therefore, the only possible impact on an adjacent unit would be the result of radiological releases due to a severe accident and the subsequent impact on utility workers and plant operations. CTS-01101

A severe accident is an event that is beyond the design basis and involves significant core damage. A severe accident could result in a large release of radioactive materials to the environment if containment failure were to occur during the event. A severe accident with a large release of radioactive material can only occur as a result of the unlikely failure of multiple safety systems and mitigating features such that no safety injection and no containment spray systems are available to prevent or mitigate the accident consequences and containment failure occurs. A severe accident is characterized by its accident scenario and release category as discussed below.

7.5.2 SEVERE ACCIDENT SCENARIOS

In general, if there is a severe accident at one unit, its impact to other units on site would be negligible as long as containment integrity at the affected unit is maintained. For severe accidents in which containment integrity is maintained, the impact to other units on site would be bounded by the impact of a design basis accident at the other units, which the plants are designed to withstand. Therefore, the following evaluation focuses on severe accidents that involve a containment failure or containment bypass that results in a large release of radioactivity.

For cases involving multiple safety system failures and containment damage, the timing as well as the quantity of radioactive material released is important. The impact of a severe accident on the unaffected units would not be significant if the unaffected units can reach cold shutdown (i.e., average coolant temperature ≤ 200°F) prior to any significant radiological release from the affected unit. This is true because the units are designed to stay safely shutdown with little or no operator oversight for extended periods of time once cold shutdown is achieved. For the US-APWR Units, the time to achieve a cold-shutdown condition takes approximately 12 hours after a reactor trip. For the Westinghouse PWR Units (W-PWR Units 1 and 2), approximately 10 hours would be required to reach cold shutdown after a reactor trip. These times are derived from the US-APWR DCD and W-PWR FSAR respectively. Consequently, any accident scenario or release category which has a delayed radiological release (i.e., greater than 12 hours) would not have a significant impact on the ability to shutdown the unaffected units.

ER Section 7.2 describes the off-site dose and cost risks that could accompany a severe accident at either CPNPP Unit 3 or 4. A number of accident sequences, each of which represents a broader family of accidents, are analyzed. For the US-APWR, severe accidents resulting from internally initiated events are classified into six categories based on the characteristics of the accident sequence.

CTS-01101

Release Category	Description
RC1	Containment bypass which includes both core damage after a Steam Generator Tube Rupture (SGTR) and thermal induced SGTR after core damage
RC2	Containment isolation failure
RC3	Containment overpressure failure before core damage due to loss of heat removal
RC4	Early containment failure due to dynamic loads which includes hydrogen combustion before or just after reactor vessel failure, in-vessel and ex-vessel steam explosion, and containment direct heating
RC5	Late containment failure which includes containment overpressure failure after core damage, hydrogen combustion long after reactor vessel failure, and basemat melt through
RC6	Intact containment in which fission products are released at design leak rate

The following table presents the release frequencies for the above release categories. CTS-01103

CPNPP Units 3 and 4 Release Category	CPNPP Units 3 and 4 Release Frequency per reactor-year (Table 7.2-6)
RC1	7.5E-09
RC2	2.1E-09
RC3	2.0E-08
RC4	1.1E-08
RC5	6.5E-08
RC6	1.1E-06

Under NEPA, events with a probability of less than 1.0 E-6 per reactor-year are considered remote and speculative and need not be evaluated further. Release categories RC1 through RC5 are eliminated from further consideration because of their low probability; those events are remote and speculative. Release category RC6 is for an intact containment, which means that the radionuclide release rate would be similar to the design basis accident. As demonstrated in FSAR Chapter 15, design basis accident releases do not have a significant impact on the affected unit and the impact at the unaffected units would be less due to the additional atmospheric dispersion of the release. As such, RC6 would not have an adverse impact on the safe shutdown of the unaffected units and also need not be considered further. CTS-01101

The above release scenarios do not consider internal fire, internal flood, or low power and shutdown events. The release frequencies for other events that result in large radiological releases are 2.3E-07 per reactor-year for internal fire, 2.8E-07 per reactor-year for internal flood, and 2.0E-07 for low power and shutdown events. The release frequency for external events, including seismic, are negligible compared to internal events (Section 7.2). These frequencies are too low to warrant further consideration (these events are remote and speculative).

The accident sequences and accident progressions at the existing Westinghouse PWR units at CPNPP Units 1 and 2 are similar to the US-APWR units. The accident sequences and accident progressions for Units 1 and 2 are classified into 14 release categories as given below.

CPNPP Units 1 & 2 Release Category	Description	CPNPP Units 1 & 2 Core Damage Frequency per reactor-year
I	Early containment rupture failure without sprays	4.21E-08
II	Early containment leakage without sprays	8.00E-09
III	Early containment rupture failure with sprays	4.60E-08
IV	Early containment leakage with sprays	1.88E-08
V	Late containment rupture failure due to core concrete interaction (CCI)-induced non-condensible gas overpressure without sprays	2.29E-08
VI	Late leakage-type containment failure due to CCI-induced non-condensible gas overpressure without sprays	4.55E-06

CTS-01101

CPNPP Units 1 & 2 Release Category	Description	CPNPP Units 1 & 2 Core Damage Frequency per reactor-year
VII	Late containment rupture failure due to core concrete interaction (CCI)-induced non-condensible gas overpressure with sprays	1.42E-09
VIII	Late leakage-type containment failure due to CCI-induced non-condensible gas overpressure with sprays	2.82E-07
IX	Late steam-induced overpressure rupture-type failure without sprays but with overlying water pool	1.03E-09
X	Late steam-induced overpressure leakage-type failure without sprays but with overlying water pool	2.04E-07
XI	V-Sequence	2.67E-08
XII	SGTR and induced SGTR (ISTGR)	7.80E-07
XIII	Failure to isolate	2.22E-09
Intact containment events		4.0E-06

The Unit 1 and 2 release frequencies (based on large early release frequencies) for other events are 1.23E-07 per reactor-year for internal fire, high winds and tornadoes; 1.7E-07 per reactor-year for internal flood; and 3.8E-08 per reactor-year for low power and shutdown events. In addition, the release frequency resulting from seismic events is negligible. These frequencies are too low to warrant further consideration (these events are remote and speculative).

The only release categories which cannot be eliminated from further consideration due to their low probability are category VI and the intact containment events. For the intact-containment events, the containment would remain intact, which means that the radionuclide release rate would be similar to the design basis accident. As demonstrated in Chapter 15 of the Unit 1 and 2 FSAR, design basis accident releases do not have a significant impact on the affected unit and the impact at the unaffected units would be less due to the additional atmospheric dispersion of the release. As such, intact containment events would not have an adverse impact on the safe shutdown of the unaffected units and need not be considered further.

With respect to category VI, there are 38.5 hours from the start of the event to the release and more than 35 hours from core melt to release. The 35 hours from core melt to release is more than sufficient time to warn the unaffected units and for the operators of those units to safely bring the unaffected units to a safe cold shutdown condition in a controlled manner. This amount of time also allows sufficient time to coordinate with the grid managers to minimize impact on the electrical distribution grid. CTS-01101

Any releases after the unaffected units are in cold shutdown (i.e., average coolant temperature ≤ 200°F) will not adversely impact the safety of the unaffected units because these units are designed to stay safely shutdown with little or no operator oversight for extended periods of time once cold shutdown is achieved. Operability of equipment required to maintain cold shutdown is not adversely affected by the radionuclide releases for a release category VI event as discussed in Subsection 7.5.3.2.

7.5.3 POTENTIAL OPERABILITY IMPACTS ON UNAFFECTED UNITS

The following subsections evaluate the impact of severe accidents on the control room operators and the impact of radionuclide release on necessary equipment.

7.5.3.1 Evaluation of Potential Impacts of Severe Accidents on Operators

Even though for the event of interest, release category VI for CPNPP Units 1 and 2, safe shutdown can be accomplished prior to any significant radionuclide releases, a discussion of the impact of a severe accident on the control room operators is provided. The impact of a severe accident on the unaffected units is mitigated by the slow evolution of a severe accident, the unaffected units control room habitability systems, plant shielding, and equipment design. Severe accidents require time to progress from the initiating event to a loss of containment integrity which results in significant radionuclide release. In the event of a severe accident, the Site Emergency Plan will be implemented to provide mitigating activities such as evacuation of non-essential personnel and other actions to address the accident consequences. Included in the Emergency Plan are mitigating and protective actions necessary to protect the workers, the general public, and the unaffected units. The operators and staff of adjacent units will be kept informed as to any accident progression in accordance with the site emergency plan. In the event of a severe accident, a site emergency would be announced in all units. Per the Emergency Plan and supporting procedures, the Emergency Coordinator is responsible for directing notifications to affected plant staff, which may include the unaffected units' control rooms. This notification, and subsequent communications, would enable the unaffected units' staff to take action, as necessary. It is expected that this action would include prompt shutdown of the unaffected units. There is adequate time after the site emergency announcement to place the undamaged units in a safe condition and to shelter or evacuate nonessential site personnel if necessary.

Control room habitability systems are designed to protect the control room operators during design basis accidents by providing missile protection, radiation shielding, radiation monitoring, air filtration and ventilation, and fire protection. For Units 1 and 2, the control room operator dose limit for releases from a design basis accident given in 10 CFR 50, Appendix A, GDC 19 is 5 rem whole body, or its equivalent to any part of the body, for the duration of the accident. The control room dose limit for Units 3 and 4 is 5 rem total effective dose equivalent (TEDE).

The control room habitability systems design ensures conformance with this regulatory requirement during design basis accidents so that adequate radiation protection is provided to permit access and occupancy of the control room under accident conditions.

Radiological protection of the control room operators needed during shutdown activities following a severe accident would be provided by the control room habitability systems of the adjacent units and available post-accident mitigating measures. For a severe accident, the control room habitability system would be placed in the emergency mode to minimize the introduction of radionuclides released from the damaged unit into the control room envelope. The control room operator dose could be further minimized by the use of self-contained breathing apparatus which would essentially eliminate the inhalation dose component of the total dose. CTS-01101

The main control room habitability systems provide filters and iodine adsorbers for the outside air intake and the control room recirculation air flow. The initial post-accident operating mode for the control room habitability systems is the isolation mode with only recirculation air flow. The emergency ventilation mode of operation which introduces fresh air into the control room is under administrative control so that the dose to the control room occupants is minimized, and the need for air change is satisfied.

Once a plant is shutdown, stable, and in long term decay heat removal, operator action is not continuously necessary to maintain the plant in a safe shutdown condition. Therefore, at that time, the operators could be evacuated or replaced by other operators as necessary. Additional mitigating measures which could be used to limit control room operator doses following the severe accident include:

- Control room access control to minimize introduction of radioactive materials into the control room envelope
- Limitation of exposure times
- Individual thyroid protection

Implementation of any of these protective measures would be in accordance with the Site Emergency Plan.

7.5.3.2 Evaluation of Potential Impacts of Severe Accidents on Equipment Operability

Nuclear power plant equipment can inherently perform its safety functions given the radiation doses expected from a design basis accident at that unit. Additionally, plant design features, such as shielding, provide protection by reducing the post-accident radiation dose from another unit at the site. For example, the concrete of the unaffected units containment structure provides substantial shielding and the containment is sealed which prevents the introduction of post-accident airborne radioactivity releases into the containment. The structural concrete in other buildings would also provide equipment shielding and protection from external radiation.

The potential impact of a severe accident on equipment operability at an adjacent unit is due to the post-accident radiation exposure of the equipment. A dose analysis, which bounds the Unit 1 and 2 release category VI, determined that the 30 day ground level gamma radiation dose resulting from the radionuclides released to the atmosphere is less than 1.3E+03 rad at Unit 3 or 4. The MELCOR Accident Consequence Code System (MACCS2) software, Version 1.13.1 (Chanin and Young 1997) was used to determine the external gamma dose. Doses inside the adjacent units would be reduced due to shielding by structural materials. The doses would be reduced to approximately 11.6 rad by 1 foot of concrete. The exterior walls and roof of the US-APWR Auxiliary Building, Reactor Building, and Power Source Building have a thickness of greater than or equal to 1 foot of concrete. As a result, doses internal to these buildings due to ground level external gamma radiation is expected to be less than or equal to the radiation level calculated based on 1 foot of concrete shielding. With the additional shielding of the internal walls and the self shielding of critical components by the equipment itself, the actual doses to needed equipment and components will actually be less. CTS-01101

Doses in buildings outside the containment could be somewhat higher than the 11.6 rad dose due to external radiation, because of the possibility of additional equipment radiation dose due to the intake or infiltration of contaminated air into areas where the equipment is located. Contaminated air could be introduced into the Auxiliary Building by the Auxiliary Building HVAC system. During normal plant operation, two air handling units and two exhaust fans are in operation. The exhaust airflow is continuously and automatically controlled at a predetermined value to maintain a slightly negative pressure in the controlled areas. Maintaining this negative pressure inside the building could result in the potential for infiltration of contaminated air from outside the building. Airborne radioactivity is monitored inside the exhaust air duct from the fuel handling area, penetration and safeguard component area, Reactor Building controlled area, Auxiliary Building controlled area, and sampling/laboratory area. An alarm is actuated in the main control room when the radiation levels exceed a predetermined value. If high airborne radioactivity is detected, the supply and exhaust duct isolation dampers are manually closed. Following a severe accident, if contaminated air is introduced into the building atmosphere, the exhaust air flow would be terminated upon reaching the setpoint established to keep the building releases within the 10 CFR 20.1301 limits. Securing the exhaust air flow at this point would terminate the intake of contaminated air before the concentration inside the building reaches a level which would be detrimental to the equipment.

For the power source buildings, radiation monitors are not provided and the HVAC system is not isolated on high radiation. As a result, there would be a continuous flow of potentially contaminated air into the building and contaminated air and exhaust out of the building. However, the total integrated radiation dose to equipment in the power source building would be no more than the unshielded external gamma dose (1.3E+03 rad). Radiation doses at this level are not detrimental to equipment operation and would be reduced by equipment self shielding to a lower dose.

From the standpoint of equipment survivability, the radiation levels inside the adjacent units would be at a level considered to be a mild radiation environment (i.e., < 1.0E+04 rad). Plant equipment is not considered to be adversely impacted by radiation if in a mild radiation environment (Unit 1 and 2 FSAR Subsection 3.11B-1 and DCD Subsection 3.11.5.2). Based on the discussion above, the necessary equipment in the adjacent US-APWR units would be able to perform its design function following the severe accident involving release category VI at CPNPP Units 1 and 2. This equipment would be capable of promptly shutting down the reactor, maintaining the unit in a safe condition during hot shutdown, and subsequently placing and maintaining the unit in cold shutdown. The radiation exposure to equipment at an adjacent unit, due to the radiation released from the damaged unit, would not be detrimental to equipment operation.

7.5.3.3 Evaluation of Potential Overall Operational Impacts of Severe Accidents on the Unaffected Units

CTS-01101

Severe accidents that have a very low probability are remote and speculative and do not need to be evaluated under NEPA. With respect to the remaining severe accidents, the required equipment and operator oversight will be available to safely shutdown each of the unaffected units during a postulated severe accident scenario on any of the four units on site. There will be no adverse impact on the unaffected units' operations that would result in additional environmental impacts due to the unaffected units. Therefore, the consequences of a severe accident on the unaffected units would be limited to general site contamination and prolonged outages while the original accident cause is investigated.

7.5.4 ECONOMIC IMPACTS OF A TEMPORARY SHUTDOWN OF THE UNAFFECTED UNITS

The economic impacts of the postulated event are assessed based upon the cost-risk of the event (Section 7.2 and 7.3). The risk and cost are addressed below.

7.5.4.1 Severe Accident Risk

Severe accidents, as discussed in Section 7.2, have a very low probability of occurrence. The sum of the frequencies of occurrence for each of the six US-APWR release categories, which are shown in Table 7.2-6, is the core damage frequency (CDF) for internal events. The total US-APWR CDF for internal events, internal fire, internal flooding, and low-power and shutdown (LPSD) events is 4.6E-06 per reactor-year as shown in Table 7.2-12, 7.2-13 and 7.2-14. The CDF contribution due to external events such as seismic, tornados, external flooding, transportation accidents, and nearby facility accidents is considered in FSAR Subsection 19.1.5. The CDF resulting from a tornado strike is 7.0E-08 events per reactor-year, which is almost two orders of magnitude lower than the total CDF for internal events, internal flood, internal fire, and LPSD events. As discussed in FSAR Subsection 19.1.5, the contribution of external flooding, transportation accidents, and nearby facility accidents to the total CDF is considered insignificant. Seismic events are also discussed in Subsection 19.1.5 of the US-APWR DCD and are not significant contributors to the total CDF. Therefore, external events were determined to be negligible compared to internal events and were not incorporated into the release frequencies.

The CDF for CPNPP Unit 1 due to internal events, including internal fire and flood, as derived from the PRA for Units 1 and 2, is 3.09E-05 events per reactor-year. The corresponding internal CDF for Unit 2 is 3.06E-05 events per reactor-year. Including the CDF contribution due to tornadoes increases the Unit 1 CDF to 3.46E-05 events per reactor-year and the Unit 2 CDF to 3.43E-05 events per reactor-year. Because Comanche Peak is in a low seismicity region, the seismic CDF contribution is 5.0E-07 per reactor-year. The CDF for low power and shutdown events is 3.0E-06 per reactor-year.

7.5.4.2 Cost-Risk Impacts

A severe accident at any of the CPNPP units would result in contamination and possible prolonged outages at the other units. The economic risk at an affected US-APWR unit has been evaluated and quantified in sections 7.2 and 7.3. As discussed below, this economic risk resulting from the damaged unit easily bounds the economic risk to an unaffected unit, because the frequency of occurrence would be of the same order of magnitude and the consequences to the undamaged unit would be limited to decontamination costs and a temporary outage, rather than the public costs and permanent outage considered for the damaged unit. CTS-01101

The impact of a severe accident at one of the CPNPP units on the other units is primarily economic. The impact to on-site personnel is limited by emergency response training and procedures which would require evacuation of all unnecessary personnel. The minimal increase in population dose consequences due to consideration of on-site personnel is not significant because the consequence evaluation already considers 5798 individuals in the surrounding population within 8 km of the site. Nevertheless, as discussed below, this additional cost is evaluated.

Considering the cost components listed in Table 7.3-1, the increase in the economic cost is due to an increase in on-site exposure costs and some increase in replacement power costs.

The on-site exposure cost increase can be conservatively bounded by a factor of 4 relative to the value calculated for sections 7.2 and 7.3 for a severe accident in one US-APWR unit, because the doses, and the associated exposure cost, at the three unaffected units will be considerably lower in reality. The conservatism associated with increasing the on-site exposure costs by a factor of four is not significant because the on-site exposure cost is less than 1 percent of the total cost as shown in Table 7.3-1. Site decontamination costs are already addressed in the total decontamination cost associated with the damaged unit, which is assumed to cover all affected units on-site.

The increase in replacement power cost is based on a conservative assumption of a six year outage for all three of the unaffected units. Six years is conservatively chosen because that was the outage time for Three Mile Island (TMI) Unit 1 following the TMI Unit 2 accident. This is considered a bounding conservative assumption because two of the unaffected units, being a different design and at a greater distance from the affected unit, would in all likelihood be restored to power in a shorter time period. The undamaged unit with the same design as the affected unit may experience a longer shutdown time due to root-cause investigations and possible design enhancements. The long down time for TMI-1 was based on specific post-TMI retrofits, design changes, and new training requirements. A severe accident would not cause any physical damage to the unaffected units which would delay restart of the unaffected units.

The economic costs associated with a severe accident are presented in Table 7.5-1 assuming a severe accident involves one of the US-APWR units. Table 7.5-1 considers the costs, based on November 2009 dollars, on a single unit basis and the costs considering the impact to all four CPNPP units. It should be noted that for longer-term shutdowns lasting several years, the above results would be very conservative because the utility would adopt more optimal solutions when faced with an extended loss of power production. This implies that for a multiyear outage, the increase in production cost calculated on the basis of the short-term replacement power cost would be higher than what would actually occur in practice.

As noted, there would be no physical reason restricting restart of the unaffected units. In fact, the consequences shown in Table 7.5-1 should be considered unrealistically high bounding consequences to the utility. A more realistic scenario would involve a faster restart of at least two of the units to reduce the economic impact to the utility and the local community. This would reduce the overall cost impact. CTS-01101

As noted in Table 7.3-1, the maximum averted cost-risk for internal events including internal fire, internal flood, and LPSD events [external events are not included in the US-APWR CDF because they are not a significant contributor to total risk, (Subsection 7.5.4.1)] results in a maximum averted cost-risk of $400,073 as shown in Table 7.3-1. Inclusion of the cost of the protracted shutdown of the unaffected units, given in Table 7.5-1, increases the maximum averted cost-risk to $692,576 based on a seven percent discount rate. The averted cost-risk increase would be even smaller if more realistic shutdown times (on the order of weeks) for the unaffected units are considered. CTS-01104 CTS-01104

Based on Table 7.5-1, the severe accident cost-risks do not impact the severe accident mitigation alternatives (SAMA) evaluation given in Section 7.3. The valuation of the averted risk of $692,576 is less than the cost of implementing the cheapest SAMA, $870,000, as described in Section 7.3. CTS-01104

The analysis of a postulated severe accident at one of the existing units conservatively assumed that the affected W-PWR unit is Unit 2 because this unit has a longer remaining life which would maximize the replacement power costs. The monetization of the Unit 2 severe accident was based on the assumption that the off-site dose and property damage would be similar to those for a severe accident at one of the US-APWRs. This assumption is reasonable because Units 1 and 2 are also pressurized water reactors with similar design and safety features such that the accident sequences and release characteristics would be similar. In addition, the power level of the older W-PWR units is bounded by the US-APWR power level, which would make the post-accident radiological consequences smaller. As before, the unaffected units are assumed to be out of service for six years following the accident. The Unit 2 severe accident economic impact is given in Table 7.5-2. The higher economic risk for a severe accident at Unit 2 is not unexpected because the CDF for Unit 2 is a factor of approximately 18 higher than the CDF for the US-APWR units. (4.6E-06 per reactor-year for the US-APWR units for all internal events, internal fire, internal flood and LPSD events vs. 8.5E-05 events per reactor-year for Unit 2 internal and external events).

The data provided in Table 7.5-2 is provided for completeness only. These costs are not relevant to the SAMA analysis for Units 3 and 4 because there are no SAMAs which could be implemented at Units 3 and 4 which could reduce the CDF at Units 1 or 2.

7.5.5 CONCLUSIONS CTS-01103

Under NEPA, it is not necessary to consider those severe accidents that have a very low probability of occurrence (less than 1E-6 per reactor-year) because such accidents are remote and speculative. As demonstrated above, severe accidents with a probability of greater than 1E-6 per reactor-year at the affected unit would not prevent the unaffected units from safely shutting down. All equipment necessary to complete a safe shutdown of the unaffected units would be able to operate as designed without any degradation to its functional capabilities for the exposure levels associated with the airborne release from the accidents evaluated. The radiation dose to equipment is below the level normally considered as a harsh environment which ensures proper equipment function. The control room habitability systems are capable of maintaining habitability of the control rooms during shutdown of the unaffected units. Operators at the unaffected units would be able to achieve and maintain safe shutdown of the units prior to a large release from the affected unit. CTS-01101

In summary, the consequences of a severe radiological accident at any one unit on the operation of the other units at the Comanche Peak site are of SMALL significance. The accident scenarios would not result in any incremental severe accident environmental impacts attributable to the unaffected units beyond those evaluated in Section 7.2. The environmental impact from a severe accident would remain SMALL.

Furthermore, even if it is arbitrarily postulated that severe accidents were to occur in all four units simultaneously, the cumulative environmental impacts would still be SMALL. In such a scenario, the releases of radioactivity from all four units would be approximately four times the release from an individual unit. However, even if the risk-based environmental impacts discussed in Section 7.2 for an accident originating in one of the US-APWR units were to be multiplied by a factor of four, the environmental risks would still be SMALL. For example, the cumulative dose risk from all four units would be about 1.2 person-rem/year (i.e., 4 x 0.3 person-rem per reactor-year), which is less than the cumulative population dose risk from normal operation (1.64 person-rem TEDE per reactor-year). Furthermore, the cancer fatality risk would be 1.2E-09 per reactor-year (i.e., four times 3.22E-10 per reactor-year from Subsection 7.2.4), which is well below the NRC's safety goal of 1.89E-06 per reactor-year. This value is well below the 0.1 percent value specified in the NRC's Safety Goal Policy Statement. As discussed in Section 7.5.4, the CDF for Units 1 and 2 is approximately 18 times the CDF for Units 3 and 4. However, even if these risk-based values were to be multiplied by a factor of 18, the resulting cancer fatality risk would remain well below the NRC's Safety Goal. Therefore, the environmental impact from such an arbitrary scenario would remain SMALL.

7.5.6 REFERENCES

(Chanin and Young 1997) Chanin, D.I. and M.L. Young. Code Manual for MACCS2: Volume 1, User's Guide. NUREG/CR-6613. SAND97-0594. Sandia National Laboratories. Albuquerque, New Mexico. May 1998.

TABLE 7.5-1 CTS-01101

IMPACT OF ASSUMED SIX-YEAR OUTAGES AT UNDAMAGED UNITS ON SEVERE ACCIDENT COSTS* SEVERE ACCIDENT AT UNIT 3 OR 4

	7 Percent Discount Rate Single Unit	7 Percent Discount Rate Four Units
Off-site Exposure Cost	$16,522	$16,522
Off-site Property Damage Cost	$28,022	$28,022
On-site Exposure Cost	$2,311	$9,242
On-site Cleanup Cost	$70,475	$70,475
Replacement Power Cost	$282,744	$568,315
Total	$400,073	$692,576

CTS-01104

*values are expressed in terms of risk (i.e., cost times likelihood in $/yr)

TABLE 7.5-2 CTS-01101

IMPACT OF ASSUMED SIX-YEAR OUTAGES AT UNDAMAGED UNITS ON SEVERE ACCIDENT COSTS* SEVERE ACCIDENT AT UNIT 2

	7 Percent Discount Rate Single Unit	7 Percent Discount Rate Four Units	
Off-site Exposure Cost	$4,066	$4,066	
Off-site Property Damage Cost	$6,896	$6,896	
On-site Exposure Cost	$39,941	$159,765	
On-site Cleanup Cost	$1,218,280	$1,218,280	
Replacement Power Cost	$2,933,322	$6,570,642	CTS-01104
Total	$4,202,505	$7,959,648	

*values are expressed in terms of risk (i.e., cost times likelihood in $/yr)

Chapter 9

Chapter 9 Tracking Report Revision List

Change ID No.	Section	ER Rev. 1 Page	Reason for change	Change Summary	Rev. of ER T/R
CTS-00920	9.2.2.11	9.2-30 Through 9.2-50	Address ASLB Contention 18	Added Section 9.2.2.11 to provide discussion of energy alternatives in combination with energy storage.	0
CTS-00920	9.2.5	9.2-44 through 9.2-49	Address ASLB Contention 18	Included references found in Section 9.2.2.11.	0