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Ref. # 10 CFR 52

April 19, 2011

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. 5374 (SECTION 11.2) AND 5677 (SECTION 5.4.2)

Dear Sir:

Luminant Generation Company LLC (Luminant) submits herein the response to Request for Additional Information (RAI) No. 5374 (CP RAI #203) and 5677 (CP RAI #214) for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. The RAI addresses the population dose used in the cost-benefit analysis and the pre-service/in-service inspection schedule.

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

Regulatory Commitment #6591 has been expanded in Attachment 2 to explicitly list the PSI and ISI programs in addition to the IST program schedule to be submitted to the NRC that supports the planning and conduct of NRC inspections of operational programs.

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

Executed on April 19, 2011.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachments: 1. Response to Request for Additional Information No. 5374 (CP RAI #203)
2. Response to Request for Additional Information No. 5677 (CP RAI #214)

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NRO

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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.: 5374 (CP RAI #203)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 2/11/2011

QUESTION NO.: 11.02-11

The NRC Staff's review of FSAR (Rev. 1) Section 11.2.1.5, Updated Tracking Report (UTR) (Rev. 4), and response to RAI 3401, Question 11.04-3 (RAI Letter Number 39) found insufficient information on the site-specific cost-benefit analysis (CBA) for the liquid waste management system (LWMS) to satisfy CP COL 11.2(5) to verify compliance with 10 CFR Part 50, Appendix I, Section II.D. COL FSAR Section 11.2.1.5 states the addition of processing equipment of reasonable treatment technology is not favorable or cost beneficial given the population dose of 2.14 person-rem/yr (Total Body), 2.04 person-rem/yr (Thyroid), and the equipment and operating costs in
RG 1.110. Please address the following items and provide a mark-up on the proposed FSAR changes.

1. Confirm the above site-specific population doses to the Thyroid and Total Body from liquid effluents in FSAR Section 11.2.1.5 which appear to be evaluated prior to the restricted public use of Squaw Creek Reservoir at the Comanche Peak site.

2. In the response to RAI 3401, Question 11.04-3 (CP RAI #39), the site-specific CBA for the LWMS assumes effluent population doses of 5 person-rem/yr (Total Body) and 4 person-rem/yr (Thyroid). The response provides site-specific inputs to determine the Capitol Recovery Factor (CRF) and Labor Cost Correction Factor (LCCF), but does not identify augment(s) listed in Table A-1 to RG 1.110 or other associated costs described in Appendix A to RG 1.110 applied in the site-specific CBA calculation. Specifically, identify the LWMS augment(s) and all costs considered in the site-specific CBA and provide sufficient information for the staff to evaluate the bases and assumptions of these costs used to determine the site-specific CBA in order to verify compliance with NRC regulations and conformance to NRC guidance.

ANSWER:

1. The site-specific population doses from liquid effluents increased slightly with the opening of Squaw Creek Reservoir (SCR) to the public. The doses to the Total Body and Thyroid are currently 2.36 person-rem/yr and 2.07 person-rem/yr, respectively. FSAR Subsection 11.2.3.1 was previously revised (ML100950108 page 11.2-6) to reflect these site-specific population doses. FSAR

Subsection 11.2.1.5 has been revised to provide the conservative dose values used in the CBA as noted below.

2. The cost benefit analysis performed to satisfy the requirements of 10 CFR 50, Appendix I, Section II.D used the guidance and methodology given in RG 1.110. The generic parameters used in calculating the Total Annual Cost (TAC) are given in RG 1.110 for each radwaste treatment system augment. The fixed generic parameters provided in RG 1.110 include the Annual Operating Cost (AOC) (Table A-2), Annual Maintenance Cost (AMC) (Table A-3), Direct Cost of Equipment and Materials (DCEM) (Table A-1), and Direct Labor Cost (DLC) (Table A-1).

   The following variable parameters were used in the plant specific cost benefit analysis:

   - Capital Recovery Factor (CRF) - This factor is taken from Table A-6 of RG 1.110 and reflects the cost of money for capital expenditures. A cost-of-money value of 7% per year is assumed in this analysis, consistent with the "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission" (NUREG/BR-0058). A CRF of 0.07123 was obtained using the formulation following Table A-6, an interest rate of 7%, and a service life of 60 years.
   - Indirect Cost Factor (ICF) - This factor takes into account whether the radwaste system is unitized or shared (in the case of a multi-unit site) and is taken from Table A-5 of RG 1.110. It is assumed that the radwaste system for this analysis is a unitized radwaste system at a multi-unit site, which equals an ICF of 1.75.
   - Labor Cost Correction Factor (LCCF) - This factor takes into account the differences in relative labor costs between geographical regions and is taken from Table A-4 of RG 1.110. A LCCF of 1.1 is assumed in this analysis.

   The first augment considered is a near replica train of the current US-APWR LWMS system which includes a single cartridge filter and four PWR clean waste demineralizers. Other augments considered independently were 1) a liquid waste evaporator, 2) a reverse osmosis unit, and 3) a 90 gpm cartridge filter. The direct costs for the examined augments were scaled in order to represent the flow rates of the site-specific design and a 10% contingency factor was used.

   Of the augments considered, the lowest TAC was a 90 gpm cartridge filter with a TAC of $14,910 in 1975 dollars. Using the $1,000 per person-rem criterion prescribed by Appendix I to 10 CFR 50, the dose reduction would have to be 14.91 person-rem whole body (or thyroid) to be cost beneficial. Because the site-specific population dose estimate is well below this value (i.e., 2.36 person-rem/yr and 2.07 person-rem/yr, Total Body and Thyroid respectively), there are no cost-beneficial liquid radwaste augments and no further cost-benefit analysis is needed to demonstrate compliance with 10 CFR 50 Appendix I, Section II.D.

Impact on R-COLA

See marked-up FSAR Revision 1 pages 11.2-1 and 11.2-2.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

11.2 LIQUID WASTE MANAGEMENT SYSTEM

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

11.2.1.5 Site-Specific Cost-Benefit Analysis

CP COL 11.2(5) Replace the third paragraph in DCD Subsection 11.2.1.5 with the following.

RCOL2_11.02-11

~~A site-specific cost benefit analysis using the guidance of regulatory guide (RG) 1.110 was performed based on the site-specific calculated radiation doses as a result of radioactive liquid effluents during normal operations, including anticipated operational occurrences (AOOs). The result of the dose analysis indicated a public exposure of less than 1 person-rem per year resulting from the discharge of radioactive effluents, effecting a dose cost of less than $1000 per year, in 1975 dollars. Based on a population dose results of 2.14 person-rem per year (Total Body), 2.04 person-rem per year (Thyroid) and the equipment and operating costs as presented in RG 1.110, the cost benefit analysis demonstrates that addition of processing equipment of reasonable treatment technology is not favorable or cost beneficial, and that the design provided herein complies with Title 10, Code of Federal Regulations (CFR), Part 50, Appendix I.~~The cost benefit analysis performed to satisfy the requirements of 10 CFR Part 50, Appendix I, Section II.D used the guidance and methodology given in RG 1.110, March 1976. The generic parameters used in calculating the Total Annual Cost (TAC) are given in RG 1.110 for each radwaste treatment system augment. The fixed generic parameters provided in RG 1.110 include the Annual Operating Cost (AOC) (Table A-2), Annual Maintenance Cost (AMC) (Table A-3), Direct Cost of Equipment and Materials (DCEM) (Table A-1), and Direct Labor Cost (DLC) (Table A-1). The following variable parameters were used in the plant specific cost benefit analysis:

- Capital Recovery Factor (CRF) -This factor is taken from Table A-6 of RG 1.110 and reflects the cost of money for capital expenditures. A cost-of-money value of 7% per year is assumed in this analysis, consistent with the "Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission" (NUREG/BR-0058). Using the formulation following Table A-6, an interest rate of 7%, and a service life of 60 years, a CRF of 0.07123 was obtained.

- Indirect Cost Factor (ICF) -This factor takes into account whether the radwaste system is unitized or shared (in the case of a multi-unit site) and is taken from Table A-5 of RG 1.110. It is assumed that the radwaste system for this analysis is a unitized radwaste system at a multi-unit site, which equals an ICF of 1.75.

- Labor Cost Correction Factor (LCCF) -This factor takes into account the differences in relative labor costs between geographical regions and is taken from Table A-4 of RG 1.110. A LCCF of 1.1 is assumed in this analysis.

RCOL2_11.02-11

The first augment considered is a near replica train of the current US-APWR LWMS system which includes a single cartridge filter and four PWR clean waste demineralizers. Other augments considered independently were; 1) a liquid waste evaporator, 2) a reverse osmosis unit, and 3) a 90 gpm cartridge filter. The direct costs for the examined augments were scaled in order to represent the flow rates of the site-specific design and a 10% contingency factor was used.

Of the augments considered, the lowest total annual cost (TAC) was a 90 gpm cartridge filter with a TAC of $14,910 in 1975 dollars. Using the $1,000 per person-rem criterion prescribed by Appendix I to 10 CFR Part 50 the dose reduction would have to be 14.91 person-rem whole body (or thyroid) to be cost beneficial. Because the site specific population dose estimate is well below this value (i.e., 2.36 person-rem/yr and 2.07 person-rem/yr, Total Body and Thyroid respectively) there are no cost-beneficial liquid radwaste augments and no further cost-benefit analysis is needed to demonstrate compliance with 10 CFR 50, Appendix I Section II.D.

11.2.1.6 Mobile or Temporary Equipment

~~CP~~STD COL 11.2(1)

Replace the last sentence in the paragraph in DCD Subsection 11.2.1.6.

CTS-01140

Process piping connections have connectors different from the utility connectors to prevent cross-connection and contamination. The use of mobile or temporary equipment will require ~~Luminant to address~~ applicable regulatory requirements and guidance such as 10 CFR 50.34a, 10 CFR 20.1406 and RG 1.143 to be addressed. As such the purchase or lease contracts for any temporary and mobile equipment will specify the applicable criteria.

CTS-01140

The space allocated for the temporary and mobile equipment is located in the Auxiliary Building to minimize the impact to the environment in the event of an accident or spillage of radioactive materials. Shield walls are provided on three sides with one side open for access during installation, operation, inspection, and maintenance. The shield walls also serve to minimize spread of contamination to the entire area. A shield door is provided with truck bay access door from the common walkway inside the A/B. At the door opening a curb with sloped sided is constructed to prevent spreading of any liquid spillage into the truck bay area. The connection for the spent resin is provided on the process piping panel and the transfer line is built into the pipe chase for shielding purposes. The location of the mobile unit facilitates short transfer distance. Drainage collection is provided for

RCOL2_11.02-6

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.: 5374 (CP RAI #203)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 2/11/2011

QUESTION NO.: 11.02-12

The NRC Staff's review of COL FSAR (Rev. 1) Section 11.2 and Tables 11.2-10R (Sheets 1 and 2), 11.2-11R (Sheets 1 and 2), and 11.2-12R (Sheets 1 and 2), 11.2-13R (Sheets 1 and 2), 11.2-14R (Sheets 1 and 2), and 11.2-15R, and UTR (Rev. 3 and 4) found insufficient information on the calculated annual liquid effluent releases and population doses to satisfy CP COL 11.2(4) and verify compliance with NRC regulations. Please address the following items and provide a mark-up on the proposed FSAR changes.

1. FSAR Section 11.2.3.1 describes annual average radionuclide releases are determined by the PWR-GALE code with reactor coolant activities in US-APWR DCD Tier 2 Section 11.1 and input design parameter values in DCD Table 11.2-9 (Sheets 1 and 2). The staff's calculations show different liquid effluent total releases (for "Isotope" and "All others") using the MHI PWR-GALE code, a proprietary version of the NRC PWR-GALE code, with no onsite laundry (no detergent waste effluent input). Given the observed differences, confirm that DCD Table 11.2-9 is incorporated by reference (IBR) (other than no detergent waste effluent input). If not IBR, tabulate the input parameter values in FSAR Section 11.2 and provide the basis for all departures.

2. FSAR Tables 11.2-10R (Sheets 1 and 2) and 11.2-11R (Sheets 1 and 2) present expected and maximum annual liquid effluent total releases (Ci/yr), respectively. Confirm whether these liquid effluent releases are calculated using plant-specific input values. Suggest adding a footnote to these tables to indicate the calculated liquid effluent releases are for a single new unit.

3. FSAR Tables 11.2-12R (Sheets 1 and 2) and 11.2-13R (Sheets 1 and 2) present expected and maximum annual liquid effluent fractions of concentration limits, respectively. Confirm whether these liquid effluent releases are calculated using plant-specific input values. Provide the methodology, basis, and assumptions on the dilution flow of 247,500 gpm in Note 2 of these tables. Suggest adding a footnote to these tables to indicate the unity rule calculations (sum-of-fractions) are for a single new unit.

4. FSAR Tables 11.2-15R presents population doses from liquid effluent releases during normal operation including AOOs. Suggest adding a footnote to this table to indicate the calculated liquid effluent doses are for a single new unit.

5. In FSAR Section 11.2 (and all other applicable FSAR sections), make reference to the MHI PWR-GALE code and the MHI Technical Report (TR) MUAP-10019[Proprietary]P (R0), MHI TR MUAP-10019[Non-Proprietary]NP (R0) (ML102850683), which describes the methodology, basis, and assumptions for the calculation of expected and maximum annual liquid effluent releases during normal operation including AOOs for plants referencing the US-APWR design.

6. FSAR Section 11.2.3.1 describes annual average liquid effluent releases are taken from DCD Table 11.2-10 (Sheets 1 and 2) to calculate population doses from liquid effluent releases. Given that FSAR Table 11.2-10R (Sheets 1 and 2) presents plant-specific liquid effluent releases, justify why population doses are not calculated using plant-specific liquid effluent releases.

7. In FSAR Section 11.2.3.1, describe why the various potential exposure pathways for liquid effluent releases are not considered in the LADTAP II code calculation of population doses from restricted public access of Squaw Creek Reservoir.

8. Update FSAR Section 11.2 to address the impact of the plant capacity factor of 80% applied in population dose calculations from liquid effluents when typical operating plant capacity factors exceed 90% for compliance with NRC regulations and 40 CFR Part 190 (see response to RAI 523-4246, Question 11.02-30, ML100770379).

ANSWER:

1. As stated in FSAR Subsection 11.2.3.1, handling of contaminated laundry will be a contracted offsite service. In order to reflect this site-specific feature, only hand calculations based on the PWR-GALE code analyses results for the DCD were performed. No new code calculation using PWR-GALE code was performed. Therefore, the list of input parameters for the PWR-GALE code calculation is incorporated by reference (IBR).

   The total of liquid radioactive wastes for each nuclide was calculated by subtracting the amount of detergent waste from the DCD total liquid radioactive waste of the corresponding nuclide (DCD Table 11.2-10). This is consistent with the response to RAI No. 3400 (CP RAI #36) Question 11.03-02, Item 1 (ML093090162). DCD Table 11.2-9 is IBR because the total release of CPNPP Units 3 and 4 is calculated by hand using the methodology described above, no additional code calculation is required, and no departures are required.

   MHI PWR-GALE code outputs are rounded up to two significant figures. Therefore, if an independent PWR-GALE calculation were performed for Comanche Peak Units 3 and 4 by disabling the detergent waste in the input parameters, the results would differ slightly from the hand calculation described above and reported in FSAR Table 11.2-10R.

2. The liquid effluent releases presented in Tables 11.2-10R and 11.2-11R are for a single new unit, which has been reflected in a footnote to the tables. These liquid effluent releases are calculated using plant-specific input values.

3. The liquid effluent releases presented in Tables 11.2-12R and 11.2-13R are plant-specific. Note 2 states that a 247,500 gpm dilution flow was used in these tables. This dilution flow rate was obtained from pump curves provided in the Units 1 and 2 Offsite Dose Calculation Manual (ODCM). The ODCM indicates a flow rate per pump of 275,000 gpm with a safety factor of 0.9 to compensate for flow fluctuations from the predicted rate. A footnote has been added to Tables 11.2-12R and 11.2-13R to state that the fractions of the 10 CFR 20 concentration limits are for a single unit.

4. A footnote has been added to Table 11.2-15R to state that population doses from liquid effluent releases are for normal operation including AOOs for a single new unit.

5. References to MHI PWR-GALE code and MHI Technical Reports MUAP-10019P (R1) and MUAP-10019NP (R1) have been included in the response to RAI No. 5375 (CP RAI #200) Question 11.03-04, Item 4. MHI revised MUAP-10019P and MUAP-10019NP as part of the response to DCD RAI #711 dated March 30, 2011. MUAP-10019 (R1) has been added as Reference 11.2-27 in DCD Rev. 3 Subsection 11.2.5 and a discussion of the MHI PWR-GALE code which is contained in the Technical Report has been added to FSAR Subsection 11.2.3.1.

6. FSAR Subsection 11.2.3.1 provides annual average liquid effluent releases as site-specific by referring to FSAR Table 11.2-10R. DCD Table 11.2-10 is not referenced in FSAR Subsection 11.2.3.1. These references have not been changed in any previous FSAR updates.

   However, Subsection 11.2.3.1 does reference DCD Table 11.2-9 for input parameters for the PWR-GALE code. As discussed in the response to Item 1 above, this table is IBR and the site-specific releases are calculated by subtracting the calculated DCD detergent release from the DCD total release to give the site-specific releases in Table 11.2-10R.

7. The exposure pathways considered in the LADTAP II code calculation are fishing and shoreline recreation. For this purpose, the number of daily users is assumed to be 250 (100 boats x 2 people per boat + 50 additional people on the shoreline). Based on a review of population doses, swimming is not a significant contributor. There are no drinking water pathways or irrigated food pathways associated with Squaw Creek Reservoir (SCR). The additional amount of fish ingestion as a result of opening SCR for public use is a minor contributor to the overall population dose and does not change the 50-mile population dose. Therefore, these pathways (swimming, drinking water, irrigated foods and fish ingestion) were not considered for the calculation of population doses for public use of SCR. These pathways are consistent with the guidance provided in RG 1.09. FSAR Subsection 11.2.3.1 has been clarified to reflect the appropriate pathways.

8. Plant capacity factors greater than 80% were addressed in the response to DCD RAI 523-4246, Question 11.02-30 (ML100770379). As discussed in Table 11.2-9 of the DCD, the basis of the PWR-GALE source term calculation uses a built-in plant capacity factor of 80%, which is less than the expected capacity factor for the US-APWR. The difference in capacity factor has no impact on the calculated liquid effluent release and resultant dose, but there is a minor impact on the gaseous effluent releases and resultant doses. However, the calculated values for liquid effluent release have sufficient margin to the acceptance criteria to cover any US APWR capacity factor between 80% and 100%. This remains true for the CPNPP plant-specific effluent concentrations given in FSAR Tables 11.2-12R and 11.2-13R. Footnotes have been added to these tables to reflect this conclusion.

Impact on R-COLA

See marked-up FSAR pages 11.2-7, 11.2-15, 11.2-16, 11.2-17, 11.2-18, 11.2-19, 11.2-20, 11.2-21, 11.2-22, 11.2-25, and 11.2-26.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

concentration in the pond is uniform. Stagnation and stratification of concentrations is not expected. This is confirmed by obtaining representative samples from the pond. The bottom of the pond is designed to be sloped towards the discharge pit to facilitate complete drainage. The pond is washed each time the contents are emptied to significantly reduce the potential for accumulation of residual contamination. Further, a radiation monitor is located close to the pump discharge to monitor the radiation level of the contents. The radiation monitor alarms in the Main Control Room and the Radwaste Operator Control Room and also isolates the pump and its discharge valve in the unlikely event of the content exceeding the setpoint. The radiation monitor setpoint for the evaporation pond discharge is the same as that used at the Waste Monitor Tank discharge.

Isotopic concentrations are calculated, assuming 247,500 gpm per unit of circulating water from CPNPP Units 1 and 2 (Reference 11.2-201, ODCM for CPNPP Units 1 and 2). The isotopic ratios between the expected releases and the concentration limits of 10 CFR 20 Appendix B are listed in Tables 11.2-12R. The isotopic ratios between the maximum releases and the concentration limits of 10 CFR 20 Appendix B are listed in Table 11.2-13R. These ratio values are less than the allowable value of 1.0.

The individual doses and population doses are evaluated with the LADTAP II Code (Reference 11.2-14). The site-specific parameters used in the LADTAP II Code are listed in Table 11.2-14R, and the calculated individual doses are listed in Table 11.2-15R. Population dose due to public use of SCR is estimated to be 250 times the maximum SCR individual dose based on an estimated maximum usage of 250 people. ~~And the~~The exposure pathways considered due to the public use of SCR are fishing and shoreline recreation. There are no drinking water pathways or irrigated food pathways associated with SCR. Swimming is not a significant contributor to population dose and the 50-mile population dose due to fish ingestion is unchanged due to the public use of SCR. Therefore, drinking water, irrigated foods, swimming and fish ingestion are not considered for the 50-mile population dose.The calculated population dose from liquid effluents is ~~2.14~~2.36 person-rem for whole-body and ~~2.04~~2.07 perso~~m~~n-rem for thyroid. Based on these parameters, the maximum individual dose to total body is 0.90 mrem/yr (adult) and the maximum individual dose to organ is ~~1.28~~1.29 mrem/yr (teenager's liver). These values are less than the 10 CFR 50 Appendix I criteria of 3 mrem/yr and 10 mrem/yr, respectively. Evaluating the dose contribution from the evaporation pond (conservatively assuming 50% evaporation of the diverted flow) amounts to 1.15E-01 mrem/yr (Adult's GI-Tract) described in FSAR Table 11.3-204 and the combined dose from the vent stack gaseous emission and the evaporation pond emission amounts to 2.73E+00 mrem/yr (Adult's GI-Tract) described in FSAR Table 11.3-205, which is well within the 10 CFR Appendix I limit. Based on the above, the evaporation pond meets the acceptance criteria of SRP 11.2. With regards to RG 1.143, RG 1.143 does not provide any guidance on specific design requirements for an evaporation pond. Hence RG 1.143 is not applicable to the desing of the evaporation pond.According to NUREG-0543 (Reference 11.2-202), there is reasonable assurance that sites with up to four operating reactors that have releases within Appendix I design objective values

CTS-01105

RCOL2_11.02-12

CTS-01105

CTS-01105

CP COL 11.2(4)

Table 11.2-10R (Sheet 1 of 2)

RCOL2_11.02-12

Liquid Releases Calculated by PWR GALE Code[4] (Ci/yr)

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste[3]	TOTAL Releases [1]
Corrosion and Activation Products						
Na-24	0.00000	0.00029	0.00002	0.00031	N/A	4.70E-03
P-32	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Cr-51	0.00000	0.00008	0.00000	0.00008	N/A	1.30E-03
Mn-54	0.00000	0.00004	0.00000	0.00005	N/A	7.00E-04
Fe-55	0.00000	0.00003	0.00000	0.00003	N/A	5.00E-04
Fe-59	0.00000	0.00001	0.00000	0.00001	N/A	1.00E-04
Co-58	0.00000	0.00012	0.00000	0.00013	N/A	1.90E-03
Co-60	0.00000	0.00001	0.00000	0.00002	N/A	0.00E+00
Ni-63	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Zn-65	0.00000	0.00001	0.00000	0.00001	N/A	2.20E-04
W-187	0.00000	0.00002	0.00000	0.00002	N/A	3.50E-04
Np-239	0.00000	0.00003	0.00000	0.00004	N/A	5.30E-04
Fission Products						
Rb-88	0.00000	0.00187	0.00000	0.00187	N/A	2.80E-02
Sr-89	0.00000	0.00000	0.00000	0.00000	N/A	6.00E-05
Sr-90	0.00000	0.00000	0.00000	0.00000	N/A	8.00E-06
Sr-91	0.00000	0.00000	0.00000	0.00000	N/A	6.80E-05
Y-91m	0.00000	0.00000	0.00000	0.00000	N/A	4.40E-05
Y-91	0.00000	0.00000	0.00000	0.00000	N/A	1.00E-05
Y-93	0.00000	0.00002	0.00000	0.00002	N/A	3.10E-04
Zr-95	0.00000	0.00001	0.00000	0.00001	N/A	2.00E-04
Nb-95	0.00000	0.00001	0.00000	0.00001	N/A	1.00E-04
Mo-99	0.00000	0.00011	0.00000	0.00011	N/A	1.64E-03
Tc-99m	0.00000	0.00011	0.00000	0.00011	N/A	1.70E-03
Ru-103	0.00001	0.00020	0.00000	0.00021	N/A	3.11E-03
Rh-103m	0.00001	0.00020	0.00000	0.00021	N/A	3.10E-03
Ru-106	0.00010	0.00243	0.00005	0.00257	N/A	3.81E-02
Rh-106	0.00010	0.00243	0.00005	0.00257	N/A	3.90E-05
Ag-110m	0.00000	0.00003	0.00000	0.00004	N/A	6.00E-04
Ag-110	0.00000	0.00000	0.00000	0.00000	N/A	7.20E-05
Sb-124	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Te-129m	0.00000	0.00000	0.00000	0.00001	N/A	7.80E-05
Te-129	0.00000	0.00002	0.00000	0.00002	N/A	3.10E-04
Te-131m	0.00000	0.00002	0.00000	0.00002	N/A	2.50E-04
Te-131	0.00000	0.00000	0.00000	0.00001	N/A	7.60E-05
I-131	0.00002	0.00001	0.00000	0.00002	N/A	4.00E-04
Te-132	0.00000	0.00003	0.00000	0.00003	N/A	4.70E-04
I-132	0.00000	0.00001	0.00001	0.00002	N/A	3.10E-04
I-133	0.00001	0.00002	0.00003	0.00005	N/A	8.10E-04
I-134	0.00000	0.00001	0.00000	0.00001	N/A	8.90E-05
Cs-134	0.00002	0.00005	0.00000	0.00007	N/A	1.00E-03
I-135	0.00000	0.00002	0.00003	0.00005	N/A	7.80E-04
Cs-136	0.00030	0.00112	0.00000	0.00141	N/A	2.16E-02
Cs-137	0.00003	0.00008	0.00000	0.00011	N/A	2.00E-03

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Table 11.2-10R (Sheet 2 of 2)

RCOL2_11.02-12

Liquid Releases Calculated by PWR GALE Code[4] (Ci/yr)

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste[3]	TOTAL Releases[1]
Fission Products						
Ba-137m	0.00003	0.00000	0.00000	0.00003	N/A	4.60E-04
Ba-140	0.00001	0.00031	0.00001	0.00033	N/A	4.89E-03
La-140	0.00001	0.00051	0.00001	0.00053	N/A	8.00E-03
Ce-141	0.00000	0.00000	0.00000	0.00000	N/A	6.00E-05
Ce-143	0.00000	0.00003	0.00000	0.00003	N/A	5.00E-04
Pr-143	0.00000	0.00001	0.00000	0.00001	N/A	7.90E-05
Ce-144	0.00000	0.00011	0.00000	0.00011	N/A	1.70E-03
Pr-144	0.00000	0.00011	0.00000	0.00011	N/A	1.70E-03
All others	0.00000	0.00000	0.00000	0.00000	N/A	1.20E-05
TOTAL (except H-3)	**0.00065**	**0.01053**	**0.00025**	**0.01143**	N/A	**1.70E-01**
H-3 release						1.60E+03

Notes:

1. The release totals include an adjustment of 0.16 Ci/yr added by the PWR-GALE Code to account for AOOs.
2. An entry of 0.00000 indicates that the value is less than 1.0E-5 Ci/yr.
3. For this site-specific application, contaminated laundry is contracted for off-site services.
4. These releases are for a single reactor.

RCOL2_11.02-12

CP COL 11.2(4)

Table 11.2-11R (Sheet 1 of 2)

Liquid Releases with Maximum Defined Fuel Defects[4] (Ci/yr)

RCOL2_11.0 2-12

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste[3]	TOTAL Releases[1]
Corrosion and Activation Products						
Na-24	0.00000	0.00029	0.00002	0.00031	N/A	3.20E-04
P-32	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Cr-51	0.00000	0.00008	0.00000	0.00008	N/A	8.25E-05
Mn-54	0.00000	0.00004	0.00000	0.00004	N/A	4.13E-05
Fe-55	0.00000	0.00003	0.00000	0.00003	N/A	3.10E-05
Fe-59	0.00000	0.00001	0.00000	0.00001	N/A	1.03E-05
Co-58	0.00000	0.00012	0.00000	0.00012	N/A	1.24E-04
Co-60	0.00000	0.00001	0.00000	0.00001	N/A	1.03E-05
Ni-63	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Zn-65	0.00000	0.00001	0.00000	0.00001	N/A	1.03E-05
W-187	0.00000	0.00002	0.00000	0.00002	N/A	2.06E-05
Np-239	0.00000	0.00003	0.00000	0.00003	N/A	3.10E-05
Fission Products						
Rb-88	0.00000	0.03849	0.00000	0.03849	N/A	3.97E-02
Sr-89	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Sr-90	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Sr-91	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Y-91m	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Y-91	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Y-93	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Zr-95	0.00000	0.00001	0.00000	0.00001	N/A	1.03E-05
Nb-95	0.00000	0.00002	0.00000	0.00002	N/A	2.06E-05
Mo-99	0.00000	0.01333	0.00000	0.01333	N/A	1.38E-02
Tc-99m	0.00000	0.00527	0.00000	0.00527	N/A	5.44E-03
Ru-103	0.00000	0.00001	0.00000	0.00001	N/A	1.03E-05
Rh-103m	0.00000	0.00001	0.00000	0.00001	N/A	1.03E-05
Ru-106	0.00000	0.00001	0.00000	0.00001	N/A	1.03E-05
Rh-106	0.00000	0.00001	0.00000	0.00001	N/A	1.03E-05
Ag-110m	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Ag-110	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Sb-124	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Te-129m	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Te-129	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Te-131m	0.00000	0.00033	0.00000	0.00033	N/A	3.40E-04
Te-131	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
I-131	0.00113	0.00056	0.00000	0.00169	N/A	1.74E-03
Te-132	0.00000	0.00526	0.00000	0.00526	N/A	5.43E-03
I-132	0.00000	0.00015	0.00015	0.00030	N/A	3.10E-04
I-133	0.00163	0.00327	0.00491	0.00981	N/A	1.01E-02
I-134	0.00000	0.00005	0.00000	0.00005	N/A	5.16E-05
Cs-134	0.73457	1.83643	0.00000	2.57100	N/A	2.65E+00
I-135	0.00000	0.00083	0.00125	0.00208	N/A	2.15E-03
Cs-136	0.12019	0.44873	0.00000	0.56892	N/A	5.87E-01
Cs-137	0.43698	1.16528	0.00000	1.60226	N/A	1.65E+00

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Table 11.2-11R (Sheet 2 of 2)

RCOL2_11.02-12

Liquid Releases with Maximum Defined Fuel Defects[4] (Ci/yr)

Isotope	Shim Bleed	Misc. Wastes	Turbine Building	Combined Releases	Detergent Waste[3]	TOTAL Releases [1]
Fission Products						
Ba-137m	0.20917	0.00000	0.00000	0.20917	N/A	2.16E-01
Ba-140	0.00000	0.00010	0.00000	0.00010	N/A	1.03E-04
La-140	0.00000	0.00002	0.00000	0.00002	N/A	2.06E-05
Ce-141	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Ce-143	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Pr-143	0.00000	0.00000	0.00000	0.00000	N/A	0.00E+00
Ce-144	0.00000	0.00001	0.00000	0.00001	N/A	1.03E-05
Pr-144	0.00000	0.00001	0.00000	0.00001	N/A	1.03E-05
TOTAL (except H-3)	**1.50367**	**3.51883**	**0.00633**	**5.02883**	N/A	**5.19E+00**
H-3 release						1.60E+03

Notes:

1. The release totals include an adjustment of 0.16 Ci/yr added by the PWR-GALE Code to account for AOOs.
2. An entry of 0.00000 indicates that the value is less than 1.0E-5 Ci/yr.
3. For this site-specific application, contaminated laundry is contracted for off-site services.
4. These releases are for a single reactor.

RCOL2_11.02-12

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Table 11.2-12R (Sheet 1 of 2)

Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Expected Releases)

RCOL2_11.02-12

Isotope [1]	Discharge Concentration (µCi/ml) [2][5]	Effluent Concentration Limit (µCi/ml) [3]	Fraction of Concentration Limit[4]
Na-24	1.19E-11	5.00E-05	2.39E-07
P-32	0.00E+00	9.00E-06	0.00E+00
Cr-51	3.30E-12	5.00E-04	6.60E-09
Mn-54	1.78E-12	3.00E-05	5.92E-08
Fe-55	1.27E-12	1.00E-04	1.27E-08
Fe-59	2.54E-13	1.00E-05	2.54E-08
Co-58	4.82E-12	2.00E-05	2.41E-07
Co-60	0.00E+00	3.00E-06	0.00E+00
Ni-63	0.00E+00	1.00E-04	0.00E+00
Zn-65	5.58E-13	5.00E-06	1.12E-07
W-187	8.88E-13	3.00E-05	2.96E-08
Np-239	1.35E-12	2.00E-05	6.73E-08
Rb-88	7.11E-11	4.00E-04	1.78E-07
Sr-89	1.52E-13	8.00E-06	1.90E-08
Sr-90	2.03E-14	5.00E-07	4.06E-08
Sr-91	1.73E-13	2.00E-05	8.63E-09
Y-91m	1.12E-13	2.00E-03	5.58E-11
Y-91	2.54E-14	8.00E-06	3.17E-09
Y-93	7.87E-13	2.00E-05	3.93E-08
Zr-95	5.08E-13	2.00E-05	2.54E-08
Nb-95	2.54E-13	3.00E-05	8.46E-09
Mo-99	4.16E-12	2.00E-05	2.08E-07
Tc-99m	4.32E-12	1.00E-03	4.32E-09
Ru-103	7.89E-12	3.00E-05	2.63E-07
Rh-103m	7.87E-12	6.00E-03	1.31E-09
Ru-106	9.67E-11	3.00E-06	3.22E-05
Ag-110m	1.52E-12	6.00E-06	2.54E-07
Sb-124	0.00E+00	7.00E-06	0.00E+00
Te-129m	1.98E-13	7.00E-06	2.83E-08
Te-129	7.87E-13	4.00E-04	1.97E-09
Te-131m	6.35E-13	8.00E-06	7.93E-08
Te-131	1.93E-13	8.00E-05	2.41E-09
I-131	1.02E-12	1.00E-06	1.02E-06
Te-132	1.19E-12	9.00E-06	1.33E-07
I-132	7.87E-13	1.00E-04	7.87E-09
I-133	2.06E-12	7.00E-06	2.94E-07

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Table 11.2-12R (Sheet 2 of 2)

Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Expected Releases)

Isotope [1]	Discharge Concentration (µCi/ml) [2][5]	Effluent Concentration Limit (µCi/ml) [3]	Fraction of Concentration Limit[4]
I-134	2.26E-13	4.00E-04	5.65E-10
Cs-134	2.54E-12	9.00E-07	2.82E-06
I-135	1.98E-12	3.00E-05	6.60E-08
Cs-136	5.49E-11	6.00E-06	9.15E-06
Cs-137	5.08E-12	1.00E-06	5.08E-06
Ba-140	1.24E-11	8.00E-06	1.55E-06
La-140	2.03E-11	9.00E-06	2.26E-06
Ce-141	1.52E-13	3.00E-05	5.08E-09
Ce-143	1.27E-12	2.00E-05	6.35E-08
Pr-143	2.01E-13	2.00E-05	1.00E-08
Ce-144	4.32E-12	3.00E-06	1.44E-06
Pr-144	4.32E-12	6.00E-04	7.19E-09
H-3	4.06E-06	1.00E-03	4.06E-03
TOTAL			4.12E-03

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Notes:

1. Rh-106, Ag-110, Ba-137m are not included in Table 2 of 10 CFR 20 Appendix B. Therefore, these nuclides are excluded from the calculation of the discharge concentration.
2. Annual average discharge concentration based on release of average daily discharge for 292 days per year with 247,500 gpm dilution flow. This includes a Safety Factor of 0.9 to compensate for flow fluctuations.
3. 10 CFR 20 Appendix B, Table 2
4. Fractions of 10 CFR 20 concentration limits are for a single unit.
5. The basis of the PWR-GALE source term calculation uses a built-in capacity factor of 80%, which is less than the expected capacity factor for the US-APWR. This difference in capacity factor has no impact on liquid effluent release concentrations.

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Table 11.2-13R (Sheet 1 of 2)

Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Maximum Releases)

Isotope [1]	Discharge Concentration (µCi/ml) [2][5]	Effluent Concentration Limit (µCi/ml) [3]	Fraction of Concentration Limit[4]
Na-24	8.12E-13	5.00E-05	1.62E-08
P-32	0.00E+00	9.00E-06	0.00E+00
Cr-51	2.10E-13	5.00E-04	4.19E-10
Mn-54	1.05E-13	3.00E-05	3.49E-09
Fe-55	7.86E-14	1.00E-04	7.86E-10
Fe-59	2.62E-14	1.00E-05	2.62E-09
Co-58	3.14E-13	2.00E-05	1.57E-08
Co-60	2.62E-14	3.00E-06	8.73E-09
Ni-63	0.00E+00	1.00E-04	0.00E+00
Zn-65	2.62E-14	5.00E-06	5.24E-09
W-187	5.24E-14	3.00E-05	1.75E-09
Np-239	7.86E-14	2.00E-05	3.93E-09
Rb-88	1.01E-10	4.00E-04	2.52E-07
Sr-89	0.00E+00	8.00E-06	0.00E+00
Sr-90	0.00E+00	5.00E-07	0.00E+00
Sr-91	0.00E+00	2.00E-05	0.00E+00
Y-91m	0.00E+00	2.00E-03	0.00E+00
Y-91	0.00E+00	8.00E-06	0.00E+00
Y-93	0.00E+00	2.00E-05	0.00E+00
Zr-95	2.62E-14	2.00E-05	1.31E-09
Nb-95	5.24E-14	3.00E-05	1.75E-09
Mo-99	3.49E-11	2.00E-05	1.75E-06
Tc-99m	1.38E-11	1.00E-03	1.38E-08
Ru-103	2.62E-14	3.00E-05	8.73E-10
Rh-103m	2.62E-14	6.00E-03	4.37E-12
Ru-106	2.62E-14	3.00E-06	8.73E-09
Ag-110m	0.00E+00	6.00E-06	0.00E+00
Sb-124	0.00E+00	7.00E-06	0.00E+00
Te-129m	0.00E+00	7.00E-06	0.00E+00
Te-129	0.00E+00	4.00E-04	0.00E+00
Te-131m	8.64E-13	8.00E-06	1.08E-07
Te-131	0.00E+00	8.00E-05	0.00E+00
I-131	4.43E-12	1.00E-06	4.43E-06
Te-132	1.38E-11	9.00E-06	1.53E-06
I-132	7.86E-13	1.00E-04	7.86E-09
I-133	2.57E-11	7.00E-06	3.67E-06
I-134	1.31E-13	4.00E-04	3.27E-10
Cs-134	6.73E-09	9.00E-07	7.48E-03

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Table 11.2-13R (Sheet 2 of 2)

Comparison of Annual Average Liquid Release Concentrations with 10 CFR 20 (Maximum Releases)

Isotope [1]	Discharge Concentration (µCi/ml) [2][5]	Effluent Concentration Limit (µCi/ml) [3]	Fraction of Concentration Limit[4]
I-135	5.45E-12	3.00E-05	1.82E-07
Cs-136	1.49E-09	6.00E-06	2.48E-04
Cs-137	4.20E-09	1.00E-06	4.20E-03
Ba-140	2.62E-13	8.00E-06	3.27E-08
La-140	5.24E-14	9.00E-06	5.82E-09
Ce-141	0.00E+00	3.00E-05	0.00E+00
Ce-143	0.00E+00	2.00E-05	0.00E+00
Pr-143	0.00E+00	2.00E-05	0.00E+00
Ce-144	2.62E-14	3.00E-06	8.73E-09
Pr-144	2.62E-14	6.00E-04	4.37E-11
H-3	4.06E-06	1.00E-03	4.06E-03
TOTAL			**1.60E-02**

RCOL2_11.02-12

Notes:

1. Rh-106, Ag-110, Ba-137m are not included in Table 2 of 10 CFR 20 Appendix B. Therefore, these nuclides are excluded from the calculation of the discharge concentration.
2. Annual average discharge concentration based on release of average daily discharge for 292 days per year with 247,500 gpm dilution flow. This includes a Safety Factor of 0.9 to compensate for flow fluctuations. RCOL2_11.02-12
3. 10 CFR 20 Appendix B, Table 2
4. Fractions of 10 CFR 20 concentration limits are for a single unit. RCOL2_11.02-12
5. The basis of the PWR-GALE source term calculation uses a built-in capacity factor of 80%, which is less than the expected capacity factor for the US-APWR. This difference in capacity factor has no impact on liquid effluent release concentrations.

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Table 11.2-15R

Individual Doses from Liquid Effluents

	Annual Doses (mrem/yr)							
PATHWAY	**SKIN**	**BONE**	**LIVER**	**T.BODY**	**THYROID**	**KIDNEY**	**LUNG**	**GI-LLI**
Drinking								
Adult	-	2.40E-05	6.39E-03	6.39E-03	6.37E-03	6.38E-03	6.37E-03	6.42E-03
Teenager	-	2.24E-05	4.51E-03	4.50E-03	4.49E-03	4.50E-03	4.49E-03	4.52E-03
Child	-	6.32E-05	8.67E-03	8.63E-03	8.62E-03	8.64E-03	8.62E-03	8.65E-03
Infant	-	6.16E-05	8.52E-03	8.47E-03	8.46E-03	8.48E-03	8.47E-03	8.48E-03
Fish								
Adult	-	7.86E-01	1.25E+00	8.83E-01	1.36E-01	5.15E-01	2.61E-01	1.72E-01
Teenager	-	8.38E-01	1.26E+00	5.22E-01	1.04E-01	4.98E-01	2.56E-01	1.32E-01
Child	-	1.05E+00	1.13E+00	2.49E-01	8.64E-02	4.26E-01	2.08E-01	9.74E-02
Shoreline								
Adult	~~1.52~~2.27E-03	~~1.30~~1.95E-03	~~1.30~~1.95E-03	~~1.30~~1.95E-03	~~1.30~~1.95E-03	~~1.30~~1.95E-03	~~1.30~~1.95E-03	~~1.30~~1.95E-03
Teenager	~~8.47E-03~~1.27E-02	~~7.25E-03~~1.09E-02	~~7.25E-03~~1.09E-02	~~7.25E-03~~1.09E-02	~~7.25E-03~~1.09E-02	~~7.25E-03~~1.09E-02	~~7.25E-03~~1.09E-02	~~7.25E-03~~1.09E-02
Child	~~1.77~~2.65E-03	~~1.51~~2.27E-03	~~1.51~~2.27E-03	~~1.51~~2.27E-03	~~1.51~~2.27E-03	~~1.51~~2.27E-03	~~1.51~~2.27E-03	~~1.51~~2.27E-03
Irrigated Foods : Vegetables								
Adult	-	1.17E-04	4.64E-03	4.60E-03	4.53E-03	4.57E-03	4.54E-03	4.74E-03
Teenager	-	1.89E-04	5.72E-03	5.60E-03	5.53E-03	5.60E-03	5.56E-03	5.80E-03
Child	-	4.38E-04	9.09E-03	8.82E-03	8.77E-03	8.89E-03	8.81E-03	8.99E-03
Irrigated Foods : Leafy Vegetables								
Adult	-	1.44E-05	5.72E-04	5.68E-04	5.58E-04	5.64E-04	5.60E-04	5.85E-04
Teenager	-	1.26E-05	3.82E-04	3.74E-04	3.70E-04	3.74E-04	3.71E-04	3.88E-04
Child	-	2.19E-05	4.55E-04	4.42E-04	4.39E-04	4.45E-04	4.41E-04	4.50E-04
Irrigated Foods : Milk								
Adult	-	6.84E-05	2.80E-03	2.77E-03	2.71E-03	2.74E-03	2.72E-03	2.71E-03
Teenager	-	1.23E-04	3.69E-03	3.58E-03	3.52E-03	3.58E-03	3.54E-03	3.53E-03
Child	-	2.95E-04	5.86E-03	5.62E-03	5.58E-03	5.67E-03	5.61E-03	5.58E-03
Irrigated Foods : Meat								
Adult	-	4.04E-05	9.71E-04	9.71E-04	9.60E-04	1.03E-03	9.61E-04	3.04E-03
Teenager	-	3.39E-05	5.81E-04	5.79E-04	5.72E-04	6.27E-04	5.73E-04	1.87E-03
Child	-	6.34E-05	7.05E-04	7.01E-04	6.93E-04	7.65E-04	6.94E-04	1.48E-03
Total								
Adult	~~1.52~~2.27E-03	7.88E-01	1.27E+00	9.00E-01	~~1.52~~1.53E-01	5.32E-01	~~2.77~~2.78E-01	1.91E-01
Teenager	~~8.47E-03~~1.27E-02	~~8.46~~8.49E-01	~~1.28~~1.29E+00	~~6.44~~5.48E-01	~~1.26~~1.29E-01	~~6.20~~5.24E-01	~~2.78~~2.81E-01	~~1.55~~1.59E-01
Child	~~1.77~~2.65E-03	1.05E+00	1.16E+00	2.75E-01	~~1.12~~1.13E-01	~~4.52~~4.53E-01	2.34E-01	~~1.24~~1.25E-01
Infant	-	6.16E-05	8.52E-03	8.47E-03	8.46E-03	8.48E-03	8.47E-03	8.48E-03

CTS-01105

CTS-01105

Note:
Doses are for a single unit from liquid effluent releases during normal operation including AOOs.

RCOL2_11.0
2-12

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.: 5374 (CP RAI #203)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 2/11/2011

QUESTION NO.: 11.02-13

The NRC Staff's review of FSAR (Rev. 1) and UTR (Rev. 4) found information that requires updating and/or needs to be addressed in FSAR Sections 11.2.3.2 and 2.4.13, and CP COL 11.2(3) on an assessment based on the methodology and description proposed in US-APWR DCD (Rev. 3) Tier 2, Section 11.2.3.2 and COL 11.2(3) to address the postulated failed liquid tank evaluation. Please address the following items and provide a mark-up of the proposed FSAR changes.

1. Update FSAR Sections 11.2.3.2 and 2.4.13 with an assessment based on the methodology and information proposed in US-APWR DCD (Rev. 3) Tier 2, Section 11.2.3.2 and COL 11.2(3) which uses the RATAF code to calculate source terms for the failed liquid tank (ML1025700671) as described in MHI TR MUAP-10019[Proprietary]P (R0), MHI TR MUAP-10019[Non-Proprietary]NP (R0) (ML102850683).

2. Make reference to MHI TR MUAP-10019[Proprietary]P (R0), MHI TR MUAP-10019[Non-Proprietary]NP (R0) (ML102850683) which describes the methodology, basis, and assumptions for failed liquid tank analysis for plants referencing the US-APWR design.

3. In FSAR Sections 11.2.3.2 and 2.4.13, fully describe the approach and results to select the failed liquid tank and provide the basis and assumptions on all site-specific parameter values in the respective updated FSAR sections for assessing the radioactive effluent release to surface or groundwater from a liquid tank failure using site-specific groundwater transport and soil properties to meet compliance with 10 CFR Part 20, Appendix B, Table 2, Column 2, under the unity rule, at the nearest potable water and surface water supplies in an unrestricted area.

4. Update FSAR Section 11.2.3.2 to address the impact of the plant capacity factor of 80% applied in the calculation of doses from a liquid containing tank failure when typical operating plant capacity factors exceed 90% (see response to RAI 523-4246, Question 11.02-30, ML100770379).

5. Based on the liquid tank evaluation, update FSAR Section 11.2.3.4 to identify the failed liquid tank that bounds the contamination level due to failure of the evaporation pond.

6. Provide a copy of any input/output code files or calculation packages which show demonstration of compliance for the staff's review.

ANSWER:

1. FSAR Subsection 2.4.13 includes an assessment based on the methodology and information in US-APWR DCD (Rev. 3) Tier 2, Subsection 11.2.3.2 and COL 11.2(3) which uses the RATAF code to calculate source terms for the failed liquid tank. FSAR Subsection 11.2.3.2 has been revised to refer to Subsection 2.4.13. Subsections 2.4.13.1 and 2.4.13.5 discuss calculation of the source term and refer to the DCD and the RATAF code.

2. Topical Reports MUAP-10019P (R1) and MUAP-10019NP (R1) that provide the genesis of the source term utilized in the tank failure analysis have been referenced in DCD Rev.3 Subsection 11.2.6 and are incorporated by reference into the CPNPP FSAR.

3. FSAR Subsection 11.2.3.2 has been revised to refer to Subsection 2.4.13, where the FSAR fully describes the approach and results to select the failed liquid tank and provides the basis and assumptions on all site-specific parameter values in the respective updated FSAR sections for assessing the radioactive effluent release to surface or groundwater from a liquid tank failure using site-specific groundwater transport and soil properties to comply with 10 CFR 20 Appendix B, Table 2, Column 2, under the unity rule, at the nearest potable water and surface water supplies in an unrestricted area.

4. Plant capacity factors greater than 80% were addressed in the response to DCD RAI 523-4246, Question 11.02-30 (ML100770379). The plant capacity factor is a built-in parameter in the code and could not be modified by the designer. However, as discussed in the response to RAI 523-4246, the overall conservatisms in the analysis will bound the realistic results for any plant capacity factor between 80% and 100%. Conservatism is included in the fuel failure assumptions that are based on operating plant primary coolant concentration data that spans more than 30 years. Current fuel performances are shown to be much higher than these assumptions.

   DCD Table 11.2-16 was modified by the response to RAI 523-4246 to state that this difference in capacity factor has no impact on liquid effluent release concentrations provided in DCD Table 11.2-17 due to liquid containing tank failures. DCD Table 11.2-17 is identified in FSAR Subsection 2.4.13 as the location where the source term is obtained. The adoption of the results contained in DCD Table 11.2-17 also adopts the explanation regarding capacity factor into the CPNPP FSAR.

   Site-specific parameters such as SCR dilution are not dependent on plant capacity factor. Therefore, there is no impact on the liquid-containing tank failure analyses due to plant capacity factor.

5. DCD Subsection 11.2.3.2 includes a liquid tank evaluation for the holdup tank, the waste holdup tank, and the boric acid tank. The boric acid tank was chosen to be the bounding tank since it contains a larger amount of radioactivity than other two tanks. The tank concentration calculation in the FSAR is IBR, so the failure of the boric acid tank is bounding. Also, because the evaporation pond contains treated effluent from the waste holdup tank, the nuclide contamination levels resulting from the failure of the evaporation pond are also bounded by the failure of the boric acid tank.

6. The tank failure analysis is fully described in FSAR Subsection 2.4.13.

Impact on R-COLA

See marked-up FSAR Revision 1 page 11.2-8.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

are also in conformance with the EPA Uranium Fuel Cycle Standard, 40 CFR 190. Once the proposed CPNPP Units 3 and 4 are constructed, the Comanche Peak site will consist of four operating reactors.

11.2.3.2 Radioactive Effluent Releases Due to Liquid Containing Tank Failures

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CP COL 11.2(3) Replace the second sentence in the second paragraph in DCD Subsection 11.2.3.2 with the following. MAP-11-201 RCOL2_11.0 2-13

Source term for each tank is provided in the DCD and the assessment of this model using the site-specific parameters to evaluate the conservatism of this analysis is described below.

CP COL 11.2(3) Replace the first two sentences in the last paragraph in DCD Subsection 11.2.3.2 with the following. RCOL2_11.0 2-13

~~Site-specific hydrogeological data indicate that contaminant migration time is about two years (see Subsection 2.4.12), exceeding the travel time used in the above analysis. Additionally, the tank cubicles are equipped with drainpipes to a local sump that is designed to detect leakage and/or overflow, and initiate an alarm for operator action. Hence, the potential for groundwater contamination is greatly reduced and further analysis is not warranted.~~The evaluation of potential radioactive effluent releases to surface water or groundwater due to failure of the holdup tank is provided in Subection 2.4.13. Releases from this tank result in concentrations at the nearest unrestricted potable water supply that are within the limits of 10 CFR 20, Appendix B (Ref 11.2-8). RCOL2_11.0 2-13

CP SUP 11.2(1) Add the following Subsection after DCD Subsection 11.2.3.3.

11.2.3.4 Evaporation Pond

The primary purpose of the evaporation pond is to provide a means to receive, store, and process treated radioactive effluent from the CPNPP Units 3 and 4 liquid radioactive waste management systems when the tritium concentration in Squaw Creek Reservoir is approaching the ODCM limit.

In order to minimize contamination, the pond is rinsed each time the pond content is emptied. The rinse water is also forwarded to Squaw Creek Reservoir, via the discharge box and blended with the CPNPP Units 1 or 2 circulation water flow.

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.: 5374 (CP RAI #203)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 2/11/2011

QUESTION NO.: 11.02-14

The NRC Staff's review of COL FSAR (Rev. 1) and UTR (Rev. 4) found information that requires updating and/or needs to be addressed in the FSAR. Please update the relevant FSAR sections such as 1.9, 11.2, and 13.5, etc. to satisfy CP COL 11.2(7) for identifying the implementation of the epoxy coatings program used in the LWMS, and address the milestones for decontaminable paints and suitable smooth-surface coatings applied to all areas inside the Auxiliary Building including the floor under the pumps of the detergent drain subsystem for compliance with 10 CFR 20.1406 and conformance to RG 1.54 (Rev. 1) or more recent industry standards and BTP 11-6 as proposed in US-APWR DCD (Rev. 3) Tier 2 Section 11.2 and COL 11.2(7) (ML092090556 and ML100770379). Provide a mark-up of the proposed COL FSAR changes.

ANSWER:

DCD RAI No. 523-4246 Revision 2, Question No. 11.02-29, sub-question 3 requested information on the operational maintenance and assessment program (i.e., in-service coatings monitoring program). Because these programs are site-specific, COL 11.2(7) was added in the DCD Revision 3 for the COL applicant to address these requirements for the coatings. An equivalent COL 11.4(9) was also added for the SWMS:

> COL 11.2(7) The COL Applicant is responsible for identifying the implementation milestones for the coatings program used in the LWMS. The coatings program addresses RG 1.54 Revision 1, recognizing that more recent standards may be used if referenced in DCD Section 11.2.
>
> COL 11.4(9) The COL Applicant is responsible for identifying the implementation milestones for the coatings program used in the SWMS. The coatings program addresses RG 1.54 Revision 1, recognizing that more recent standards may be used if referenced in DCD Section 11.4.

FSAR Sections 11.2 and 11.4 have been updated to include a commitment to follow RG 1.54 Rev. 1 and recommendations from liner manufacturers for developing epoxy coating implementation and maintenance guidelines, and to address the milestones for decontaminable paints. Table 1.9-201 has been updated to commit to the regulatory guide and to be site-specific. FSAR Subsection 11.2.2.2 (IBR) describes the controls to be used for the installation, testing and inspection of these Service Level II epoxy coatings as defined by RG 1.54 Rev.1. FSAR Subsections 11.2.4 and 11.4.6 have been supplemented to describe the plant-specific program and FSAR Table 13.4-201 has been modified to address implementation.

Impact on R-COLA

See marked-up FSAR Revision 1 pages 1.9-6, 11.2-13, 11.4-5 and 13.4-10.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None

Table 1.9-201 (Sheet 3 of 12)

Comanche Peak Nuclear Power Plant Units 3 & 4 Conformance with Division 1 Regulatory Guides

RG Number	RG Title	Revision/Date	COLA FSAR Status	Corresponding Chapter/ Section	
1.38	Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants	Revision 2 May 1977	Conformance with exception (QAPD conforms with SRP 17.5 and Subpart 2.2 of NQA-1 1994 Edition.)	~~17.2~~ 17.5	CTS-01144
1.39	Housekeeping Requirements for Water-Cooled Nuclear Power Plants	Revision 2 September 1977	Conformance with exception (QAPD conforms with SRP 17.5 and NQA-1 1994 Edition.)	~~17.2~~ 17.5	CTS-01144
1.54	Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants	Revision 1 July 2000	~~Conformance~~Conformance with exceptions. ASTM standard revision levels may differ from RG 1.54 as specifically referenced in the "Corresponding Chapter/Section."	6.1.2, 11.2, 11.4	RCOL2_11.02-14
1.59	Design Basis Floods for Nuclear Power Plants	Revision 2 August 1977	Conformance with exceptions (RG 1.59 Appendix A indicates use of ANSI N170-1976. In place of this standard, ANSI/ANS-2.8-1992 was used. ANSI/ANS-2.8-1992 was issued as a superseding document to ANSI N170-1976. ANSI/ANS-2.8-1992 was withdrawn on July 26, 2002. However, a replacement standard has not been issued. NUREG-0800 2.4.4 Revision 3, March 2007 includes ANSI/ANS-2.8-1992 as a reference.)	2.4.2 - 2.4.5 2.4.10 ~~3.4~~	CTS-01144
1.60	Design Response Spectra for Seismic Design of Nuclear Power Plants	Revision 1 December 1973	Conformance	2.5.2	

an important part to minimize the potential for contamination. Leakage detection design, radiation monitors are added for early detection to prevent spread of contamination. The current CPNPP pond management program is expanded to include the above requirements for the evaporation pond and its supporting components including the radiation monitor, pumps and valves. RCOL2_11.0 2-16

Operating procedures limit the use of the pond to receive treated effluent on an as-needed basis and the pond will be washed each time it is emptied. Sampling procedures confirm the tritium concentration in the SCR is below the pre-determined setpoint, and that the effluent is acceptable for release. The tritium sampling procedures will be included in the site-wide ODCM, which will be part of Radiological Effluent Controls Program. The Radiological Effluent Controls Program already has an implementation milestone established as shown in Table 13.4-201. RCOL2_11.0 2-8 RCOL2_11.0 2-16

11.2.4 Testing and Inspection Requirements

RCOL2_11.0 2-14

CP COL 11.2(7) Add the following sentences to the end of the last paragraph of DCD Subsection 11.2.4.

The licensee has an Epoxy Coatings Program used to facilitate the ALARA objective of promoting decontamination in radiologically controlled areas outside containment. The program controls refurbishment, repair, and replacement of coatings in accordance with the manufacturers' product data sheets and good painting practices. The program will be implemented as described in FSAR Table 13.4-201.

11.2.5 Combined License Information

Replace the content of DCD Subsection 11.2.4 with the following.

~~CP~~STD COL 11.2(1) ***11.2(1)*** *The mobile and temporary liquid radwaste processing equipment* CTS-01140

This combined license (COL) item is addressed in Subsection 11.2.1.6.

CP COL 11.2(2) ***11.2(2)*** *Site-specific information of the LWMS*

This COL item is addressed in Subsections 11.2.2 and 11.2.3.1.

CP COL 11.2(3) ***11.2(3)*** *The liquid containing tank failure*

This COL item is addressed in Subsection 11.2.3.2.

CP COL 11.2(4) ***11.2(4)*** *The site-specific dose calculation*

This COL item is addressed in Subsection 11.2.3.1, Table 11.2-10R, Table 11.2-11R, Table 11.2-12R, Table 11.2-13R, Table 11.2-14R and Table 11.2-15R.

also includes backflow inhibitors. Liquid effluent from the mobile de-watering station is routed to the Liquid Waste Management System and the non-condensables are vented to the A/B ventilation system. An operating procedure will be provided prior to fuel load to ensure proper operation of the mobile de-watering station to prevent the contamination of non-radioactive piping or uncontrolled releases of radioactivity into the environment.

Applicable regulatory requirements and guidance, such as Regulatory Guide 1.143, are addressed by lease or purchase agreements associated with the use of a mobile dewatering subsystem for spent resin dewatering. The lease or purchase agreements include applicable criteria such as testing, inspection, interfacing requirements, operating procedures, and vendor oversight. RCOL2_11.04-1

11.4.6 Testing and Inspection Requirements RCOL2_11.02-14

CP COL 11.4(9) Add the following sentences to the end of the last paragraph of DCD Subsection 11.4.6.

The licensee has an Epoxy Coatings Program used to facilitate the ALARA objective of promoting decontamination in radiologically controlled areas outside containment. The program controls refurbishment, repair, and replacement of coatings in accordance with the manufacturers' product data sheets and good painting practices. The program will be implemented as described in FSAR Table 13.4-201.

11.4.8 Combined License Information

Replace the content of DCD Subsection 11.4.8 with the following.

CP COL 11.4(1)
STD COL 11.4(1) ***11.4(1)*** *Plant-specific needs for onsite waste storage* CTS-01140

This COL item is addressed in Subsection 11.4.2.1.1 and 11.4.2.3.

11.4(2) *Deleted from the DCD*

~~CP~~STD COL 11.4(3) ***11.4(3)*** *Plan for the process control program describing the process and effluent monitoring and sampling program* CTS-01140

This COL item is addressed in Subsection 11.4.3.2.

~~CP~~STD COL 11.4(4) ***11.4(4)*** *Mobile/portable SWMS connections* CTS-01140

~~STD~~CP COL 13.4(1)

Table 13.4-201 (Sheet 9 of 9)

CTS-01140

Operational Programs Required by NRC Regulation and Program Implementation

Item	Program Title	Program Source (Required By)	FSAR (SRP) Section	Implementation		
				Milestone	Requirement	
	FFD Program for Operation	10 CFR 26.4(a) and (b)	13.7	Prior to the earlier of: Licensee's receipt of fuel assemblies onsite or Establishment of a protected area or The 10 CFR 52.103(g) finding	10 CFR 26, Subparts A-H, N, and O, except for individuals listed in § 26.4(b), who are not subject to §§ 26.205-209	RCOL2_ NONE-2
21	Epoxy Coatings Program	10 CFR 20.1406, RG 1.54	6.1.2, 11.2, 11.4	Prior to plant start-up	10 CFR 20.1406 and RG 1.54	RCOL2_11.0 2-14

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.: 5374 (CP RAI #203)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 2/11/2011

QUESTION NO.: 11.02-15

The NRC Staff's review of COL FSAR (Rev. 1) Sections 11.2.3.4, 14.2, and 14.3, Tier 1 information, UTR (Rev. 4), and response to RAI 3401, Question 11.04-3 (CP RAI #39) found that information on testing and inspection requirements for the evaporation pond was not fully described. FSAR Section 11.2.3.4 provides design criteria and specifications for the evaporation pond (EP) and states the EP is designed and constructed in accordance with Texas Commission of Environment Quality (TCEQ) and other applicable standards (e.g., ASTM). The EP is equipped with several design features such as a liner, leak collection and detection instrumentation, radiation monitor with alarm, and back flow preventer, etc. for compliance with 10 CFR Part 20, Appendix B, Table 2; 10 CFR Part 50, Appendix A, GDC 64; 10 CFR 50.36a; and 10 CFR 20.1406. Please describe the testing and inspection requirements (i.e., TCEQ permit process, NRC ITP and ITAAC) that will be conducted to ensure that the EP and its features will be designed and constructed in accordance with TCEQ requirements and NRC regulations. Provide a mark-up of the proposed FSAR changes.

ANSWER:

Prior to construction of the evaporation pond, the TCEQ permit process requires an Industrial Wastewater Permit Application (IWPA) that initiates the wastewater permitting process for the Texas Pollutant Discharge Elimination System (TPDES) permits and the Texas Land Application Permits (TLAP). The IWPA is required to be submitted 330 days prior to operation of the discharge. A pre-application conference is recommended by TCEQ. 30 TAC 335.6 also requires notification of the executive director at least 90 days prior to starting operations.

The Technical Guidelines in the Texas Administrative Code (TAC) require testing and monitoring of the evaporation pond "periodically," and follow recommendations from the liner manufacturer for periodic inspections and the methodology for performing those inspections, including the interstitial monitoring to identify leakage.

The construction of the evaporation pond is specified in a construction specification that will include sloping of the pond, liner type, number of layers, and thickness. After construction, initial testing and inspection of the evaporation pond will consist of the following:

- Inspection of the liner for integrity, lack of damage, and welt seams construction
- Slope and drainage capability
- Liquid level instrument calibration
- Sill and groundwater contamination analysis to establish contamination levels

During normal operation, periodic testing and inspection of evaporation pond will consist of the following:

- Water sample and analysis before draining and decontamination to monitor concentration buildup
- Liner and welt seams integrity
- Drainage capability
- Liquid level instrument calibration
- Soil and groundwater contamination analysis per NEI 07-07

FSAR Subsection 11.2.3.4 has been revised to reflect the TCEQ permit process and requirements.

Discussion regarding the ITAAC requirements was already provided in response to RAI No. 3398 (CP RAI # 49) Question 11.02-8, Part 1.f. (ML093370112) and is repeated in part below for convenience:

> An ITAAC is not required because the criteria for ITAAC in the NUREG-0800 Standard Review Plan (SRP) do not apply. Specifically, SRP Acceptance Criterion 7 of Section 14.3.7 is applicable to liquid waste management system (LWMS), gaseous waste management system (GWMS), and the solid waste management system (SWMS). The evaporation pond is not a part of any of these systems. In addition, the evaporation pond is outside the boundary of the LWMS, and there are no specific requirements in RG 1.143 to govern the pond's design and construction.

Impact on R-COLA

See marked-up FSAR Revision 1 pages 11.2-9 and 11.2-10.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None.

The evaporation pond is equipped with a leak detection system. In the event a leak is developed, a signal is sent to the Main Control Room and the Radwaste Control Room for operator actions, which may include removing the contents from the pond to facilitate inspection and repair as required.

The pond liner is inspected regularly to determine liner integrity with respect to the liners and their seams. In the event of punctures and/or rupture and repair is required, the pond contents are removed, and the pond is rinsed before repair is performed.

The construction, testing, and inspection requirements for the evaporation pond meet the TCEQ permit process and requirements. RCOL2_11.0 2-15

The evaporation pond is designed and constructed in accordance with the following standards (others may be applicable as the design is finalized):

~~Texas Commission of Environmental Quality (TCEQ)~~ RCOL2_11.0 2-8

Texas Administrative Code (TAC), Title 30 on Environmental Quality, Part 1 Texas Commission on Environmental Quality (TCEQ): RCOL2_11.0 2-15

TCEQ 321.255, Requirements for Containment of Wastes and Pond(s)

TCEQ 330, Municipal Solid Waste

TCEQ 217.203, Design Criteria for Natural Treatment Facilities

American Society for Testing and Materials (ASTM)

ASTM D3020, Specification for Polyethylene and Ethylene Copolymer Plastic Sheeting for Pond, Canal and Reservoir Lining

ASTM D5514-06, Standard Test Method of Large Scale Hydrostatic Puncture Testing of Geosynthetics

ASTM D7002-03, Standard Practice for Leak Location on Exposed Geomembranes Using the Water Puddle System

Industry standards such as ANSI / HI -2005 "Pump standard" will be used in designing the pumps RCOL2_11.0 2-8

Geosynthetic Research Institute Standard GM13 will be utilized for HDPE

The evaporation pond will be initially inspected and tested following construction and prior to the initial release of liquid effluents from the liquid waste management system to the pond. The evaporative pond construction requirements from the TECQ and ASTM codes and standards listed above are specified in a construction specification that includes sloping the pond, liner RCOL2_11.0 2-15

type, instrument calibration, number of layers, thickness, etc. After construction, initial testing and inspection of the evaporation pond will consist of the following: RCOL2_11.02-15

- Inspection of the liner for integrity, lack of damage, and welt seams construction
- Slope and drainage capability
- Instrumentation calibration
- Leakage detection system

The specific requirements are listed in the following paragraphs.

The evaporation pond will be periodically tested and inspected. Using the acceptance criteria established in the codes and standards listed above. The periodic testing and inspection procedures for the evaporation pond will include the following:

- Water sample and analysis before draining and decontamination to monitor concentration buildup
- Liner and welt integrity
- Drainage capability
- Instrument calibration
- Soil and groundwater contamination analysis per NEI 07-07

The evaporation pond is designed and constructed to contain treated effluent that is contaminated with radioactive nuclides. The pond opens to the environment to allow the tritiated water to naturally evaporate.

The evaporation pond is constructed with two layers of High Density Polyethylene material suitable for this service. The High Density Polyethylene is a minimum of 60 mils thickness.

A drainable mesh mat, with a minimum thickness of 30 mils, is provided in between the two layers of High Density Polyethylene to allow movement of the liquid due to leakage of the content from the top layer of High Density Polyethylene.

The evaporation pond is constructed with a total depth of six feet, with four feet below grade and two feet freeboad. A berm is constructed to prevent surface water from entering the pond during rainy seasons.

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.: 5374 (CP RAI #203)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 2/11/2011

QUESTION NO.: 11.02-16

The NRC Staff's review of FSAR Section 11.2.1.6 of UTR (Rev. 4) found insufficient information on sampling procedures to measure tritium concentration in the evaporation pond and Squaw Creek Reservoir (Technical Specification limit of 30,000 pCi/l tritium). FSAR Section 11.2.1.6 states sampling procedures will need to be developed to confirm tritium concentrations for release from these surface water bodies. Please identify the implementation milestones on the development of the tritium sampling procedures for compliance with NRC regulations and provide a mark-up of the proposed FSAR changes.

ANSWER:

FSAR Subsection 11.2.3.1 states that the effluent in the evaporation pond is sampled and analyzed before discharging into Squaw Creek Reservoir (SCR) via the CPNPP Unit 1 and 2 circulating water return line. Also, the response to RAI No. 3398 (CP RAI # 49) Question 11.02-10 (ML093370112) states that specific sample points will be located during detailed design and will ensure that representative samples of the pond are taken before the contents are transferred to the SCR.

Tritium sampling procedures currently exist in the CPNPP Unit 1 and 2 ODCM and will be included in the site-wide ODCM, which will be part of Radiological Effluent Controls Program. The Radiological Effluent Controls Program has an implementation milestone established in Table 13.4-201. FSAR Subsection 11.2.3.4 has been revised to add a reference to that implementation milestone.

Impact on R-COLA

See marked-up FSAR Revision 1 page 11.2-13.

Impact on S-COLA

None; this response is site-specific.

Impact on DCD

None

an important part to minimize the potential for contamination. Leakage detection design, radiation monitors are added for early detection to prevent spread of contamination. The current CPNPP pond management program is expanded to include the above requirements for the evaporation pond and its supporting components including the radiation monitor, pumps and valves. RCOL2_11.0 2-16

Operating procedures limit the use of the pond to receive treated effluent on an as-needed basis and the pond will be washed each time it is emptied. Sampling procedures confirm the tritium concentration in the SCR is below the pre-determined setpoint, and that the effluent is acceptable for release. The tritium sampling procedures will be included in the site-wide ODCM, which will be part of Radiological Effluent Controls Program. The Radiological Effluent Controls Program already has an implementation milestone established as shown in Table 13.4-201. RCOL2_11.0 2-8 RCOL2_11.0 2-16

11.2.4 Testing and Inspection Requirements

RCOL2_11.0 2-14

CP COL 11.2(7) Add the following sentences to the end of the last paragraph of DCD Subsection 11.2.4.

The licensee has an Epoxy Coatings Program used to facilitate the ALARA objective of promoting decontamination in radiologically controlled areas outside containment. The program controls refurbishment, repair, and replacement of coatings in accordance with the manufacturers' product data sheets and good painting practices. The program will be implemented as described in FSAR Table 13.4-201.

11.2.5 Combined License Information

Replace the content of DCD Subsection 11.2.4 with the following.

~~CP~~STD COL 11.2(1) ***11.2(1)*** *The mobile and temporary liquid radwaste processing equipment* CTS-01140

This combined license (COL) item is addressed in Subsection 11.2.1.6.

CP COL 11.2(2) ***11.2(2)*** *Site-specific information of the LWMS*

This COL item is addressed in Subsections 11.2.2 and 11.2.3.1.

CP COL 11.2(3) ***11.2(3)*** *The liquid containing tank failure*

This COL item is addressed in Subsection 11.2.3.2.

CP COL 11.2(4) ***11.2(4)*** *The site-specific dose calculation*

This COL item is addressed in Subsection 11.2.3.1, Table 11.2-10R, Table 11.2-11R, Table 11.2-12R, Table 11.2-13R, Table 11.2-14R and Table 11.2-15R.

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.: 5677 (CP RAI #214)

SRP SECTION: 05.02.04 - Reactor Coolant Pressure Boundary Inservice Inspection and Testing

QUESTIONS for Component Integrity, Performance, and Testing Branch 1 (AP1000/EPR Projects) (CIB1)

DATE OF RAI ISSUE: 3/31/2011

QUESTION NO.: 05.04.02-2

NUREG-0800, Standard Review Plan Section 5.2.4, "Reactor Coolant Pressure Boundary Inservice Inspection and Testing," and SECY-05-0197,"Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria," establish criteria that the staff uses to evaluate whether an Applicant meets the NRC's regulations regarding coolant reactor pressure boundary inservice inspection.

A COL applicant should fully describe operational programs as defined in SECY-05-0197. As discussed in SECY-05-0197, the applicant should provide schedules for implementation milestones for these operational programs. The preservice inspection (PSI) and inservice inspection (ISI) programs are identified as operational programs in Regulatory Guide (RG) 1.206, C.I.5.2.4.1 and C.I.5.2.4.2. As discussed in RG 1.206, a fully described PSI and ISI program should address:

(1) system boundary subject to inspection; (2) accessibility; (3) examination categories and methods; (4) inspection intervals; (5) evaluation of examination results; (6) system pressure tests; (7) Code exemptions; (8) relief requests; and (9) ASME Code Cases.

Due to the scope of this operational program, submittal of the schedule for this program development is necessary to in order for the staff to plan and conduct NRC inspections during construction. During construction, the staff must be able to inspect the construction and nondestructive examination of the plant for conformance to the regulations and the ASME Code of record. Therefore, the staff is proposing the Applicant implement the following license condition in COLA, Part 10 and Part 2 FSAR, Table 13.4-201:

- The licensee shall submit to the Director of NRO, a schedule, no later than 12 months after issuance of the COL, that supports planning and conduct of NRC inspections of the PSI/ISI program (including augmented ISI program). The schedule shall be updated every 6 months until 12 months before scheduled fuel load, and every month thereafter until either the PSI/ISI (including augmented ISI program) have been fully implemented or the plant has been placed in commercial service, whichever comes first.

ANSWER:

The PSI and ISI programs are included in Table 13.4-201, which lists the regulatory requirement(s) for each program, the FSAR references where each program is described, and the implementation milestones for each program.

RG 1.206, includes the following:

> **C.IV.4.2 Treatment of Operational Programs in COL Applications**
>
> In its SRM regarding SECY-05-0197, the Commission endorsed the staff's proposal that an operational program does not require ITAAC in the COL application, provided that the application "fully describes" the program and its implementation. Thus, to avoid the need to propose ITAAC for a given operational program,, the COL applicant must fully describe the following:
>
> (1) the operational program
> (2) the implementation of the operational program
>
> In the SRM for SECY-04-0032, dated May 14, 2004, the Commission defined "fully described" as follows:
>
> > In this context, "fully described" should be understood to mean that the program is clearly and sufficiently described in terms of scope and level of detail to allow a reasonable assurance finding of acceptability. Required programs should always be described at a functional level and at an increased level of detail where implementation choices could materially and negatively affect the program effectiveness and acceptability.
>
> Toward that end, Section 13.4 of the FSAR should provide a table that lists each operational program, the sections of the FSAR that fully describes the operational program, and the associated implementation milestones.
>
> **C.IV.4.4 Optional Treatment of Operational Programs**
>
> COL applicants may choose to use an operational program although the program is not explicitly required by regulation. For example, a COL applicant might adopt a sump strainer cleanliness program to satisfy the ECCS requirements in the regulations. In such instances, the COL applicant should add the operational program to its list of programs in Section 13.4 of the FSAR and should fully describe the program and its implementation in the FSAR.

The guidance in RG 1.206 clearly requires a License Condition for the operational programs identified. The CPNPP 3 and 4 COLA address this in Table 13.4-201 and Part 10 of the application.

The RAI proposes an additional License Condition. The proposed license condition addresses PSI/ISI, which is included in Table 13.4-201, but the license condition proposes requirements beyond the guidance above. Per RG 1.206 and ISG-015, the proposed requirement does not meet guidance criteria for a license condition (e.g., operational restrictions for the facility, restrictions on operating power levels, the performance of special tests, operational constraints associated with implementation of specific design features). The proposed requirements are not necessary to make a finding required for license issuance. The proposed license condition does request scheduler information regarding the licensee's activities to facilitate NRC inspection activities. This proposed license condition is inconsistent with NRC guidance including RG 1.206, RG 1.68 and the SRP.

As such, Luminant believes the appropriate way to control the issuance of a schedule on the CPNPP docket is either as a Regulatory Commitment provided by letter or to include the controls in the CPNPP FSAR. Either approach is acceptable to Luminant. The commitment should be similar to the ITAAC requirements in 10 CFR 52.99(a). While such detailed instructions and reporting may be appropriate for ITAAC, this type of information is exchanged with the NRC inspectors on an ongoing basis. Neither a license condition nor an FSAR update is appropriate as they would create unnecessary bureaucracy that would not enhance the inspection process but would put an unnecessary burden on the licensee. Therefore a regulatory commitment is found below.

In response to RAI 2772 (CP RAI #57) regarding the IST program, Luminant made the following commitment:

Number	Commitment	Due Date/Event
6591	Luminant commits to submit a schedule to the NRC that supports the planning and conduct of NRC inspections of operational programs, including the IST program, no later than 12 months after issuance of the COL or at the start of construction as defined in 10 CFR 50.10a, whichever is later. This is similar to the approach for the ITAAC schedule required in 10 CFR 52.99(a).	12 months after COL or at start of construction, whichever is later.

In response to this RAI, Luminant hereby expands this commitment to explicitly list the PSI and ISI programs in addition to the IST program.

Impact on R-COLA

None.

Impact on S-COLA

None, this response is site specific.

Impact on DCD

None.