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Ref. # 10 CFR 52

October 19, 2009

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

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 3 AND 4
DOCKET NUMBERS 52-034 AND 52-035
RESPONSE TO REQUESTS FOR ADDITIONAL INFORMATION NO. 2749, 2751, 2758, 2760, 2795, 2970, 2971, 3033, 3225, 3398, 3401, 3402, 3556, AND 3557

Dear Sir:

Luminant Generation Company LLC (Luminant) herein submits responses to Requests for Additional Information (RAI) No. 2749, 2751, 2758, 2760, 2795, 2970, 2971, 3033, 3225, 3398, 3401, 3402, 3556, and 3557 for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. The FSAR pages affected by the responses to the RAIs are included in Attachment 15. Attachment 16 includes electronic copies of four calculations and SACTI input files that support the responses. The input files are in their native format as required by the NRC and do not meet the submittal criteria established in the "Guidance for Electronic Submissions to the NRC, Rev. 5."

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

The commitments made in this letter are presented in a table on page 3.

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

Executed on October 19, 2009.

Sincerely,

Luminant Generation Company LLC

RD/[illegible] for

Rafael Flores

D090
NRO

Attachments -

1. Response to Request for Additional Information No. 2749 (CP RAI #38)
2. Response to Request for Additional Information No. 2751 (CP RAI #40)
3. Response to Request for Additional Information No. 2758 (CP RAI #47)
4. Response to Request for Additional Information No. 2760 (CP RAI #41)
5. Response to Request for Additional Information No. 2795 (CP RAI #42)
6. Response to Request for Additional Information No. 2970 (CP RAI #43)
7. Response to Request for Additional Information No. 2971 (CP RAI #44)
8. Response to Request for Additional Information No. 3033 (CP RAI #37)
9. Response to Request for Additional Information No. 3225 (CP RAI #48)
10. Response to Request for Additional Information No. 3398 (CP RAI #49)
11. Response to Request for Additional Information No. 3401 (CP RAI #39)
12. Response to Request for Additional Information No. 3402 (CP RAI #50)
13. Response to Request for Additional Information No. 3556 (CP RAI #45)
14. Response to Request for Additional Information No. 3557 (CP RAI #46)
15. FSAR Pages Affected by Responses to Requests for Additional Information
16. Electronic Attachments

cc: Stephen Monarque w/all Attachments (CD)
Electronic Distribution w/Attachments except 16

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Regulatory Commitments in this Letter

This communication contains the following new or revised commitments which will be completed or incorporated into the CPNPP licensing basis as noted:

Number	Commitment	Due Date/Event
6521	The details of the requested information will be submitted with the Procedure Generation Package (PGP) for the EOPs that will be submitted to the NRC at least three months prior to the start of formal operator training on the EOPs. The PGP will include detailed information on the following: (a) a description of the process used to develop plant-specific technical guidelines (P-STGs) from the US-APWR generic technical guidelines, (b) identification of (safety) significant deviations from the generic guidelines, including the identification of additional equipment beyond that identified in the generic technical guidelines, and engineering evaluations or analyses as necessary to support the adequacy of each deviation, and (c) in accordance with the human factors program (FSAR Section 18.8), a description of the process used to identify operator information and control requirements.	3 months prior to start of formal operator training
6531	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 Squaw Creek Reservoir via the CPNPP Units 1 and 2 circulating water return line.	Detailed design
6541	The [interim radioactive waste] building will be designed in accordance with the applicable regulatory requirements and NRC/industry guidance referenced in FSAR Subsection 11.4.2.3.	Detailed design

The Commitment Number is used by Luminant for internal tracking.

Attachment 1

Response to Request for Additional Information No. 2749 (CP RAI #38)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 2749, Revision 0 (CP RAI #38)

SRP SECTION: 11.04 – Solid Waste Management System

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 11.04-1

Technical Rationale Section 4 of NUREG-0800, Standard Review Plan (SRP) Section 11.4, "Solid Waste Management System" states, "Compliance with GDC 61 requires that the SWMS [solid waste management system] and other systems (as permanently installed systems or in combination with mobile systems) that may contain radioactivity shall be designed to ensure adequate safety under normal and postulated accident conditions. This criterion specifies that such facilities shall be designed with a capability to permit inspection and testing of components important to safety and with suitable shielding for radiation protection."

Similarly, Regulatory Guide 1.206 "Combined License Applications for Nuclear Power Plants (LWR Edition)" states, the applicant should discuss any mobile or temporary equipment used for storing or processing liquid radwaste in accordance with RG 1.143, 'Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants.' If this guidance is not followed, the applicant should describe the specific alternative methods used. Describe system design features and operational procedures used to ensure that interconnections between plant systems and mobile processing equipment avoids the contamination of nonradioactive systems and uncontrolled releases of radioactivity in the environment (see IE BL-80-10, 'Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity in the Environment,' dated May 6, 1980, and RG 1.11, 'Instrument Lines Penetrating Primary Reactor Containment (Safety Guide 11) Supplement to Safety Guide 11, Backfitting Considerations,' March 1971 for details).

With respect to the mobile de-watering system, Luminant is requested to include in the FSAR, discussion of how contracted mobile de-watering system would meet the design requirements of Regulatory Guide (RG) 1.143, "Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants," Revision 2, November 2001. Additionally, Luminant is requested to include in the FSAR discussions of capability to permit inspection, testing of components, shielding, and operational procedures for contracted mobile systems.

ANSWER:

The lease or purchase document for the mobile de-watering system will specify the applicable regulatory criteria, as well as testing, inspection, interfacing requirements, and operating procedures (including Luminant oversight of vendor personnel). This requirement is added in Subsection 11.4.4.5.

As described in DCD Subsection 11.4.2.2.1, the dewatering subsystem is located in a shielded cubicle near the storage area. Access port and shield doors are provided to assist operation, and to permit inspection and testing of components. A sketch (Figure 11.04-1-01) indicating the location and the access port is attached to illustrate the design concept.

To ensure that the non-radioactive systems are not contaminated due to the interconnections between non-radioactive plant systems and the mobile dewatering subsystem, double isolation is provided per 10 CFR 20.1406 requirements. DCD Subsection 11.4.1.4 states that;

> The non-radioactive connections (e.g., PMW [primary makeup water] for flushing, nitrogen gas for sluicing spent resin, and service air to operate valves and pumps) to the SWMS components, including the modular de-watering system, contain double isolation valves and special fittings (e.g., one check valve and one isolation valve) to minimize the potential for cross contamination of the non-radioactive system.

In addition, there is no effluent release from the SWMS to the environment. Any liquids and gases from the operation of the SWMS (including the mobile dewatering subsystem) are routed to the LWMS and GWMS for treatment as described in DCD Subsection 11.4.1.2.

Impact on R-COLA

See attached marked-up FSAR Draft Revision-1 page 11.4-5.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment

Figure 11.04-1-01.

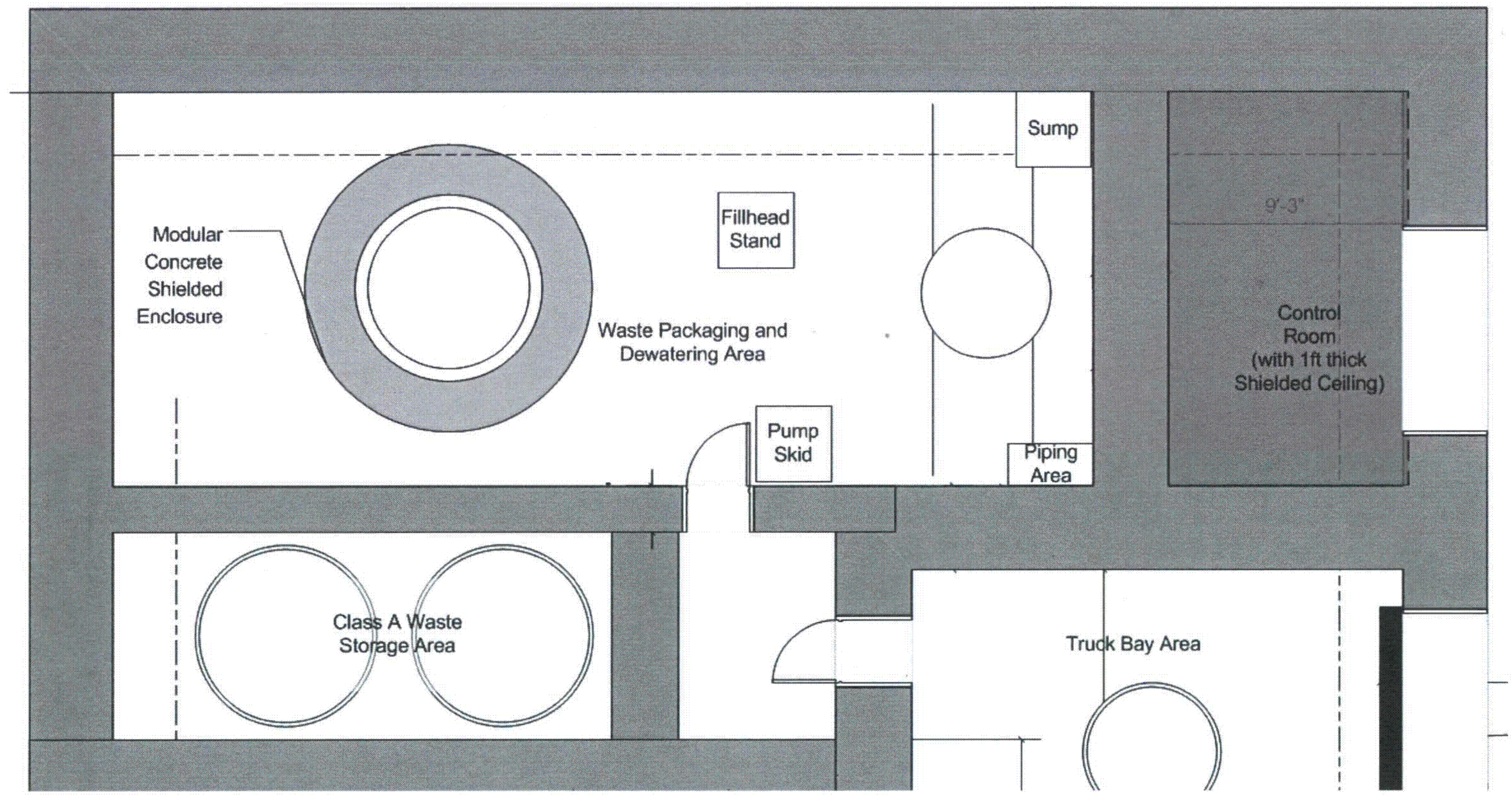


FIGURE 11.04-1-01: SKETCH OF DEWATERING AREA

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 2749, Revision 0 (CP RAI #38)

SRP SECTION: 11.04 – Solid Waste Management System

QUESTIONS for Balance of Plant Branch 1 (AP1000/EPR Projects) (SBPA)

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 11.04-2

Technical Rationale Section 4 of NUREG-800 Standard Review Plan Section 11.4, states, "Compliance with GDC 61 requires that the SWMS [solid waste management system] and other systems (as permanently installed systems or in combination with mobile systems) that may contain radioactivity shall be designed to ensure adequate safety under normal and postulated accident conditions. This criterion specifies that the design of such facilities' shall enable inspection and testing of components important to safety and with suitable shielding for radiation protection."

In FSAR Section 11.4.1.6, "Mobile or Temporary Equipment," it states, "The de-watering station is contracted for vendor services." Luminant is requested to describe in the FSAR how the contracted de-watering station will meet the guidance of SRP Section 11.4 and RG 1.143, "Design Guidance for Radioactive Waste Management System, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants," Revision 2, November 2001.

ANSWER:

The dewatering subsystem consists of a dewatering (vacuuming) pump that discharges from the spent resin fillhead to the waste holdup tank for re-processing on the other end. The dewatering pump is used to remove standing water to comply with waste disposal and transportation requirements. The dewatering operation is described in DCD Subsections 11.4.1.3, 11.4.2.2.1, and 11.4.4.5. Other location details are incorporated into the FSAR by the response to Question No. 11.04-1 above. The provisions incorporated in the design include a CCTV and a level instrument on the fillhead to prevent and contain spillage while spent resin is transferred, filling, and overfilling waste containers. The location of the dewatering pump and the spent resin fillhead is in a shielded area that is accessible for inspection, testing, and maintenance. The dewatering pump is specified to meet RG 1.143. These design features and specifications meet the requirements of SRP Section 11.4.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment 2

Response to Request for Additional Information No. 2751 (CP RAI #40)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 2751 (CP RAI #40)

SRP SECTION: 05.02.01.01 – Compliance with the Codes and Standards Rule, 10 CFR 50.55a

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

DATE OF RAI ISSUE: 9/3/2009

QUESTION NO.: 05.02.01.01-1

Comanche Peak FSAR Section 5.2, "Integrity of Reactor Coolant Pressure Boundary," incorporates by reference US-APWR DCD Tier 2, Subsection 5.2.1.1, "Compliance with 10 CFR 50, Section 50.55a," including Table 5.2.1-1, "Applicable Code Addenda for RCS Class 1 Components," which lists ASME *Boiler and Pressure Vessel Code* (BPV Code), Sections II, III, V, and XI. The NRC staff requests that the Comanche Peak FSAR Subsection 5.2.1.1 specify that preservice and inservice testing of the reactor coolant pressure boundary components will be in accordance with the edition and addenda of the ASME *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) required by 10 CFR 50.55a as described in the applicable DCD sections for pumps, valves, and dynamic restraints.

ANSWER:

Subsection 5.2.1.1 has been revised to specify preservice and inservice testing of the reactor coolant pressure boundary components in accordance with the ASME OM Code as stated in DCD Subsection 3.9.6, which is in compliance with 10 CFR 50.55a.

Impact on R-COLA

See the attached FSAR Draft Revision-1 page 5.2-1 mark-up.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 2751 (CP RAI #40)

SRP SECTION: 05.02.01.01 – Compliance with the Codes and Standards Rule, 10 CFR 50.55a

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

DATE OF RAI ISSUE: 9/3/2009

QUESTION NO.: 05.02.01.01-2

US-APWR DCD Tier 2, Subsection 5.2.1.2 specifies that the COL Applicant will address the addition of ASME Code Cases that are approved in Regulatory Guide (RG) 1.84, "Design, Fabrication, and Materials Code Case Acceptability, ASME Section III," RG 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," and RG 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM Code." As a replacement for these DCD provisions, Comanche Peak FSAR Subsection 5.2.1.2 (as modified in Editorial Correction Version dated March 31, 2009) states that the CPNPP Units 3 and 4 uses no Code Cases listed in RG 1.84 beyond those listed in the referenced DCD. The FSAR indicates that the use of Code Cases including those listed in RG 1.147 is identified in the inservice inspection program (Subsection 5.2.4 and Section 6.6). The FSAR also states that the use of Code Cases including those listed in RG 1.192 is identified in the inservice testing program (Subsections 3.9.6 and 5.2.4). Clarify that the Code Cases for ASME BPV Code Section XI, and the ASME OM Code, currently planned to be applied at Comanche Peak Units 3 and 4 are those specifically listed in the US-APWR DCD, or identify any additional Code Cases to be used.

ANSWER:

Luminant confirms that the Code Cases for ASME BPV Code Section XI and the ASME OM Code currently planned to be applied at CPNPP Units 3 and 4 are listed in the referenced US-APWR DCD.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment 3

Response to Request for Additional Information No. 2758 (CP RAI #47)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 2758 (CP RAI #47)

SRP SECTION: 03.02.01 - Seismic Classification

QUESTIONS for Engineering Mechanics Branch 2 (ESBWR/ABWR Projects) (EMB2)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 03.02.01-1

10 CFR Part 50, Appendix S, IV(a)(2)(i)(B)(I) states that structures systems and components (SSCs) necessary for continued operation without undue risk to the health and safety of the public must remain functional and within applicable stress, strain, and deformation limits when subject to the effects of the Operating Basis Earthquake (OBE) Ground Motion with normal operating loads. NUREG-0800, Standard Review Plan (SRP) 3.2.1, Areas of Review, item 3, states that, if the applicant has set the OBE Ground Motion to the value one-third of the safe shutdown earthquake (SSE) Ground Motion, then the applicant should also provide a list of SSCs necessary for continued safe operation that must remain functional without undue risk to the health and safety of the public and within applicable stress, strain and deformation, during and following the OBE. Comanche Peak Nuclear Power Plant, Units 3 and 4 FSAR Section 3.7.1.1 states that the value of the OBE ground motion that serves as the basis for defining the criteria for shutdown of the plant is 1/3 of the site-specific SSE ground motion.

Provide the list of site-specific SSCs necessary for continued operation as discussed in SRP 3.2.1, Areas of Review, item 3. If there are no site-specific SSCs necessary for continued operation, state that in the COLA FSAR.

ANSWER:

The site-specific SSCs necessary for continued operation are classified as Equipment Class 1, 2 and 3 in CPNPP Units 3 and 4 FSAR Table 3.2-201.

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

None.

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

None.

<u>Impact on DCD</u>

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 2758 (CP RAI #47)

SRP SECTION: 03.02.01 - Seismic Classification

QUESTIONS for Engineering Mechanics Branch 2 (ESBWR/ABWR Projects) (EMB2)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 03.02.01-2

Combined License application, FSAR Table 3.2-201, Sheet 1 of 3, includes ultimate heat sink basin blowdown control valves ESW-HVC-2000, 2001, 2002, 2003; however, these valves cannot be located on the essential service water system piping and instrumentation diagrams (Figure 9.2.1-1R). Please confirm that the valve IDs (HVC, HCV?) are correct.

ANSWER:

The tag numbers for the UHS basin blowdown control valves shown on FSAR Figure 9.2.1-1R are correctly identified as HCV-2000, 2001, 2002, and 2003, while tag numbers listed in Table 3.2-201 were incorrectly identified as "HVC." The UHS basin blowdown control valve numbers listed in Table 3.2-201 have been corrected from HVC-2000, 2001, 2002, and 2003 to HCV-2000, 2001, 2002, and 2003.

Impact on R-COLA

See attached marked-up FSAR Draft Revision 1, Table 3.2-201 Sheet 1 of 3 (page 3.2-3).

Impact on S-COLA

None.

Impact on DCD

None.

Attachment 4

Response to Request for Additional Information No. 2760 (CP RAI #41)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 2760 (CP RAI #41)

SRP SECTION: 05.02.01.02 - Applicable Code Cases

QUESTIONS for Engineering Mechanics Branch 1 (AP1000/EPR Projects) (EMB1)

DATE OF RAI ISSUE: 9/3/2009

QUESTION NO.: 05.02.02.02-1

In Combined License (COL) application, FSAR section 5.2.1.2, Luminant stated that it will not use Code Cases beyond those listed in the referenced US-APWR design certification document (DCD). It also stated that the use of Code Cases, including those listed in Regulatory Guide (RG) 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," (October 2007) were identified in the inservice inspection (ISI) program (Subsection 5.2.4 and Section 6.6). The use of Code Cases including those listed in RG 1.192, "Operation and Maintenance Code Case Acceptability, ASME OM Code," (June 2003) is identified in the Inservice testing (IST) program (Subsection 3.9.6 and 5.2.4).

The US-APWR DCD Tier 2, COL 5.2(1), requires the COL applicant to address use of additional ASME Code Cases that are approved by NRC in RG 1.84, "Design, Fabrication, and Materials Code Case Acceptability, ASME Section III," (October 2007). The NRC staff requests Luminant confirm whether it will use code cases at Comanche Peak Nuclear Power Plant in addition to those listed in US-APWR DCD Table 5.2.1-2. Luminant is also requested to list all the American Society of Mechanical Engineers Section III, Section XI and OM Code Cases that will be used for Comanche Peak COL application, which are different from those listed in COL application, FSAR Table 5.2.1-2.

ANSWER:

Luminant confirms that the Code Cases for ASME BPV Code Section III, Section XI, and the ASME OM Code, currently planned to be applied at CPNPP Units 3 and 4 are the same as listed in the referenced US-APWR DCD Table 5.2.1-2.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment 5

Response to Request for Additional Information No. 2795 (CP RAI #42)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 2795 (CP RAI #42)

SRP SECTION: 05.02.01.02 - Applicable Code Cases

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

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 05.02.01.02-2

The regulatory basis for this question is Regulatory Guide 1.84, "Design, Fabrication, and Materials Code Case Acceptability, American Society of Mechanical Engineers (ASME) Section III," Revision 34, October 2007 and 10 CFR Part 50, Appendix A, General Design Criterion 1.

USAPWR Design Certification Document (DCD) Tier 2, Section 5.2.1.2, "Compliance with Applicable Code Cases," states that applicable ASME Code Cases for reactor coolant pressure boundary (RCPB) Class 1 components are listed in Table 5.2.1-2, "ASME Code Cases." USAPWR DCD Tier 2, Section 5.2.1.2 states that any Code Case conditionally approved in Regulatory Guide 1.84 for Class 1 components meets the conditions established in the regulatory guide. Table 5.2.1-2 lists ASME Code Case N-71-18, "Additional Material for Subsection NF, Class 1, 2, 3 and MC Supports Fabricated by Welding, Section III Division 1," for use in the design of supports for specific nuclear power plant components.

Because ASME Code Case N-71-18 provides many additional materials as an option for applicants and licensees to use, the NRC staff requests that Luminant specify in the combined license application FSAR the components that will be fabricated using Code Case N-71-18 and the specific materials specifications and grades that will be used.

ANSWER:

Major subassemblies of the supports for RCPB Class 1 components and piping in the US-APWR do not use materials listed in ASME Code Case N-71-18. However, minor subassemblies or devices which are considered to be part of the supports for RCPB Class 1 components and piping may be purchased from vendors incorporating materials listed in ASME Code Case N-71-18.

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

None.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment 6

Response to Request for Additional Information No. 2970 (CP RAI #43)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 2970 (CP RAI #43)

SRP SECTION: 06.06 - Inservice Inspection and Testing of Class 2 and 3 Components

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

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 06.06-1

Table 5.2.1-1 in the US-APWR design certification document (DCD) indicates that the applicable American Society of Mechanical Engineers (ASME) Code/Addenda for Class 1 components is the 2001 Edition and 2003 Addenda. However, neither the US-APWR DCD nor the Comanche Peak Nuclear Power Plant (CPNPP) combined license application (COLA) specify the year/addenda for development of the preservice inspection (PSI)/inservice inspection (ISI) program for Class 2 and 3 components. Please revise the CPNPP COLA FSAR to reflect the year/addenda to be used for development of the PSI/ISI program.

ANSWER:

As a result of US-APWR DCD RAI No.232-2114 Revision 0, Question 06.06-1, the entry for Reference 6.6-2 in the DCD has been revised to include the 2001 edition and 2003 addenda of ASME Section XI. The CPNPP 3 and 4 FSAR incorporates the US-APWR DCD section by reference.

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

None.

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

None.

<u>Impact on DCD</u>

None.

Attachment 7

Response to Request for Additional Information No. 2971 (CP RAI #44)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 2971 (CP RAI #44)

SRP SECTION: 06.06 - Inservice Inspection and Testing of Class 2 and 3 Components

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

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 06.06-2

The NRC staff reviewed Comanche Peak Nuclear Power Plant, Units 3 and 4 combined license (COL) application, FSAR COL information item STD COL 6.6(2) which states that the implementation milestones of the augmented ISI [inservice inspection] program are the same as that specified for ISI of Class 2 and 3 components provided in Table 13.4-201. The subject information item proposes to replace a portion of the US-APWR design certification document, Section 6.6.8 which states that the COL applicant is responsible for preparing an augmented ISI program for high-energy fluid system piping. The information provided by the COL applicant does not provide sufficient detail for the NRC staff to obtain a reasonable assurance finding of this operational program. R.G. 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)," (June 2007) Section C.III.1, Chapter 6, C.I.6.6.8 and NUREG-0800, Standard Review Plan 6.6, "Inservice Inspection and Testing of Class 2 and 3 Components," provide acceptance criteria for an augmented ISI program which include accessibility, extent of examination, use of inspection ports, and areas subject to examination. Please provide a level of detail of the Augmented ISI Program sufficient for the NRC staff to obtain a reasonable assurance finding of the acceptability of this operational program in accordance with 10 CFR 52.79(a)(11).

ANSWER:

DCD Subsection 6.6.8 (attached) has been revised to clarify the acceptance criteria for an augmented ISI program. Changes to the DCD were provided in Mitsubishi Heavy Industries, Ltd. letter UAP-HF-09484, "Update of Chapter 6 of US-APWR DCD," dated October 8, 2009.

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

None.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment

US-APWR DCD Tier 2 page 6.6-5 marked up for incorporation in Revision 2.

6.6.8 Augmented ISI to Protect against Postulated Piping Failures

An augmented ISI program is required for high-energy fluid system piping between containment isolation valves or—where no isolation valve is used inside containment—between the first rigid pipe connection to the containment penetration or the first pipe whip restraint inside containment and the outside isolation valve. The ISI program contains information addressing areas subject to inspection, method of inspection, and extent and frequency of inspection in accordance with the requirements of Article IWC-2000 for Examination Category C–F welds. The inservice examination completed during each inspection interval is a 100 percent volumetric examination of circumferential and longitudinal pipe welds within the boundary of these portions of piping. The access provisions incorporated into the design of the US-APWR provide access for personnel and equipment to inspect the affected welds. The program covers the high-energy fluid systems described in Chapter 3, Subsections 3.6.1 and 3.6.2. An augmented ISI program is required to ensure structural integrity of cold-worked austenitic stainless steel components (Refer to Subsection 6.1.1.1).

The COL Applicant is responsible for identifying the implementation milestone for the augmented inservice inspection program~~responsible for preparing an augmented inservice inspection program for high-energy fluid system piping. The preservice inspection program addresses the equipment and examination techniques to be used~~.

As noted in Subsection 6.6.2, the design and installed arrangement of US-APWR Class 2 and 3 components provide clearance adequate to conduct Code-required examinations.

6.6.9 Combined License Information

Any utility that references the US-APWR design for construction and Licensed operation is responsible for the following COL items:

COL 6.6(1) The COL Applicant is responsible for the preparation of a preservice inspection program (non-destructive baseline examination) and an Inservice inspection program for ASME Code Section III Class 2 and 3 systems, components (pumps and valves), piping, and supports in accordance with 10 CFR50.55a(g), including selection of specific examination techniques and preparing appropriate inspection procedures.

COL 6.6(2) The COL Applicant is responsible for identifying the implementation milestone for the augmented inservice inspection program.

6.6.10 References

6.6-1. Inservice Inspection Requirements, Title 10, code of Federal Regulations, 10 CFR 50.55a(g), January 2007.

6.6-2. Rules for Inservice Inspection of Nuclear Power Plant Components, ASME Boiler & Pressure Vessel Code, Division 1, Section XI, American Society of Mechanical Engineers,2001 Edition with 2003 Addenda.

Attachment 8

Response to Request for Additional Information No. 3033 (CP RAI #37)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3033 (CP RAI #37)

SRP SECTION: 13.05.02.01 - Operating and Emergency Operating Procedures

QUESTIONS for Operating Licensing and Human Performance Branch (AP1000/EPR Projects) (COLP)

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 13.05.02.01-1

Combined License Application (COLA) Part 2, FSAR, Section 13.5.2, 'Operating and Maintenance Procedures' refers to US-APWR Design Control Document (DCD), Section 13.5.1, 'Administrative Procedures,' instead of DCD Section 13.5.2, 'Operating and Maintenance Procedures.' Luminant is requested to clarify the DCD reference in the FSAR.

ANSWER:

Subsection 13.5.2 has been revised to correct the typographical error and make the reference to the correct DCD Subsection.

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

See attached mark-up FSAR Draft Revision 1, page 13.5-3.

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

None.

<u>Impact on DCD</u>

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3033 (CP RAI #37)

SRP SECTION: 13.05.02.01 - Operating and Emergency Operating Procedures

QUESTIONS for Operating Licensing and Human Performance Branch (AP1000/EPR Projects) (COLP)

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 13.05.02.01-2

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 13.5.2.1, "Operating and Emergency Operating Procedures."

The USAPWR design certification document (DCD), Section 13.5.3, 'Combined License Information' COL 13.5(3) states: "The COL Applicant is to develop procedures performed by licensed operators in the main control room... The plan includes the implementation of these procedures."

COL application, Part 2, FSAR, Section 13.5.3, COL 13.5(3) 'Procedures performed by licensed operators in the control room' states: "This COL item is addressed in Subsection 13.5.2 and 13.5.2.1." However, the staff's review found that Subsections 13.5.2 and 13.5.2.1 did not identify the party that would develop and maintain these procedures.

Identify who will develop and maintain the procedures performed by licensed operators in the main control room.

ANSWER:

The operating and emergency operating procedures that will be performed by licensed operators in the main control room will be developed and maintained by the plant staff under the direction of the Plant Manager. The iterative EOP development process will use a team approach that follows the guidance in NUREG-0899. Procedures for safety-related operations and maintenance activities are developed in accordance with the Human Factors Engineering program described in DCD Section 18.8.

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

None.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3033 (CP RAI #37)

SRP SECTION: 13.05.02.01 - Operating and Emergency Operating Procedures

QUESTIONS for Operating Licensing and Human Performance Branch (AP1000/EPR Projects) (COLP)

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 13.05.02.01-3

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 13.5.2.1, "Operating and Emergency Operating Procedures."

NUREG-0800, Section 13.5.2.1, states that the procedures generation package should include plant-specific technical guidelines (P-STG's).

Combined License Application, Part 2, FSAR, Section 13.5.2.1, discusses generic technical guidelines, but does not mention P-STG's.

Describe the plans to develop and submit P-STG's.

ANSWER:

Plant staff under the direction of the Plant Manager will develop and submit plant-specific technical guidelines (P-STGs) for use in the development of the EOPs.

Subsection 13.5.2.1 has been revised to refer to P-STGs and the plant-specific writer's guide.

Impact on R-COLA

See attached mark-up FSAR Draft Revision 1 page 13.5-4.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3033 (CP RAI #37)

SRP SECTION: 13.05.02.01 - Operating and Emergency Operating Procedures

QUESTIONS for Operating Licensing and Human Performance Branch (AP1000/EPR Projects) (COLP)

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 13.05.02.01-4

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 13.5.2.1, "Operating and Emergency Operating Procedures."

NUREG-0800, Section 13.5.2.1, states that, for plants referencing generic technical guidelines, the submitted documentation should include (1) a description of the process used to develop plant-specific technical guidelines from the generic technical guidelines, (2) identification of significant deviations from the generic guidelines, including identification of additional equipment beyond that identified in the generic guidelines, along with all necessary engineering evaluations or analyses to support the adequacy of each deviation, and (3) a description of the process used for identifying operator information and control requirements.

The FSAR, Section 13.5.2.1, discusses generic technical guidelines, but does not mention the above three items.

Describe what information will be included with the generic technical guidelines.

ANSWER:

The details of the requested information will be submitted with the Procedure Generation Package (PGP) for the EOPs that will be submitted to the NRC at least three months prior to the start of formal operator training on the EOPs. The PGP will include detailed information on the following: (a) a description of the process used to develop plant-specific technical guidelines (P-STGs) from the US-APWR generic technical guidelines, (b) identification of (safety) significant deviations from the generic guidelines, including the identification of additional equipment beyond that identified in the generic technical guidelines, and engineering evaluations or analyses as necessary to support the adequacy of each deviation, and (c) in accordance with the human factors program (FSAR Section 18.8), a description of the process used to identify operator information and control requirements.

Consistent with the response to Question 13.05.02.01-3, the text of FSAR Section 13.5.2.1 has been changed to reference P-STGs instead of generic technical guidelines.

Impact on R-COLA

See attached mark-up FSAR Draft Revision 1 page 13.5-4.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3033 (CP RAI #37)

SRP SECTION: 13.05.02.01 - Operating and Emergency Operating Procedures

QUESTIONS for Operating Licensing and Human Performance Branch (AP1000/EPR Projects) (COLP)

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 13.05.02.01-5

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 13.5.2.1, "Operating and Emergency Operating Procedures."

NUREG-0800, Section 13.5.2.1, states that the procedures generation package should include a plant-specific writer's guide (P-SWG) that details the specific methods to be used by the applicant in preparing emergency operating procedures based on P-STG's.

Combined license application, Part 2, FSAR, Section 13.5.2.1, discusses a writer's guide, but does not specify that it is plant-specific.

Either clarify that the writer's guide discussed in the FSAR is plant-specific or justify the use of a generic writer's guide.

ANSWER:

A plant-specific writer' guide will be used that details the specific methods for preparing the EOPs based on the P-STGs. Subsection 13.5.2.1 has been modified to clarify this.

Impact on R-COLA

See attached mark-up FSAR Draft Revision 1 page 13.5-4.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3033 (CP RAI #37)

SRP SECTION: 13.05.02.01 - Operating and Emergency Operating Procedures

QUESTIONS for Operating Licensing and Human Performance Branch (AP1000/EPR Projects) (COLP)

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 13.05.02.01-6

The regulatory basis for this question is discussed in NUREG-0800, Standard Review Plan, Chapter 13.5.2.1, "Operating and Emergency Operating Procedures."

NUREG-0800, Section 13.5.2.1, states that the procdures generation package should include a description of the program for verification and validation (V&V) of Emergency Operating Procedures (EOP).

Combined license application, Part 2, FSAR, Section 13.5.2.1, discusses a program for validation of the EOP's, does not address EOP verification.

Describe the plans to develop and to submit a complete EOP V&V program.

ANSWER:

The verification aspect of the EOP V&V Program will be described in the Procedure Generation Package (PGP). MHI will develop a set of US-APWR Emergency Response Guidelines (ERGs), which are US-APWR generic technical guidelines, and a set of US-APWR draft EOPs to aid the COL applicant in this process.

MHI is developing the US-APWR ERGs in two phases. Phase 1 is the on-going development of draft ERGs based on the approach used by Japanese domestic plant ERGs. The draft ERGs are scheduled to be completed at the end of 2009. They will reflect the US-APWR design and include input from a multidiscipline US industry review team. During Phase 2, which is scheduled for a two-year period beginning in January 2010, the draft ERG document will be updated to include additional details such as the detailed design-specific bases, MHI component IDs, and instrument setpoints. In addition, Phase 2 will include the development of US-APWR draft EOPs for use by the US-APWR COL Applicants to support developing their final EOP subsequent V&V. The general objectives of the EOP V&V process are to ensure the EOPs:

- correctly reflect the US-APWR generic technical guidelines
- reflect the procedure writer's guide
- are useable
- correctly refer to controls, equipment and indications
- provide language and level of information consistent with minimum staff qualifications and composition; and
- provide a high level of assurance they will effectively guide the operator in mitigating transients and accidents.

Impact on R-COLA

See attached mark-up FSAR Draft Revision 1 pages 13.5-4 and 13.5-5.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment 9

Response to Request for Additional Information No. 3225 (CP RAI #48)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3225 (CP RAI #48)

SRP SECTION: 09.04.03 - Auxiliary and Radwaste Area Ventilation System

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

DATE OF RAI ISSUE: 9/7/2009

QUESTION NO.: 09.04.03-1

USAPWR Design Control Document, Chapter 9, Section 9.4.7, 'Combined License Information,' COL 9.4(4) states 'The COL applicant is to determine the capacity of cooling and heating coils that are affected by site specific conditions.' Consistent with COL 9.4(4), the applicant is requested to provide the size of the in-duct heaters and provide a basis for determining the sizing.

ANSWER:

COL Item 9.4 (4) requires the capacity of cooling and heating coils that are major components, which include the heating coils installed in air handling units and locally-installed safety-related heating coils. However, all in-duct heaters are not safety-related and it is not the intention of the DCD that such heaters be described in the FSAR. Therefore, it is not necessary to provide the size of the in-duct heaters and the basis for determining the sizing for the auxiliary building ventilation system.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment 10

Response to Request for Additional Information No. 3398 (CP RAI #49)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3398 (CP RAI #49)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 9/7/2009

QUESTION NO.: 11.02-5

Tables 11.2-10R and 11.2-11R of the combined license application (COLA), Part 2, FSAR (Rev 0) present liquid effluent release concentrations calculated from a modified version of the PWR-GALE code with input parameter values from Table 11.2-9 shown in US-APWR design control document (DCD), Tier 2, FSAR (Rev 1) and the site-specific application of handling contaminated laundry to off-site services. Because the PWR-GALE code was modified (Refer to US-APWR DCD RAI 402-3028), the NRC staff is unable to independently confirm Luminant's calculated effluent release concentrations and resulting doses for compliance with 10 CFR 20, Appendix B, Table 2; 10 CFR 50, Appendix I; 10 CFR 20.1302; and 10 CFR 50, Appendix A, General Design Criterion (GDC) 60. Please provide a full description and supporting rationale for all modifications made to the code subroutines and submit the PWR-GALE input/output files for the site-specific application.

ANSWER:

The following response to RAI No. 3400 (CP RAI #36) Question 11.03-2, Part 1 in Luminant letter TXNB-09054 dated October 15, 2009 addressed this issue as well:

> The CPNPP Units 3 and 4 effluent releases are based on US-APWR DCD calculations. The liquid effluent release is the total release of the DCD calculation minus detergent waste release (see Table 11.2-10R). The gaseous effluent release from the vent stack is the same as the DCD calculation (see the column "Source Term" in Table 11.3-8R). The gaseous effluent release from the evaporation pond is based on the half of the liquid effluent release diverted to the evaporation pond (see FSAR subsection 11.3.3.1).
>
> A description and supporting rationale for all modifications made to the PWR-GALE code subroutines (including source/execute/input/output files for DCD calculations) have already been sent to NRC from Mitsubishi Heavy Industries (MHI) in

response to DCD RAI No. 164 (ML090570441), 189 (ML090770414), and 402 (ML092090556).

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3398 (CP RAI #49)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 9/7/2009

QUESTION NO.: 11.02-6

Section 11.2.1.6 of the COLA, Part 2, FSAR (Rev 0) describes use of mobile or temporary equipment for processing liquid waste. Figure 12.3-1 (Sheet 17 of 34) in the US-APWR DCD, Tier 2, FSAR (Rev 1) depicts the location of this equipment at an elevation of 3'-7" which is adjacent to the truck bay access to outside areas. The NRC staff review of COLA, FSAR Section 11.2.1.6 indicates there is no description of design features to prevent leakage from this equipment through the truck bay entrance door or contamination of below grade elevations via nearby stairways for compliance with 10 CFR 20.1406. Please address the following items.

1. Describe the design features and related inspection and maintenance requirements to prevent or mitigate contamination of the facility and environment from use of mobile or temporary structures systems and components that may contain radioactive material.
2. Describe and justify the specific approaches employed for the prevention of and monitoring for contamination of the facility and environment from use of these systems.

Revise the COLA to include this information and provide the NRC staff with a markup FSAR in your response.

ANSWER:

1. FSAR Subsection 11.2.1.6 has been revised as shown on the attached marked-up pages.
2. Specific design features and approaches for the prevention of spread of contamination is discussed in FSAR Subsection 11.2.1.6. Specific design and operating requirements, which include monitoring the mobile system or temporary equipment, will be specified in the contract or lease document for the mobile system or temporary equipment prior to the use of such equipment.

Process and utility piping and electrical connections are provided to forward liquid waste to a future mobile system or temporary equipment, for CPNPP Units 3 and 4. Process piping has 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. As such the purchase or lease contracts for any temporary and mobile equipment will specify the applicable criteria.

The inspection, testing of components, and shielding for such equipment will be specified in the purchase or lease contracts and evaluated and approved prior to use, based on regulatory requirements and guidance such as RG 4.21 and RG 1.143. The operating procedures will be implemented and training will be complete prior to use of the equipment.

Impact on R-COLA

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

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3398 (CP RAI #49)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 9/7/2009

QUESTION NO.: 11.02-7

The NRC staff's review of COLA, Part 2, FSAR (Rev 0), Section 11.2.2 indicates the information needed to satisfy CP COL 11.2(2) for compliance with 10 CFR 50.34a was not provided. This section states, "The shape of the flow orifices and other technical details will be developed in the detail design phase." However, COL 11.2(2) in US-APWR DCD, Tier 2, FSAR (Rev 1), Section 11.2.4 states, "Site-specific information of the LWMS [liquid waste management system], e.g., radioactive release points, effluent temperature, shape of flow orifices, etc., is provided in the COLA." Please provide the design information to satisfy CP COL 11.2(2). Revise the COLA to include this information and provide a markup of the FSAR in your response.

ANSWER:

The flow orifice was addressed in the answer to RAI No. 2747, CP RAI #29, Question 11.02-2 (ML092720676). That response explains why there is no need for a mixing orifice. The response also includes a marked-up page of the COLA revision 0 to address the orifice.

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

None.

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

None.

<u>Impact on DCD</u>

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3398 (CP RAI #49)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 9/7/2009

QUESTION NO.: 11.02-8

The NRC staff's review of COLA, Part 2, FSAR (Rev 0), Section 11.2 indicates additional information is needed on the design of the evaporation pond system for compliance with 10 CFR 20.1302; 10 CFR 20.1406; 10 CFR 50.34a; 10 CFR 50, Appendix A, GDC 60, 61, and 64; 10 CFR 52.80(a); and 40 CFR 264. Please address the following items.

1. Provide the evaporation pond system design information in Section 11.2. Specifically,

    a. Identify the applicable Federal (Titles 10 and 40 CFRs, etc.) and State (Texas) regulations and describe how the design complies with these requirements.

    b. Identify the applicable NRC regulatory guidance (RG) (such as RG 1.143, 'Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants,' Revision 2 (November 2001), RG 4.21, 'Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning,' (June 2008) etc.) and industry standards (such as ANSI, etc.) and describe how the design conforms to these guidance documents and standards for compliance with the regulations in 1.a., or justify their exclusion.

    c. Identify other design information (such as tritium concentration limit, structural, capacity, sizing, over/under flow prevention, contributing sources for dilution water, components, effluent and/or process radiation monitoring, representative sampling, etc.) and describe their bases.

    d. Identify and describe the design features such as provisions for leakage prevention and/or detection that will be used to minimize contamination of the facility and environment from the origin to the ultimate discharge point into the Squaw Creek Reservoir.

    e. Identify and describe the associated programs and procedures that will be used to comply with State and Federal regulations and conform to NRC regulatory guidance and industry standards.

f. Identify and describe the ITAAC that will be used to ensure acceptable construction and operation of the evaporation pond system, or justify its exclusion.

2. Section 11.2.3.1 states, "Once it is confirmed that the treated effluent meets discharge requirements, the effluent is released into the Squaw Creek Reservoir via the CPNPP [Comanche Peak Nuclear Power Plant] Units 1 and 2 circulating water return line." Please identify the programs and procedures that will be used to ensure treated effluents from the evaporation pond meet discharge requirements prior to release into the Squaw Creek Reservoir via CPNPP, Units 1 and 2.

3. Section 11.2.3.1 refers to an analysis that considers site environmental data (e.g., local rainfall, evaporation, etc.) performed to evaluate how the evaporation pond maintains the tritium concentration of 30,000 pCi/L offsite dose calculation manual (ODCM) limit since this limit could be exceeded with four CPNPP units operating at full power. Please submit this analysis and supporting technical basis documents including references that demonstrates the tritium concentration limit in the ODCM for the Squaw Creek Reservoir is not exceeded.

4. Section 11.2.3.1 states, "The exact locations of the connections into the circulating water discharge header is determined in the detail design phase with consideration of the impact of sharing structure, system, and components (SSCs) among the nuclear units." Provide this design information and describe how adequate mixing and sharing of SSCs will be ensured on the two unspecified connection locations for the CPNPP Units 3 and 4 discharge header and evaporation pond discharge line to the circulating water return line for CPNPP Units 1 and 2 into the Squaw Creek Reservoir.

5. Discuss the scenario and resulting calculated doses (or bounding analysis evaluation) for a postulated liquid effluent release from the evaporation pond into the Squaw Creek Reservoir due to normal routine operations including anticipated operational occurrences.

Revise the COLA to include this information and provide a markup in your response.

ANSWER:

1. a. The design features of the evaporation pond (using HDPE, the leak detection pit, and sloping towards the drainage pit for discharge) and operating procedures (cleaning, diversion only when required) will ensure ease of decontamination and minimization of cross contamination (leakage to the groundwater), thus satisfying RG 4.21 and the requirements of 10 CFR 20.1406. Refer to the response to RAI No. 2747 (CP RAI #29) Question 11.02-2 (ML092720676).

   The state regulations governing the evaporation pond have been added to Subsection 11.2.3.4 (see attached marked-up FSAR Draft Revision 1 page 11.2-8).

   b. RG 1.143 does not apply to the design of the evaporation pond as there is no specific design criteria related to the design of an evaporation pond. The boundary of the liquid waste management system (LWMS) ends at the discharge isolation valve and the radiation monitor of the discharge header from the waste monitor tanks, as described in DCD Subsection 11.2.2. The evaporation pond is not a part of the LWMS because the pond only contains treated effluent for discharge. Unlike the waste monitor tanks, which could contain off-specification effluent that may need to be re-processed, the evaporation pond is designed to manage the tritium concentration in the SCR by providing temporary holdup of treated effluent for discharge.

This has been added to FSAR Subsection 11.2.2 (see attached marked-up FSAR Draft Revision 1 pages 11.2-2 and 11.2-5).

See Item 1.a. for RG 4.21 applicability. Other applicable guidance and standards have been added to Subsection 11.2.3.4.

c. The design information and basis for structural, capacity, sizing, over/under flow prevention is provided in FSAR Subsection 11.2.3.4 as a part of the response to Health Physics Safety Site Visit Information Need HPSV-02 (see attached marked-up FSAR Draft Revision 1 pages 11.2-8 through and 11.2-10). The information on the contributing sources for dilution water, components, effluent and/or process radiation monitoring, and representative sampling, are discussed in FSAR Subsection 11.2.3.1 [see FSAR Update Tracking Report Rev. 4 (ML092520125)]. The evaporation pond does not have a tritium concentration limit. The primary purpose of the evaporation pond is to receive and store 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.

   Sampling and effluent monitoring information is addressed in the response to RAI No. 2747 (CP RAI #29) Question 11.02-3 FSAR markup page 11.2-6 (ML092720676).

d. The design features for leakage prevention and/or detection that will be used to minimize contamination of the facility and environment from the origin to the ultimate discharge point into the Squaw Creek Reservoir are addressed in response to RAI No. 2747 (CP RAI #29) Question 11.02-3 FSAR markup pages 11.2-5 and 11.2-6 (ML092720676).

e. FSAR Section 11.2.3.4 has been revised to include the requested information on attached FSAR Draft Revision pages 11.2-8 through 11.2-10.

f. 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. Hence RG 1.143 does not apply. The evaporation pond is designed and constructed to meet TCEQ regulations. The gaseous doses from the evaporation pond have been calculated as given in RAI No. 2747 (CP RAI #29) Question 11.02-3. The public doses from the combined gaseous emissions from the evaporation pond and vent stack are within the 10 CFR 50 Appendix I limit.

2. See Item 1.e. above.

3. The evaluation of tritium concentration in the SCR was performed in "Determination of the Tritium Concentration in the Squaw Creek Reservoir," Calculation #28831-LWM-25-05-500-001, Revision D, and the use of an evaporation pond to manage the tritium concentration was performed in "Preliminary Sizing of Evaporation Pond," Calculation #28831-LWM-25-05-500-002, Revision C. These two calculations are attached.

4. Details on the discharge connection locations are addressed in the response to RAI No. 2747 (CP RAI #29) Question 11.02-2 FSAR markup pages 11.2-2 and 11.2-3 (ML092720676).

5. The evaporation pond receives treated liquid effluent for temporary holdup. Although up to 50% of the discharge flow may be directed to the evaporation pond, doses to the public from 100% of the treated liquid effluents have been evaluated. The results are provided in FSAR Table 11.2-15R. Because the dose calculation includes 100% of the discharge flow, no separate calculation of effluent release from the evaporation pond is needed.

Impact on R-COLA

See attached marked-up FSAR Draft Revision 1 pages 11.2-2, 11.2-5, 11.2-8 through 11.2-10.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment

Calculation 28831-LWM-25-05-500-001, Rev D
Calculation 28831-LWM-25-05-500-002, Rev C

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3398 (CP RAI #49)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 9/7/2009

QUESTION NO.: 11.02-9

Table 11.2-14R of the COLA, Part 2, FSAR (Rev 0) presents site-specific LADTAP II code input parameter values for the site-specific application to calculate doses from liquid effluents for compliance with 10 CFR 50 Appendix I and 40 CFR 190. The NRC staff's review of Section 11.2 indicates additional information is needed for the site-specific parameter values and their basis to support Luminant's conclusions. Because LADTAP II applies effluent release concentrations calculated from a modified version of the PWR-GALE code (DCD RAI 402-3028), the NRC staff is unable to independently confirm Luminant's dose calculations for a reasonable assurance of safety conclusion. Please address the following items.

1. Submit the LADTAP II code input/output files for the site-specific application.
2. Submit the calculation and supporting technical basis documents including references for selecting the site- specific parameter values used in the LADTAP II code calculations.
3. Table 11.2-14R identifies "Cow" as the animal considered in the irrigated foods - milk pathway dose for liquid effluent releases, whereas, Table 11.3-8R identifies both "Cow" and Goat" as animals considered in the milk pathway dose calculations for gaseous effluent releases. Please address this inconsistency.

Revise the COLA to include this information and provide a markup in your response.

ANSWER:

1. The LADTAP II input and output files were submitted in Luminant letter TXNB-09045 dated September 14, 2009.

2. The calculation and supporting technical basis document is attached.

3. Table 11.2-14R has been revised to show both goats and cows.

Impact on R-COLA

See attached marked-up FSAR Draft Revision 1 page 11.2-20.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment

TXUT-001-ER-5.4-CALC -010, Rev. 0

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3398 (CP RAI #49)

SRP SECTION: 11.02 - Liquid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 9/7/2009

QUESTION NO.: 11.02-10

Figure 11.2-201 of the COLA, Part 2, FSAR (Rev 0) depicts some SSCs such as the evaporation pond, CPNPP Units 3 and 4 discharge headers, piping, instrumentation, discharge line connections to CPNPP Units 1 and 2 circulating water lines, and discharge line into the Squaw Creek Reservoir, etc. The NRC staff's review of this figure indicates that additional information is needed in regards to the description of design equipment associated with the evaporation pond for compliance with 10 CFR 50.34a, and monitoring of effluent discharge paths and plant environs for compliance with 10 CFR 50, Appendix A, GDC 64. As such, please address the following items.

1. Clarify the dotted lines representing both proposed (evaporation pond) and existing SSCs (piping on CPNPP Units 1 and 2 circulating water lines) in Figure 11.2-201.

2. Section 11.2.3.1 states, "The pond design includes a discharge line and a transfer pump." However, this pump is not identified in Figure 11.2-201. Identify the transfer pump in Figure 11.2-201.

3. Identify the radiation monitoring and sampling locations from the evaporation pond origin to the ultimate discharge point into the Squaw Creek Reservoir in Figure 11.2-201.

Revise the COLA to include this information and provide a markup in your response.

ANSWER:

1. Details on the existing and proposed piping are addressed in the response to RAI No. 2747 (CP RAI #29) on revised Figure 11.2-201, Sheets 9 and 10 in Attachment 3 (ML092720676).

2. The transfer pump is shown on revised Figure 11.2-201, Sheets 9 and 10 (ML092720676).

3. The radiation monitor located close to the pump discharge is shown on revised Figure 11.2-201, Sheets 9 and 10 (ML092720676). 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 Squaw Creek Reservoir via the CPNPP Units 1 and 2 circulating water return line.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment 11

Response to Request for Additional Information No. 3401 (CP RAI #39)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3401 (CP RAI #39)

SRP SECTION: 11.04 – Solid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 11.04-3

Section 11.4.1.5 in the combined license application (COLA), Part 2, FSAR (Rev 0) states, "... there is no unique direct release pathway from the solid waste handling operation to the environment, and a cost benefit analysis for the SWMS [solid waste management system] is included in the consideration of the LWMS [liquid waste management system] and GWMS [gaseous waste management system]." The site-specific cost benefit analysis using guidance in Regulatory Guide 1.110, "Cost-Benefit Analysis for Radwaste Systems for Light-water-Cooled Nuclear Power Reactors," (March 1976) for the LWMS in Section 11.2.1.5, and the GWMS in Section 11.3.1.5 concludes that the addition of processing equipment of reasonable treatment technology is not favorable or cost beneficial. The NRC staff's review of these sections indicate insufficient information was provided to independently confirm Luminant's conclusion for compliance with 10 CFR 50, Appendix I, Section II.D. Please provide the values, bases and assumptions used in the cost benefit analysis for the LWMS, GWMS, and SWMS.

ANSWER:

As stated in Subsection 11.4.1.5, there is no direct release pathway from the solid waste handling operation to the environment, therefore there is no separate cost benefit analysis performed for the SWMS. In addition, the SWMS is contained within a completely shielded area and does not include additional processing of the waste, such as removal of radioactive isotopes from the effluents, which could potentially release radioactivity into the environment. The purpose of the SWMS is to provide packaging and storage of solid wastes for eventual offsite shipping.

The values, bases, and assumptions used in the GWMS and LWMS cost benefit analyses are summarized below.

RG 1.110 was used for the methodology and inputs. The site-specific values for Luminant which are required by RG 1.110 are listed below and are the same for both the gaseous and liquid cost-benefit calculations.

Symbol	Description	Site-specific value	Basis
r	No. of reactors served by radwaste system	1	Each radwaste system serves one reactor unit
u	No. of unitized radwaste systems	1	There is one radwaste system for each unit
i	Interest Rate (cost of money/yr)	7%	Based on NUREG/BR-0058 recommendation
n	Plant lifetime (yr)	60	
LCCF	Labor cost correction factor	1.1	Based on Texas location, Region V in RG 1.110 Figure A-1

Other necessary site-specific inputs for the cost-benefit are the population doses from liquid and gaseous effluents. The actual values for these doses come from LADTAP II and GASPAR II, but the values were rounded up to be conservative. The values used are shown below:

	Liquid Effluents	Gaseous Effluents
Total Body Dose (person-rem/yr)	5.0	4.0
Thyroid Dose (person-rem/yr)	5.0	4.0

All other inputs are from RG 1.110.

The GWMS assumptions for the cost-benefit calculation are:

- The new augments considered for cost benefit analysis will be added to provide additional decay time with the existing train in the GWMS.
- When determining the direct capital costs of each augment, the costs associated with process equipment, building assignment, and piping systems are prorated based on the normal weight or volume of the new design versus the costs specified in RG 1.110. The costs of instrumentation and control (I&C), electrical service, and spare parts are independent of weight and volume and are not adjusted. This approach minimizes the costs and is therefore conservative.
- Any capital cost adjustments made based on weight will follow the "Order of Magnitude (Ratio) Estimate method from Basic Cost Engineering (Kenneth Humphreys and Paul Wellman, Third Edition, Marcel Dekker Publishing, 1996). This methodology is widely practiced in the engineering industry and is therefore justified.
- Capital Recovery Factors (CRFs) are based on a discount rate of 7% to represent the approximate marginal pretax real rate of return on a private sector investment as recommended in NUREG/BR-0058.
- The charcoal used in the charcoal absorbers has a density of 33 lb/ft^3, giving each bed a net weight of 2310 lbs.
- All augments considered in the cost-benefit analysis are conservatively assumed to eliminate all radioactivity from gaseous effluents, thereby maximizing the potential benefit

The LWMS assumptions for the cost-benefit calculation are:

- Each new augment considered for cost-benefit analysis will be added to operate in series with the existing train in the LWMS.
- When determining the direct capital costs of each augment, the costs associated with process equipment, building assignment, and piping systems are prorated based on the normal flow rates of the new design versus the costs specified in RG 1.110. The costs of I&C, electrical service, and spare parts are independent of flow rate and are not adjusted. This approach minimizes the costs and is therefore conservative.
- Any capital cost adjustments made based on weight will follow the "Order of Magnitude (Ratio) Estimate method from Basic Cost Engineering (Kenneth Humphreys and Paul Wellman, Third Edition, Marcel Dekker Publishing, 1996). This methodology is widely practiced in the engineering industry and is therefore justified.
- Capital Recovery Factors (CRFs) are based on a discount rate of 7% to represent the approximate marginal pretax real rate of return on a private sector investment as recommended in NUREG/BR-0058.
- The augments whose order of magnitude ratios fall outside the intended range of Basic Cost Engineering are assumed to be applicable for the "order of magnitude estimate."
- All augments considered in the cost-benefit analysis are conservatively assumed to eliminate all radioactivities from liquid effluents, thereby maximizing the potential benefit.
- Results from LADTAP II for offsite dose values have been rounded up to 5.0 person-rem/yr for total body dose and 5.0 person-rem/yr for thyroid dose. These values are conservative and bounding as the calculated results for offsite doses are less than these values.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3401 (CP RAI #39)

SRP SECTION: 11.04 – Solid Waste Management System

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 9/4/2009

QUESTION NO.: 11.04-4

Section 11.4.2.3 in the COLA, Part 2, FSAR (Rev 0) identifies a common radioactive waste interim storage facility between the proposed Comanche Peak Nuclear Power Plant (CPNPP), Units 3 and 4 that will be used to store classes A, B, and C wastes from all four CPNPP units for up to 10 years to satisfy COL 11.4(1). COL 11.4(1) in the US-APWR design certification document (DCD), Tier 2, FSAR (Rev 1) instructs the COL Applicant to identify plant-specific needs for onsite low-level radioactive waste storage and to provide a discussion of this onsite storage if additional storage capacity is desired beyond that provided in the DCD, Tier 2, FSAR, Section 11.4. The NRC staff's review of Section 11.4 in the COLA, Part 2, FSAR (Rev 0) indicates insufficient information is provided on the design of the interim radioactive waste storage facility for compliance with 10 CFR Parts 20, 50, 61, 71, 40 CFR 190, and 49 CFR 171-180. Please address the following items.

1. Provide the interim radioactive waste storage facility design information in Section 11.4. Specifically,

   a. Identify the applicable Federal (Titles 10, 40, and 49 CFRs, etc.) regulations and describe how the design complies with these requirements.

   b. Identify the applicable NRC regulatory guidance and communications (such as NUREG/CR-4062, NUREG-0800, RIS 2008-12, GL 81-38, RG 4.21, etc.) and industry guidance (such as EPRI, etc.) and describe how the design conforms to these guidance documents and standards for compliance with the regulations in 1.a., or justify their exclusion.

   c. Identify other design information (such as ventilation exhaust system, structural requirements, shielding considerations, capacity, sizing, airborne radioactivity and area radiation monitoring, etc.) and describe their bases.

   d. Identify and describe the design features such as provisions for leakage prevention and/or detection that will be used to minimize contamination of the facility and environment.

e. Identify and describe the associated programs and procedures that will be used to comply with Federal regulations and conform to NRC regulatory guidance, communications, and industry guidance.

f. Identify and describe the ITAAC that will be used to ensure acceptable construction and operation of the interim radioactive waste storage facility, or justify its exclusion.

Revise the COLA to include this information and provide a markup of the FSAR in your response.

ANSWER:

FSAR Update Tracking Report Rev. 4 was submitted with updated Subsection 11.4.2.3 (ML092520125). More detail was added to the description of the interim radioactive waste storage facility. Currently Luminant plans to construct a warehouse-type building that will be used to store radioactive waste. The building design is not detailed at this point in time so that the design can be flexible and adjusted to accommodate the amounts and types of radioactive waste to be stored which are not fully known yet and which are expected to change over time. Therefore, the detailed design has not been accomplished and the specific design detail requested is unavailable. The building will be designed in accordance with the applicable regulatory requirements and NRC/industry guidance referenced in FSAR Subsection 11.4.2.3.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment 12

Response to Request for Additional Information No. 3402 (CP RAI #50)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3402 (CP RAI #50)

SRP SECTION: 11.05 - Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 9/7/2009

QUESTION NO.: 11.05-1

Section 11.5.2.9 of the COLA, Part 2, FSAR (Rev 0) indicates that the offsite dose calculation manual (ODCM) follows the guidance in NEI Report 07-09, Generic FSAR template Guidance for Offsite Dose Calculation Manual Program Description,' and that Comanche Peak Nuclear Power Plant (CPNPP) already has an existing ODCM (CPNPP, Units 1 and 2) that reflects the new units (CPNPP, Units 3 and 4) See also Section 11.3.3.3. However, it is not clear whether the existing ODCM adequately addresses all elements in NEI 07-09A (Rev 0) approved by the NRC in March 2009. Please clarify this statement. Revise the COLA to include this information and provide a markup in your response.

ANSWER:

Information on ODCM conformance with NEI 07-09A has been provided in the response to RAI No. 3400 (CP RAI #36) Question 11.03-2 in Luminant letter TXNB-09054 dated October 15, 2009.

Impact on R-COLA

None.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3402 (CP RAI #50)

SRP SECTION: 11.05 - Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 9/7/2009

QUESTION NO.: 11.05-2

The NRC staff's review of Section 11.5 in the COLA, Part 2, FSAR (Rev 0) indicates the information provided to satisfy CP COL 10.4(2) in regards to the design of the site-specific steam generator blowdown system (SGBDS) radiation monitor used in the blowdown system, for compliance with 10 CFR 50.34a, 10 CFR50.34(b)(6)(iii), and 10 CFR 52.47(b)(1), was not provided. CP COL 10.4(2) in Section 10.4.8.2.1 of the COLA states,

> "A radiation monitor located downstream of the startup SG blowdown heat exchanger measures radioactive level in the blowdown water. When an abnormally high radiation level is detected, the blowdown lines are isolated and the blowdown water included in the SGBDS is transferred to waste holdup tank in the LWMS. The location and other technical details of the monitor will be developed during the detail design phase."

COL 10.4(2) in the DCD, Tier 2, FSAR (Rev 1) instructs the COL applicant to address the discharge to Waste Water System including site specific requirements for the SGBDS. Please address the following items.

1. In Section 11.5, provide the location and other technical details of the SGBDS radiation monitor to satisfy CP COL 10.4(2). Include in the description how the SGBDS radiation monitor design
   a. complies with Technical Specification (TS) 3.4.13, "RCS Operational Leakage" and TS 5.5.9, Steam Generator (SG) Program
   b. conforms to NEI 97-06 and EPRI Guidelines
   c. satisfies ITAAC and preoperational testing for sensitivity, response time, and alarm limit
2. In Section 11.5, tabulate the SGBDS radiation monitor design information such as "Item No.", "Monitor Number", "Service", "Type", "Range $\mu Ci/cm^3$", "Calibration Isotopes", "Check Source", etc. consistent with design information for process radiation monitors.

3. Revise CP COL 10.4(2) to remove the statement that details of the SGBDS radiation monitor will be developed during the detail design phase.

4. Explain the bypass around the SGBDS radiation monitor in Figure 10.4.8-201.

Revise the COLA to include this information and provide a markup in your response.

ANSWER:

1. As discussed in the response to Question 11.05-13 of DCD RAI 400-3032 (ML092600316), the condenser vacuum pump exhaust line radiation monitors are the primary monitors used to estimate the primary-to-secondary leak rate. The Startup Steam Generator Blowdown (SGBD) Heat Exchanger Downstream Radiation Monitor is used for radiation detection. SR 3.4.13.2 requires verification that primary-to-secondary leakage is $\leq$ 150 gallons per day through any one SG, with a NOTE: "Not required to be performed until after 12 hours after establishment of steady state operation". So, although the leakage limit applies during startup, the surveillance requirement does not apply until steady state operation. Therefore, this radiation monitor does not need to comply with Technical Specification (TS) 3.4.13, "RCS Operational Leakage" and TS 5.5.9, "Steam Generator (SG) Program." However, the Startup SGBD Heat Exchanger Downstream Radiation Monitor conforms with NEI 97-06 and EPRI Guidelines for startup requirements.

   The Startup SGBD Heat Exchanger Downstream Radiation Monitor is non-safety related and provides a high radiation signal to isolate blowdown liquid discharge and divert the flow to LWMS. Therefore, ITAAC will be included in COLA Part 10, consistent with ITAAC for US-APWR standard plant Process Effluent and Radiation Monitoring System (PERMS) instrumentation.

2. Design information for the Startup SGBD Heat Exchanger Downstream Radiation Monitor (RMS-RE-110) is provided in FSAR Table 11.5-201 and a design description has been added in Subsection 11.5.2.5.3. Also, Evaporation Pond Discharge Radiation Monitor (RMS-RE-111) is provided in FSAR Table 11.5-201 and a design description has been added in Subsection 11.5.2.5.4.

3. The statement that "details of the SGBDS radiation monitor will be developed during the detail design phase" has been deleted from FSAR Subsection 10.4.8.2.1 and replaced with a reference to the monitor's description added as Subsection 11.5.2.5.3 and Table 11.5-201.

4. The bypass line and valve are for maintenance of the Startup SGBD Heat Exchanger Downstream Radiation Monitor and for personnel protection when work is being performed. This bypass valve is normally locked closed and not used during normal operation or startup.

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

See attached marked-up FSAR Draft Revision 1 pages 10.4-7, 11.5-1, 11.5-2, 11.5-4, Table 1.5-201 (page 11.5-5), Figure 11.5-201, and COLA Part 10 page 34.

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

None.

<u>Impact on DCD</u>

None.

Attachment 13

Response to Request for Additional Information No. 3556 (CP RAI #45)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3556 (CP RAI #45)

SRP SECTION: 02.03.02 - Local Meteorology

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 02.03.02-1

When the NRC staff compared the Combined License (COL) FSAR Table 2.3-284 to FSAR Tables 2.3-272 through 2.3-283, it appeared that the column labels Comanche Peak Nuclear Power Plant (CPNPP) Lower Level and CPNPP Upper levels have been reversed in FSAR Table 2.3-284. Please explain this apparent discrepancy.

ANSWER:

The CPNPP Upper Level and Lower Level columns on FSAR Table 2.3-284 are indeed reversed. The column labels should read from left to right "CPNPP Lower Level" and "CPNPP Upper Level". All values contained within the columns are correct. In addition, Note 3 of Table 2.3-284 has been revised to correct the reference to Mineral Wells.

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

See attached mark-up FSAR Draft Revision 1 pages 2.3-162 and 2.3-163.

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

None.

<u>Impact on DCD</u>

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3556 (CP RAI #45)

SRP SECTION: 02.03.02 - Local Meteorology

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 02.03.02-2

Regarding the seasonal/annual cooling tower impact (SACTI) cooling tower plume modeling, please describe the input assumptions (including the cooling tower vendor data) and provide an electronic copy of the cooling tower plume modeling SACTI input and output files, including the meteorological data used.

ANSWER:

There is no data specific to a particular vendor because a cooling tower vendor has not been selected. Instead, some input for the linear mechanical forced-draft cooling towers (LMDCT) was based on scaling of the LMDCT example in the SACTI manual. Some data values were based on previous LMDCT modeling efforts using a standard Marley forced-draft cooling tower design.

The sources of data used and assumptions made are documented in CPNPP Calculation TXUT-001-ER-5.3-CALC-005, Revision 0 (attached). All inputs used in the SACTI code are described in the calculation. The SACTI input and output files, including the meteorological data files were transmitted via Luminant letter TXNB-09004 dated March 31, 2009 (ML091120524) and reaffirmed as being transmitted via Luminant letter TXNB-09025 dated July 13, 2009. The results of this calculation were presented in COLA Revision 0.

TXUT-001-ER-5.3-CALC-005 was revised subsequent to issuing COLA Revision 0. Calculation Revision 2 used cooling tower flow rates that increased from 1,290,720 gpm per unit to 1,317,720 gpm per unit. This impacts the input files for the SACTI code and the corresponding results. The increase in flow had a small but detrimental impact on plume deposition characteristics. Greater deposition of water, sodium salt, chloride, and total dissolved solids are predicted. Visible plume characteristics are not impacted.

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

See attached mark-up FSAR Draft Revision 1 pages 2.3-220 through 2.3-234 and Figures 2.3-373 through 2.3-376.

Impact on S-COLA

None.

Impact on DCD

None.

Attachments

TXUT-001-ER-5.3-CALC-005, Revision 2, "Plume Characteristics of Proposed New Cooling Towers at Comanche Peak"

SACTI input files for TXUT-001-ER-5.3-CALC-005, Revision 2

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3556 (CP RAI #45)

SRP SECTION: 02.03.02 - Local Meteorology

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 02.03.02-3

Clarify the units in COL FSAR Tables 2.3-327 through 2.3-329. The units in the tables indicate values are per month while the titles of the tables indicate the data are annual values.

ANSWER:

The title and units in these tables are correct. For example, Table 2.3-327 is titled "Cooling Tower Annual Sodium Deposition Rate" to indicate that the monthly deposition rate [in kg/(km^2-month)] is determined on an annual basis not a seasonal basis. However, the titles have been revised to remove "annual."

Impact on R-COLA

See attached mark-up FSAR Draft Revision 1 pages 2.3-220 through 2.3-225.

Impact on S-COLA

None.

Impact on DCD

None.

Attachment 14

Response to Request for Additional Information No. 3557 (CP RAI #46)

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3557 (CP RAI #46)

SRP SECTION: 02.03.03 - Onsite Meteorological Measurements Programs

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 02.03.03-2

NUREG-0800, 'Standard Review Plan,' Section 2.3.3, Section II (Acceptance Criteria), Standard Review Plan (SRP) Acceptance Criterion (2) and Regulatory Guide (RG) 1.206, 'Combined License Applications for Nuclear Power Plants (LWR Edition),' Section C.I.2.3.3 (Para. 2 & 3) discusses the submittal of an hour-by-hour listing of the hourly averaged parameters in the format described in RG 1.23, "Meteorological Monitoring Programs for Nuclear Power Plants."

Luminant provided the NRC staff five years of hourly data for 2001 through 2004 and 2006 for Comanche Peak Nuclear Power Plant (CPNPP) on May 8, 2009. Refer to Response to NRC staff's RAI # 3 (2584), dated May 8, 2009. A preliminary review appears to indicate the data provided has not undergone a complete quality assurance review, as stated in the RAI response. During an analysis of temperature data, numbers of hours with erroneous negative temperatures were noted in the data sets provided. For example, hours 0900 through 1200 on day 269 of 2002, all report a temperature of -28.7 degrees C. Another example is the 60-meter wind direction remaining nearly constant from the north for an approximately 1850-hour period from November 5, 2003 to January 20, 2004.

a. Describe and justify any deviations from the meteorological monitoring criteria presented in SRP 2.3.3 and RG 1.23, in collecting and compiling the onsite meteorological data presented in support of this COL application.
b. Describe the manner in which suspect data were removed from the short-term and long-term atmospheric dispersion calculations presented in FSAR Sections 2.3.4 and 2.3.5. If suspect data were not removed, explain how this anomalous data may have affected the calculations.
c. Provide, in Regulatory Guide 1.23, Rev 1 format, an electronic copy of the meteorological dataset that reflects the screening criteria listed in the response to RAI 2584.

ANSWER:

The data provided in the response to RAI No. 2584 (CP RAI #3) dated May 8, 2009 (ML091330346), were the raw data recorded at CPNPP. As stated in the RAI response, this data was subsequently reviewed using the criteria specified in the RAI response. The answers to the specific questions posed in the current RAI are as follows:

a. Monitoring criteria is provided in Subsection 2.3.3. No deviations from the monitoring criteria presented in SRP 2.3.3 and RG 1.23 have been identified.

b. The raw meteorological data set recorded onsite for the 2001-2004 and 2006 period of record was provided on compact disc (CD) via Luminant letter TXNB-09004 dated March 31, 2009. This data was provided in ASCII format in accordance with Appendix A of RG 1.23, Revision 1, which meets the submittal requirements of SRP Section 2.3.3 and RG 1.206, Section C.I.2.3.3. The data provided consisted of a single file for the data period 2001-2004 and 2006.

   The raw meteorological data was provided again in the response to RAI No. 2584 (CP RAI #3). The only difference between the data provided with this response and the previously provided data was the provision of yearly data files for the years 2001-2004 and 2006 instead of a single composite file. ML091330346 did not provide the filtered or edited data resulting from the screening process described in the response to RAI No.2584.

   As stated in ML091330346, the raw data was screened using the criteria recommended in NUREG-0917 to flag suspect data. A manual review of the screened data was subsequently conducted to accept or reject data flagged by the screening process. In some cases where temperature data was found to be bad, it was replaced using data from a redundant device on the primary tower. A total of 2440 hours of data out of 43,824 were identified and rejected based on the screening and review process. The resulting set of edited data was subsequently used in the COL analyses presented in FSAR Subsections 2.3.4 and 2.3.5.

c. The filtered meteorological data for the years 2001-2004 and 2006, provided in RG 1.23, Rev 1 format as a composite file and as individual yearly electronic files, will be provided no later than November 9, 2009.

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

None.

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

None.

<u>Impact on DCD</u>

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3557 (CP RAI #46)

SRP SECTION: 02.03.03 - Onsite Meteorological Measurements Programs

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 02.03.03-3

NUREG-0800 Section 2.3.3, Section III (Review Procedures), indicates that atmospheric moisture should be collected for sites using cooling towers. Since the proposed Comanche Peak Nuclear Power Plants, Units 3 and 4 will use mechanical cooling towers, the NRC staff is requesting any pre-operational monitoring data for atmospheric moisture measurements conducted in relationship to the new units (Units 3 and 4). This information should include data related to the discussions in FSAR Chapter 2.3.

Provide in FSAR Section 2.3.3, a description of the instruments used for the moisture measurements. Include in the description, the height and location of the instruments as well as any other pertinent information regarding their siting.

ANSWER:

Subsection 2.3.3 has been revised to include information on the pre-operational atmospheric moisture monitoring.

Impact on R-COLA

See attached mark-up FSAR Draft Revision 1 pages 2.3-36 and 2.3-37.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3557 (CP RAI #46)

SRP SECTION: 02.03.03 - Onsite Meteorological Measurements Programs

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 02.03.03-4

The criteria in NUREG-0800 Section 2.3.3, Section III,1.a.2 specifies that instrument exposure be evaluated in relationship to the "likely finished plant grade". Please provide the likely finished grade elevation of Comanche Peak Nuclear Power Plant, Units 3 and 4 and compare this likely finished plant grade to the meteorological tower grade.

ANSWER:

The CPNPP meteorological tower is located at elevation 838 ft. - 9 in. The nominal plant grade elevation for CPNPP Units 3 and 4 is elevation 822 ft. The difference between the Unit 3 and 4 plant grade and the meteorological tower base elevation is 16 ft. - 9 in.

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

None.

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

None.

<u>Impact on DCD</u>

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3557 (CP RAI #46)

SRP SECTION: 02.03.03 - Onsite Meteorological Measurements Programs

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 02.03.03-5

Regulatory Guide 1.23, Meteorological Monitoring Programs for Nuclear Power Plants," (March 2007) Table 2, specifies the Meteorological System Accuracies and Resolutions for an onsite meteorological monitoring program. Please include in FSAR Section 2.3.3 the resolution of each of the instruments used to record ambient temperature, vertical temperature difference, wind speed, wind direction, and precipitation.

ANSWER:

A column has been added to Table 2.3-332 that provides the resolution values for ambient temperature, vertical temperature difference, wind speed, wind direction, and precipitation.

Impact on R-COLA

See attached mark-up FSAR Draft Revision 1 pages 2.3-36, 2.3-37, and Table 2.3-332.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3557 (CP RAI #46)

SRP SECTION: 02.03.03 - Onsite Meteorological Measurements Programs

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 02.03.03-6

In accordance with Regulatory Guide 1.23, "Meteorological Monitoring Programs for Nuclear Power Plants," (March 2007), please clarify how often Luminant inspects the guyed wires, as part of the guyed tower, and tower anchors.

ANSWER:

Luminant has the guyed wires and tower anchors inspected every five years by an outside contractor. The work scope includes a below grade anchor inspection, an evaluation of the condition of anchor and guyed wires, and performance of any maintenance that is needed on the guyed tower, anchors, and associated parts. The last inspection was performed on July 18, 2006.

Impact on R-COLA

See attached mark-up FSAR Draft Revision 1 page 2.3-37.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3557 (CP RAI #46)

SRP SECTION: 02.03.03 - Onsite Meteorological Measurements Programs

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 02.03.03-7

In accordance with NUREG-0800 Section 2.3.3, Section III (Review Procedures), 1.d and Regulatory Guide 1.23, Section C.5, please provide additional details that describe how Luminant performs system calibrations, to ensure the entire channel, from sensors to displays, are checked. Also, provide information on daily channel checks. Please update FSAR Section 2.3.3 to reflect this information.

ANSWER:

Calibration of the metrological tower instrumentation is performed in accordance with the quality-related CPNPP Common Unit Instrument and Control Manual. The channel calibrations provided in these procedures are acceptable when the "AS LEFT" values are within the tolerances tabulated on the instrument data sheets. Calibration is applied to the individual instruments and the entire channel (through the plant computer points in the control rooms).

The controls and surveillance requirements section of the ODCM in Specification 3.3.3.6 requires that the wind speed, wind direction, and temperature instrumentation channels at both measurement levels be operable at all times. The surveillance requirements associated with this specification states, inter alia, that each meteorological monitoring channel shall be demonstrated OPERABLE at least once per 24 hours by performing a CHANNEL CHECK.

The requested information has been added to Subsection 2.3.3.

Impact on R-COLA

See attached mark-up FSAR Draft Revision 1 pages 2.3-36 and 2.3-37.

Impact on S-COLA

None.

Impact on DCD

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3557 (CP RAI #46)

SRP SECTION: 02.03.03 - Onsite Meteorological Measurements Programs

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 02.03.03-8

For the delta-temperature, Regulatory Guide 1.23, "Meteorological Monitoring Programs for Nuclear Power Plants," (March 2007), Table 2, specifies a system accuracy of plus or minus 0.18 degrees F, while FSAR Table 2.3-332 indicates a system accuracy of plus or minus 0.19 degrees F for the Paperless Digital delta-temperature measurement. Please clarify the reasons for this apparent difference.

ANSWER:

Subsection 2.3.3 states "The on-site program follows the program requirements defined in the CPNPP Off-site Dose Calculation Manual (ODCM) (Reference 2.3-223)." Subsection 2.3.3.3 states "System accuracies are specified in Tables 2.3-332 and 2.3-333. All system accuracies meet or exceed regulatory requirements (Reference 2.3-205)."

The system accuracy requirements are based on ANSI/ANI 2.5-1984, as indicated in the heading of Table 2.3-332, because it is endorsed by the Second Proposed Revision to RG 1.23 (April 1986), to which CPNPP Units 1 and 2 are committed. Because the meteorological system used to support CPNPP Units 3 and 4 is the same system used for operating CPNPP Units 1 and 2, it has not been changed to meet any new requirements of RG 1.23 (March 2007). The Table 2.3-332 footnote was revised to reflect the Second Proposed Revision to RG 1.23 (April 1986) on May 14, 2009 (ML091400256).

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

None.

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

None.

<u>Impact on DCD</u>

None.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak Units 3 and 4

Luminant Generation Company LLC

Docket No. 52-034 and 52-035

RAI NO.: 3557 (CP RAI #46)

SRP SECTION: 02.03.03 - Onsite Meteorological Measurements Programs

QUESTIONS for Siting and Accident Conseq Branch (RSAC)

DATE OF RAI ISSUE: 9/5/2009

QUESTION NO.: 02.03.03-9

For clarification in FSAR Section 2.3.3.5.1, please specify whether the digital paperless recorder and the Yokogawa recorder are different or the same? If these recorders are different, then where is the Yokogawa recorder located? Further, how will the Comanche Peak Nuclear Power Plants, Unit 3 and Unit 4 plant computers interface with the meteorological data, and where will they display the meteorological data?

ANSWER:

The "Yokogawa recorders" and the "digital paperless recorders" refer to the same recorders. Subsection 2.3.3.5.1 states "The digital paperless recorder is mounted inside the Units 1 and 2 combined Control Room and the Units 3 and 4 Control Rooms."

Subsection 2.3.3.5.1 states that "The meteorological data sensors electronic signals from both towers are transmitted via Modems to demultiplexers located in the Unit 1 plant computer room." Additional lines and equipment of similar design may be used to transfer the data to Units 3 and 4 or newer and better methods available in the next few years may be used.

Meteorological data display is described in FSAR Subsection 2.3.3.5.1. Additionally, Emergency Plan Subsection II.H.8 states: "Measured data from the on-site meteorological tower is available to the plant computer(s) and ERF display systems." Emergency Plan Subsection II.I.5 states, regarding meteorological information "This data is available in the CR, TSC, and EOF."

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

None.

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

None.

Impact on DCD

None.

Attachment 15

FSAR Pages Affected by Responses to Requests for Additional Information

Text	Tables (Page #)	Figures
2.3-36	2.3-284 (2.3-162 - 2.3-163)	2.3-373
2.3-37	2.3-327 (2.3-220 - 2.3-222)	2.3-374
5.2-1	2.3-327 (2.3-223 - 2.3-225)	2.3-375
10.4-7	2.3-328 (2.3-223 - 2.3-225)	2.3-376
11.2-1	2.3-328 (2.3-226 - 2.3-228)	11.5-201
11.2-2	2.3-329 (2.3-226 - 2.3-228)	
11.2-5	2.3-329 (2.3-229 - 2.3-231)	
11.2-8	2.3-330 (2.3-229 - 2.3-231)	
11.2-9	2.3-330 (2.3-232 - 2.3-234)	
11.2-10	2.3-332 (2.3-333)	
11.2-20	3.2-201 Sh 1of 3 (3.2-3)	
11.4-5	11.5-201 (11.5-5)	
11.5-1		
11.5-2		
11.5-4		
13.5-3		
13.5-4		
13.5-5		
COLA Part 4 page 34		

- Sigma theta at 10 m.
- Precipitation near ground level.

An additional 10-m backup tower is located 75 ft east-northeast from the primary tower. This tower is an open lattice tower with a stationary instrumentation boom located on top of the tower. The aspirator motor and shield for the backup temperature sensor are also oriented north/south. The backup tower monitors or provides information to determine the following meteorological parameters:

- Wind speed at 10 m.
- Wind direction at 10 m.
- Ambient temperature at 10 m.
- Sigma theta at 10 m.

All the towers and instrumentation described above are located in an area surrounded by a fence and maintained free of obstructions that could interfere with data collection and accuracy. The environmentally controlled Meteorological Instrumentation Building that supports the electronic components associated with the instrumentation on the towers is located within the fenced area. (Reference 2.3-205)

Pre-operational atmospheric moisture monitoring was conducted from June 12, 2008 through September 23, 2008. The instrumentation used to collect this data was a Climatronics capacitive relative humidity sensor. This instrument had the following characteristics: RCOL2_02.03.03-3 RCOL2_02.03.03-5 RCOL2_02.03.03-7

- Accuracy: <+/- 1% RH from 0 - 100%
- Repeatability: +/- 0.3% RH
- Operating Range: 0 - 100%

This instrument was located on top of the Project Records Center Building approximately 30 feet above grade (grade elevation ~830 feet). The pre-operational onsite data was used to demonstrate that the actual onsite conditions correlated well with the longer term data from local weather stations which were used for the official calculations.

2.3.3.2 Instrumentation

An overview of the instrumentation used in the meteorological monitoring system is provided below. The CPNPP Units 1 and 2 UFSAR and other plant documents contain specific data about sensors and requirements for replacement of sensors. Wind speeds at the 10-m and 60-m levels are measured with a 3-cup anemometer with a threshold of 0.45 m/s and a range of 0-100 mph. Wind directions at the 10-m and 60-m levels are detected by a wind vane with a threshold of 0.45 m/s and a range of 0 to 360 degrees. Temperatures at the 10-m and 60-m levels are measured with a platinum temperature sensor with a range of -20°F to +120°F. Delta temperature between the 10-m and 60-m levels uses the temperature sensors at each level and has a range of -5°F to +15°F. Precipitation is measured at the surface with a tipping bucket gauge with a threshold of 0.01-in and a range of 0-in to 1.0-in.

2.3.3.3 System Accuracy

System accuracies are specified in Tables 2.3-332 and 2.3-333. All system accuracies meet or exceed regulatory requirements (Reference 2.3-205). Calibration and maintenance procedures ensure the accuracy of the instrumentation. All calibrations are performed semi-annually and in accordance with the ODCM. Calibration of metrological tower instrumentation is performed in accordance with the Quality Related CPNPP common unit Instrument and Control Manual. Calibration is applied to the individual instruments and the entire channel (through the plant computer points in the control rooms). The surveillance requirements provided in the ODCM require that the wind speed, wind direction, and temperature instrumentation channels at both measurement levels be operable at all times. In addition, channel checks are performed at least once per 24 hours in accordance with the ODCM. An annual inspection of the tower structure is also performed. The guyed wires and anchors are inspected every five years. RCOL2_02.03.03-3 RCOL2_02.03.03-5 RCOL2_02.03.03-7 RCOL2_02.03.03-6

2.3.3.4 Data Recovery

Data recovery from the meteorological monitoring program for the six-yr period 2001 – 2006 is presented in Table 2.3-334. Recovery rates are provided for joint frequency distribution (wind speed, wind direction, and stability class determined by delta temperature) and for each individual channel. The average joint frequency distribution recovery rate for this five-yr period is 98.9 percent.

2.3.3.5 Meteorological Data Processing

The meteorological monitoring program provides data for many functions. Meteorological data collection is the primary focus of the program, but the data are also provided to the plant computer system for easy access by operations and emergency planning personnel. These data are available for routine operations, accident analysis, and annual reporting requirements.

2.3.3.5.1 Data Acquisition

The meteorological monitoring system includes two separate recording systems. There is a digital system and a digital paperless recorder. The digital system records all data on the Meteorological System Computer (METSYS Computer) in the Unit 1 Control Room. Four (4) separate data recording systems exist:

Table 2.3-284 (Sheet 1 of 2)
Comparison of Average Wind Persistence

CP COL 2.3(1)

RCOL2_02.3.02-1

Wind Persistence (hrs)

Sector	Single Sector				Three Adjacent Sectors				Five Adjacent Sectors			
	CPNPP ~~Upper~~ Lower Level	CPNPP ~~Lower~~ Upper Level	Mineral Wells	Fort Worth	CPNPP ~~Upper~~ Lower Level	CPNPP ~~Lower~~ Upper Level	Mineral Wells	Fort Worth	CPNPP ~~Upper~~ Lower Level	CPNPP ~~Lower~~ Upper Level	Mineral Wells	Fort Worth
N	25.2	21.8	18.7	18.0	62.4	64.4	45.2	51.7	73.6	75.4	58.7	72.1
NNE	12.6	14.4	6.8	10.5	47.8	50.2	28.0	46.5	70.2	78.4	55.5	65.9
NE	8.6	9.0	5.7	6.1	26.6	38.4	21.2	22.5	63.2	69.6	40.0	62.9
ENE	9.4	9.0	6.8	6.7	23.6	23.6	21.0	27.9	50.0	59.0	33.7	48.1
E	9.0	9.0	8.2	9.7	26.6	30.6	24.3	28.0	56.4	56.2	36.8	41.0
ESE	9.8	11.0	6.8	7.7	43.6	39.4	27.7	32.6	87.6	80.0	52.5	51.4
SE	16.6	17.2	12.0	9.9	79.4	67.8	46.3	34.8	140.4	135.2	114.8	122.7
SSE	19.0	22.8	15.7	13.6	116.4	123.8	102.8	106.0	200.2	219.0	163.7	166.8
S	22.4	20.0	17.3	37.2	119.6	147.4	92.5	98.9	187.8	222.4	157.3	164.1
SSW	11.2	13.0	6.2	8.6	37.6	60.0	25.3	58.4	123.0	155.4	99.0	130.4
SW	10.4	11.0	5.0	4.8	30.0	34.2	11.5	18.8	51.8	71.2	32.3	60.6
WSW	9.2	11.2	3.8	5.8	22.6	29.8	17.5	18.0	38.6	43.2	25.5	28.6
W	4.6	6.8	9.0	8.5	23.6	19.8	18.3	21.4	38.8	40.8	32.0	37.0

Table 2.3-284 (Sheet 2 of 2)
Comparison of Average Wind Persistence

CP COL 2.3(1)

Wind Persistence (hrs)

Sector	Single Sector				Three Adjacent Sectors				Five Adjacent Sectors			
	CPNPP ~~Upper~~ Lower Level	CPNPP ~~Lower~~ Upper Level	Mineral Wells	Fort Worth	CPNPP ~~Upper~~ Lower Level	CPNPP ~~Lower~~ Upper Level	Mineral Wells	Fort Worth	CPNPP ~~Upper~~ Lower Level	CPNPP ~~Lower~~ Upper Level	Mineral Wells	Fort Worth
WNW	8.4	6.2	6.0	7.4	22.8	20.6	21.7	32.0	47.8	48.6	41.2	49.2
NW	15.2	15.6	8.3	10.4	40.6	41.0	29.7	35.5	61.2	59.8	51.8	60.1
NNW	20.4	24.2	11.2	15.3	58.4	52.8	40.0	50.5	71.6	73.2	54.8	66.5

RCOL2_02.3.02-1

NOTES:

1. Wind values which were either not provided, had a zero speed value, or a VRB wind direction were not included, and assumed to break any consecutive wind direction count.
2. Wind persistence values above are the average persistence durations for the period of record.
3. Period of record at CPNPP site and Mineral Wells Airport, 2001 – 2004, 2006.
4. Period of record at Mineral Wells Airport, 2001 – 2006.

RCOL2_02.03.02-2

Table 2.3-327 (Sheet 1 of 3)
Cooling Tower ~~Annual~~ Sodium Deposition Rate

CP COL 2.3(1)

RCOL2_02.03.02-3

Directions are data to which the plume is headed.
kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.06	100	8.23	6.19	4.43	4.69	4.12	5.71	1.37	1.92	55.8	9.98	4.17	2.84	2.32	2.9	0.51	0.77
0.12	200	5.62	4.23	2.05	2.1	3.03	4.31	1.31	1.85	37.49	6.99	2.11	1.47	1.68	1.99	0.45	0.66
0.19	300	0.67	0.47	0.5	0.41	0.73	0.92	1.28	1.83	2.38	0.72	0.72	0.49	0.28	0.3	0.38	0.59
0.25	400	0.24	0.17	0.48	0.39	0.44	0.56	1.28	1.83	0.85	0.31	0.7	0.46	0.16	0.13	0.35	0.57
0.31	500	0.21	0.14	0.48	0.38	0.41	0.54	1.21	1.7	0.79	0.29	0.67	0.44	0.12	0.12	0.3	0.48
0.37	600	0.2	0.13	0.32	0.26	0.32	0.41	0.98	1.43	0.67	0.25	0.45	0.29	0.1	0.11	0.24	0.34
0.43	700	0.18	0.13	0.19	0.15	0.17	0.19	0.68	1.16	0.47	0.17	0.25	0.17	0.09	0.1	0.2	0.28
0.5	800	0.18	0.12	0.02	0.01	0.17	0.18	0.6	1.1	0.47	0.16	0.02	0.02	0.09	0.1	0.2	0.27
0.56	900	0.15	0.1	0.02	0.01	0.14	0.16	0.57	1.09	0.38	0.14	0.02	0.02	0.08	0.08	0.19	0.27
0.62	1000	0.14	0.09	0.02	0.01	0.14	0.15	0.5	0.93	0.35	0.13	0.02	0.02	0.07	0.07	0.17	0.24
0.68	1100	0.14	0.09	0.02	0.01	0.14	0.15	0.12	0.15	0.35	0.13	0.02	0.02	0.07	0.07	0.05	0.05
0.75	1200	0.14	0.09	0.02	0.01	0.13	0.15	0.12	0.15	0.35	0.13	0.02	0.02	0.07	0.07	0.05	0.05
0.81	1300	0.13	0.09	0.02	0.01	0.12	0.14	0.12	0.15	0.33	0.12	0.02	0.02	0.07	0.07	0.06	0.05
0.87	1400	0.12	0.08	0.02	0.01	0.11	0.12	0.12	0.15	0.31	0.11	0.02	0.02	0.06	0.07	0.06	0.05
0.93	1500	0.12	0.08	0.02	0.01	0.11	0.12	0.12	0.15	0.31	0.11	0.02	0.02	0.06	0.07	0.05	0.05
0.99	1600	0.12	0.08	0.02	0.01	0.11	0.12	0.12	0.15	0.29	0.11	0.02	0.02	0.06	0.06	0.05	0.05
1.06	1700	0.08	0.05	0.02	0.01	0.07	0.08	0.12	0.15	0.19	0.07	0.02	0.02	0.04	0.04	0.06	0.05
1.12	1800	0.05	0.02	0.02	0.01	0.02	0.03	0.12	0.15	0.1	0.03	0.02	0.02	0.02	0.02	0.06	0.05

RCOL2_02.03.02-2

Table 2.3-327 (Sheet 2 of 3) Cooling Tower ~~Annual~~ Sodium Deposition Rate

CP COL 2.3(1)

RCOL2_02.03.02-3

Directions are data to which the plume is headed.
kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
~~1.18~~	~~1900~~	~~0.04~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.12~~	~~0.15~~	~~0.09~~	~~0.03~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.02~~	~~0.05~~	~~0.05~~
~~1.24~~	~~2000~~	~~0.03~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.12~~	~~0.15~~	~~0.07~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.02~~	~~0.05~~	~~0.05~~
~~1.3~~	~~2100~~	~~0.03~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.09~~	~~0.12~~	~~0.07~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.02~~	~~0.04~~	~~0.04~~
~~1.37~~	~~2200~~	~~0.03~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.09~~	~~0.11~~	~~0.07~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.02~~	~~0.04~~	~~0.04~~
~~1.43~~	~~2300~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.08~~	~~0.1~~	~~0.06~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.04~~	~~0.04~~
~~1.49~~	~~2400~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.06~~	~~0.08~~	~~0.06~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.03~~
~~1.55~~	~~2500~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.05~~	~~0.06~~	~~0.06~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.02~~
~~1.62~~	~~2600~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.04~~	~~0.06~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.02~~
~~1.68~~	~~2700~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.03~~	~~0.05~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~
~~1.74~~	~~2800~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.03~~	~~0.04~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0.01~~	~~0.01~~	~~0.01~~
~~1.8~~	~~2900~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.03~~	~~0.04~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0.01~~	~~0.01~~	~~0.01~~
~~1.86~~	~~3000~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.03~~	~~0.04~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0.01~~	~~0.01~~	~~0.01~~
~~1.93~~	~~3100~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.03~~	~~0.04~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0.01~~	~~0.01~~	~~0.01~~
~~1.99~~	~~3200~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.04~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0.01~~	~~0.01~~	~~0.01~~
~~2.05~~	~~3300~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.04~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0.01~~	~~0.01~~	~~0.01~~
~~2.11~~	~~3400~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.04~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0.01~~	~~0.01~~	~~0.01~~
~~2.17~~	~~3500~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.04~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0.01~~	~~0.01~~	~~0.01~~
~~2.24~~	~~3600~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.03~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~

RCOL2_02.03.02-2

Table 2.3-327 (Sheet 3 of 3)
Cooling Tower ~~Annual~~ Sodium Deposition Rate

CP COL 2.3(1)

RCOL2_02.03.02-3

Directions are data to which the plume is headed.

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
~~2.3~~	~~3700~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.03~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~
~~2.36~~	~~3800~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.03~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~
~~2.42~~	~~3900~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.03~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~
~~2.49~~	~~4000~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.03~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~
~~2.55~~	~~4100~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.03~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~
~~2.61~~	~~4200~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.03~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0~~	~~0~~	~~0.01~~	~~0.01~~

~~Note: Values can be converted to lbm/100 acre-month by multiplying by 0.893.~~

RCOL2_02.03.02-2

Table 2.3-327 (Sheet 1 of 3)
Cooling Tower Sodium Deposition Rate

CP COL 2.3(1)

RCOL2_02.03.02-3

Directions are data to which the plume is headed..

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.06	100	8.45	6.35	4.55	4.81	4.23	5.86	1.4	1.97	57.24	10.24	4.28	2.92	2.38	2.98	0.53	0.79
0.12	200	5.77	4.33	2.11	2.16	3.11	4.43	1.35	1.9	38.46	7.17	2.16	1.5	1.72	2.04	0.46	0.68
0.19	300	0.68	.048	0.51	0.42	0.75	0.95	1.32	1.87	2.44	0.74	0.74	0.5	0.29	0.31	0.39	0.61
0.25	400	0.25	0.17	0.5	0.4	0.45	0.57	1.31	1.88	0.87	0.31	0.72	0.47	0.17	0.13	0.36	0.59
0.31	500	0.22	0.15	0.49	0.39	0.42	0.55	1.24	1.74	0.81	0.3	0.69	0.45	0.13	0.12	0.31	0.49
0.37	600	0.21	0.14	0.32	0.26	0.33	0.42	1.01	1.47	0.68	0.25	0.47	0.3	0.1	0.12	0.24	0.35
0.43	700	0.19	0.13	0.19	0.15	0.18	0.2	0.7	1.19	0.49	0.17	0.26	0.18	0.1	0.11	0.21	0.28
0.5	800	0.19	0.13	0.02	0.01	0.17	0.19	0.61	1.13	0.48	0.17	0.02	0.02	0.09	0.1	0.2	0.28
0.56	900	0.15	0.1	0.02	0.01	0.15	0.16	0.59	1.11	0.39	0.14	0.02	0.02	0.08	0.08	0.2	0.28
0.62	1000	0.14	0.1	0.02	0.01	0.14	0.16	0.51	0.96	0.36	0.13	0.02	0.02	0.07	0.08	0.17	0.24
0.68	1100	0.14	0.1	0.02	0.01	0.14	0.16	0.12	0.15	0.36	0.13	0.02	0.02	0.07	0.08	0.06	0.05
0.75	1200	0.14	0.09	0.02	0.01	0.14	0.15	0.12	0.15	0.36	0.13	0.02	0.02	0.07	0.08	0.06	0.05
0.81	1300	0.13	0.09	0.02	0.01	0.13	0.14	0.12	0.15	0.34	0.11	0.02	0.02	0.06	0.07	0.06	0.05
0.87	1400	0.12	0.08	0.02	0.01	0.11	0.13	0.12	0.15	0.32	0.11	0.02	0.02	0.06	0.07	0.06	0.05
0.93	1500	0.12	0.08	0.02	0.01	0.11	0.13	0.12	0.15	0.32	0.11	0.02	0.02	0.06	0.07	0.06	0.05
0.99	1600	0.12	0.08	0.02	0.01	0.11	0.12	0.12	0.15	0.3	0.11	0.02	0.02	0.06	0.07	0.06	0.05
1.06	1700	0.08	0.06	0.02	0.01	0.07	0.08	0.12	0.15	0.2	0.07	0.02	0.02	0.04	0.05	0.06	0.05
1.12	1800	0.05	0.02	0.02	0.01	0.02	0.03	0.12	0.15	0.11	0.03	0.02	0.02	0.02	0.03	0.06	0.05

Table 2.3-327 (Sheet 2 of 3) Cooling Tower Sodium Deposition Rate

RCOL2_02.03.02-2

CP COL 2.3(1)

RCOL2_02.03.02-3

Directions are data to which the plume is headed.

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
1.18	1900	0.04	0.02	0.02	0.01	0.02	0.03	0.12	0.15	0.09	0.03	0.02	0.02	0.02	0.02	0.06	0.05
1.24	2000	0.03	0.02	0.02	0.01	0.02	0.02	0.1	0.12	0.07	0.02	0.02	0.02	0.01	0.02	0.04	0.04
1.3	2100	0.03	0.02	0.02	0.01	0.02	0.02	0.01	0.12	0.07	0.02	0.02	0.02	0.01	0.02	0.04	0.04
1.37	2200	0.03	0.02	0.01	0.01	0.02	0.02	0.09	0.12	0.07	0.02	0.02	0.02	0.01	0.02	0.04	0.04
1.43	2300	0.02	0.01	0.01	0.01	0.01	0.01	0.08	0.11	0.06	0.01	0.02	0.02	0.01	0.01	0.04	0.04
1.49	2400	0.02	0.01	0.01	0.01	0.01	0.01	0.06	0.08	0.05	0.01	0.02	0.02	0.01	0.01	0.03	0.03
1.55	2500	0.02	0.01	0.01	0.01	0.01	0.01	0.05	0.06	0.05	0.01	0.02	0.02	0.01	0.01	0.02	0.02
1.62	2600	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.05	0.01	0.02	0.02	0.01	0.01	0.01	0.02
1.68	2700	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.05	0.01	0.02	0.02	0.01	0.01	0.01	0.02
1.74	2800	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.04	0.01	0.01	0.01	0	0.01	0.01	0.02
1.8	2900	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.04	0.01	0.01	0.01	0	0.01	0.01	0.02
1.86	3000	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.04	0.01	0.01	0.01	0	0.01	0.01	0.02
1.93	3100	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.01	0.01	0.01	0	0.01	0.01	0.01
1.99	3200	0.01	0.01	0.01	0	0.01	0.01	0.02	0.03	0.04	0.01	0.01	0.01	0	0.01	0.01	0.01
2.05	3300	0.01	0.01	0	0	0.01	0.01	0.02	0.02	0.04	0.01	0.01	0.01	0	0.01	0.01	0.01
2.11	3400	0.01	0.01	0	0	0.01	0.01	0.02	0.02	0.04	0.01	0.01	0.01	0	0.01	0.01	0.01
2.17	3500	0.01	0.01	0	0	0.01	0.01	0.02	0.02	0.04	0.01	0.01	0.01	0	0.01	0.01	0.01
2.24	3600	0.01	0.01	0	0	0.01	0.01	0.02	0.02	0.04	0.01	0.01	0.01	0	0	0.01	0.01

RCOL2_02.03.02-2

Table 2.3-327 (Sheet 3 of 3)
Cooling Tower Sodium Deposition Rate

CP COL 2.3(1)

RCOL2_02.03.02-3

Directions are data to which the plume is headed..

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
2.3	3700	0.01	0.01	0	0	0.01	0.01	0.02	0.02	0.04	0.01	0.01	0.01	0	0	0.01	0.01
2.36	3800	0.01	0.01	0	0	0.01	0.01	0.02	0.02	0.04	0.01	0.01	0.01	0	0	0.01	0.01
2.42	3900	0.01	0.01	0	0	0.01	0.01	0.02	0.02	0.04	0.01	0.01	0.01	0	0	0.01	0.01
2.49	4000	0.01	0.01	0	0	0.01	0.01	0.01	0.02	0.04	0.01	0.01	0.01	0	0	0.01	0.01
2.55	4100	0.01	0.01	0	0	0.01	0.01	0.01	0.02	0.04	0.01	0.01	0.01	0	0	0.01	0.01
2.61	4200	0.01	0.01	0	0	0.01	0.01	0.01	0.02	0.04	0.01	0.01	0.01	0	0	0.01	0.01

Note: Values can be converted to lbm/100-acre-month by multiplying by 0.893.

RCOL2_02.03.02-2

Table 2.3-328 (Sheet 1 of 3)
~~Annual~~ Chlorides Deposition

CP COL 2.3(1)

Directions are data to which the plume is headed.
kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.06	100	12.85	9.66	6.92	7.31	6.44	8.92	2.13	2.99	87.08	15.58	6.51	4.44	3.62	4.53	0.8	1.2
0.12	200	8.78	6.6	3.21	3.28	4.73	6.74	2.05	2.89	58.51	10.92	3.29	2.29	2.63	3.11	0.7	1.04
0.19	300	1.04	0.74	0.78	0.63	1.15	1.45	2.01	2.85	3.74	1.13	1.13	0.76	0.45	0.47	0.6	0.93
0.25	400	0.39	0.27	0.76	0.61	0.69	0.88	2	2.86	1.34	0.48	1.09	0.72	0.26	0.21	0.55	0.89
0.31	500	0.34	0.23	0.74	0.6	0.65	0.85	1.89	2.65	1.25	0.46	1.05	0.68	0.19	0.19	0.47	0.75
0.37	600	0.32	0.21	0.49	0.4	0.51	0.64	1.54	2.24	1.06	0.39	0.71	0.45	0.16	0.18	0.37	0.54
0.43	700	0.29	0.2	0.29	0.23	0.28	0.31	1.06	1.81	0.76	0.27	0.39	0.27	0.15	0.17	0.32	0.43
0.5	800	0.29	0.2	0.03	0.02	0.27	0.29	0.94	1.72	0.75	0.26	0.04	0.04	0.14	0.16	0.31	0.43
0.56	900	0.24	0.16	0.03	0.02	0.23	0.26	0.9	1.7	0.61	0.22	0.04	0.04	0.12	0.13	0.3	0.43
0.62	1000	0.22	0.15	0.03	0.02	0.22	0.25	0.77	1.45	0.57	0.21	0.04	0.04	0.11	0.12	0.26	0.37
0.68	1100	0.22	0.15	0.03	0.02	0.22	0.25	0.19	0.23	0.57	0.21	0.04	0.04	0.11	0.12	0.08	0.08
0.75	1200	0.22	0.15	0.03	0.02	0.22	0.24	0.19	0.23	0.57	0.21	0.04	0.04	0.11	0.12	0.08	0.08
0.81	1300	0.21	0.14	0.03	0.02	0.2	0.22	0.19	0.23	0.53	0.19	0.04	0.04	0.11	0.11	0.08	0.08
0.87	1400	0.19	0.13	0.03	0.02	0.18	0.2	0.19	0.23	0.5	0.18	0.04	0.04	0.1	0.11	0.08	0.08
0.93	1500	0.19	0.13	0.03	0.02	0.18	0.2	0.19	0.23	0.5	0.18	0.04	0.04	0.1	0.11	0.08	0.08
0.99	1600	0.18	0.12	0.03	0.02	0.16	0.18	0.19	0.23	0.46	0.17	0.04	0.04	0.09	0.1	0.08	0.08
1.06	1700	0.11	0.06	0.03	0.02	0.06	0.07	0.19	0.23	0.25	0.08	0.04	0.04	0.05	0.06	0.08	0.08
1.12	1800	0.07	0.04	0.03	0.02	0.04	0.04	0.19	0.23	0.17	0.05	0.04	0.04	0.03	0.04	0.08	0.08

RCOL2_02.03.02-2

Table 2.3-328 (Sheet 2 of 3)
~~Annual~~ Chlorides Deposition

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km^2-month)

~~(mi)~~	~~(m)~~	~~S~~	~~SSW~~	~~SW~~	~~WSW~~	~~W~~	~~WNW~~	~~NW~~	~~NNW~~	~~N~~	~~NNE~~	~~NE~~	~~ENE~~	~~E~~	~~ESE~~	~~SE~~	~~SSE~~
1.18	~~1900~~	~~0.06~~	~~0.03~~	~~0.03~~	~~0.02~~	~~0.03~~	~~0.04~~	~~0.19~~	~~0.23~~	~~0.15~~	~~0.04~~	~~0.04~~	~~0.04~~	~~0.02~~	~~0.03~~	~~0.08~~	0.08
1.24	~~2000~~	~~0.05~~	~~0.03~~	~~0.03~~	~~0.02~~	~~0.03~~	~~0.03~~	~~0.19~~	~~0.23~~	~~0.12~~	~~0.03~~	~~0.04~~	~~0.04~~	~~0.02~~	~~0.03~~	~~0.08~~	0.08
1.3	~~2100~~	~~0.05~~	~~0.03~~	~~0.02~~	~~0.02~~	~~0.03~~	~~0.03~~	~~0.15~~	~~0.19~~	~~0.12~~	~~0.03~~	~~0.03~~	~~0.03~~	~~0.02~~	~~0.03~~	~~0.07~~	0.06
1.37	~~2200~~	~~0.05~~	~~0.03~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.03~~	~~0.14~~	~~0.18~~	~~0.12~~	~~0.03~~	~~0.03~~	~~0.03~~	~~0.02~~	~~0.02~~	~~0.07~~	0.06
1.43	~~2300~~	~~0.04~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.13~~	~~0.16~~	~~0.1~~	~~0.02~~	~~0.03~~	~~0.03~~	~~0.01~~	~~0.02~~	~~0.06~~	0.06
1.49	~~2400~~	~~0.03~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.1~~	~~0.12~~	~~0.08~~	~~0.02~~	~~0.03~~	~~0.03~~	~~0.01~~	~~0.01~~	~~0.04~~	0.05
1.55	~~2500~~	~~0.03~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.08~~	~~0.09~~	~~0.08~~	~~0.02~~	~~0.03~~	~~0.03~~	~~0.01~~	~~0.01~~	~~0.03~~	0.04
1.62	~~2600~~	~~0.03~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.05~~	~~0.06~~	~~0.08~~	~~0.02~~	~~0.03~~	~~0.03~~	~~0.01~~	~~0.01~~	~~0.02~~	0.03
1.68	~~2700~~	~~0.03~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.05~~	~~0.06~~	~~0.08~~	~~0.02~~	~~0.03~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.02~~	0.02
1.74	~~2800~~	~~0.03~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.05~~	~~0.06~~	~~0.08~~	~~0.02~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.02~~	0.02
1.8	~~2900~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.05~~	~~0.06~~	~~0.07~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.02~~	0.02
1.86	~~3000~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.04~~	~~0.05~~	~~0.07~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.02~~	0.02
1.93	~~3100~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.04~~	~~0.05~~	~~0.07~~	~~0.01~~	~~0.02~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.02~~	0.02
1.99	~~3200~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.04~~	~~0.07~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.02~~	0.02
2.05	~~3300~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.04~~	~~0.07~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	0.02
2.11	~~3400~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.04~~	~~0.07~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	0.02
2.17	~~3500~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.04~~	~~0.07~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	0.02
2.24	~~3600~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.04~~	~~0.06~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	0.02

RCOL2_02.03.02-2

Table 2.3-328 (Sheet 3 of 3)
~~Annual~~ Chlorides Deposition

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km^2-month)

~~(mi)~~	~~(m)~~	~~S~~	~~SSW~~	~~SW~~	~~WSW~~	~~W~~	~~WNW~~	~~NW~~	~~NNW~~	~~N~~	~~NNE~~	~~NE~~	~~ENE~~	~~E~~	~~ESE~~	~~SE~~	~~SSE~~
2.3	~~3700~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.04~~	~~0.06~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	0.02
2.36	~~3800~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.04~~	~~0.06~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	0.02
2.42	~~3900~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.03~~	~~0.04~~	~~0.06~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	0.02
2.49	~~4000~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.03~~	~~0.06~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	0.01
2.55	~~4100~~	~~0.02~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.02~~	~~0.03~~	~~0.06~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	~~0.01~~	0.01

~~Note: Values can be converted to lbm/100 acre-month by multiplying by 0.893.~~

Table 2.3-328 (Sheet 1 of 3) Chlorides Deposition

RCOL2_02.03.02-2

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.06	100	13.13	9.88	7.07	7.47	6.59	9.12	2.18	3.06	89	15.93	6.65	4.53	3.7	4.63	0.82	1.22
0.12	200	8.97	6.74	3.28	3.35	4.84	6.89	2.1	2.95	59.8	11.16	3.36	2.34	2.68	2.17	0.71	1.06
0.19	300	1.07	0.76	0.79	0.65	1.17	1.48	2.05	2.92	3.82	1.15	1.15	0.78	0.45	0.48	0.61	0.95
0.25	400	0.39	0.28	0.77	0.62	0.71	0.9	2.04	2.93	1.37	0.49	1.12	0.73	0.26	0.21	0.56	0.91
0.31	500	0.35	0.23	0.76	0.61	0.67	0.87	1.94	2.71	1.28	0.47	1.08	0.7	0.2	0.19	0.48	0.77
0.37	600	0.33	0.22	0.5	0.4	0.52	0.66	1.57	2.29	1.08	0.4	0.72	0.46	0.16	0.19	0.38	0.55
0.43	700	0.3	0.21	0.3	0.23	0.29	0.32	1.09	1.85	0.78	0.28	0.4	0.27	0.15	0.17	0.33	0.44
0.5	800	0.3	0.2	0.03	0.02	0.28	0.3	0.96	1.76	0.76	0.27	0.04	0.04	0.15	0.16	0.32	0.44
0.56	900	0.24	0.16	0.03	0.02	0.24	0.26	0.92	1.73	0.62	0.22	0.04	0.04	0.12	0.13	0.31	0.44
0.62	1000	0.23	0.15	0.03	0.02	0.23	0.25	0.79	1.48	0.58	0.21	0.04	0.04	0.12	0.12	0.27	0.38
0.68	1100	0.23	0.15	0.03	0.02	0.23	0.25	0.19	0.24	0.58	0.21	0.04	0.04	0.12	0.12	0.09	0.08
0.75	1200	0.23	0.15	0.03	0.02	0.22	0.25	0.19	0.24	0.58	0.21	0.04	0.04	0.12	0.12	0.09	0.08
0.81	1300	0.21	0.14	0.03	0.02	0.21	0.23	0.19	0.24	0.54	0.2	0.04	0.04	0.11	0.11	0.09	0.08
0.87	1400	0.2	0.14	0.03	0.02	0.19	0.21	0.19	0.24	0.51	0.19	0.04	0.04	0.1	0.11	0.09	0.08
0.93	1500	0.2	0.14	0.03	0.02	0.19	0.21	0.19	0.24	0.51	0.19	0.04	0.04	0.1	0.11	0.09	0.08
0.99	1600	0.19	0.12	0.03	0.02	0.17	0.18	0.19	0.24	0.47	0.17	0.04	0.04	0.1	0.1	0.09	0.08
1.06	1700	0.11	0.06	0.03	0.02	0.06	0.07	0.19	0.24	0.26	0.08	0.04	0.04	0.05	0.06	0.09	0.08
1.12	1800	0.07	0.04	0.03	0.02	0.04	0.05	0.19	0.24	0.17	0.05	0.04	0.04	0.03	0.04	0.09	0.08

Table 2.3-328 (Sheet 2 of 3) Chlorides Deposition

RCOL2_02.03.02-2

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km²-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
1.18	1900	0.06	0.03	0.03	0.02	0.03	0.04	0.19	0.24	0.15	0.04	0.04	0.04	0.02	0.03	0.09	0.08
1.24	2000	0.05	0.03	0.03	0.02	0.03	0.03	0.19	0.24	0.12	0.03	0.04	0.04	0.02	0.03	0.09	0.08
1.3	2100	0.05	0.03	0.02	0.02	0.03	0.03	0.15	0.19	0.12	0.03	0.03	0.03	0.02	0.03	0.07	0.07
1.37	2200	0.05	0.03	0.02	0.02	0.03	0.03	0.15	0.18	0.12	0.03	0.03	0.03	0.02	0.03	0.07	0.07
1.43	2300	0.04	0.02	0.02	0.02	0.02	0.02	0.13	0.17	0.1	0.02	0.03	0.03	0.01	0.02	0.06	0.06
1.49	2400	0.03	0.02	0.02	0.02	0.02	0.02	0.1	0.12	0.08	0.02	0.03	0.03	0.01	0.01	0.05	0.05
1.55	2500	0.03	0.02	0.02	0.02	0.02	0.02	0.08	0.1	0.08	0.02	0.03	0.03	0.01	0.01	0.04	0.04
1.62	2600	0.03	0.02	0.02	0.01	0.02	0.02	0.05	0.06	0.08	0.02	0.03	0.03	0.01	0.01	0.02	0.03
1.68	2700	0.03	0.02	0.02	0.01	0.02	0.02	0.05	0.06	0.08	0.02	0.03	0.02	0.01	0.01	0.02	0.03
1.74	2800	0.03	0.01	0.01	0.01	0.01	0.02	0.05	0.06	0.08	0.02	0.02	0.02	0.01	0.01	0.02	0.03
1.8	2900	0.02	0.01	0.01	0.01	0.01	0.01	0.05	0.06	0.07	0.01	0.02	0.02	0.01	0.01	0.02	0.03
1.86	3000	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.05	0.07	0.01	0.02	0.02	0.01	0.01	0.02	0.02
1.93	3100	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.05	0.07	0.01	0.02	0.02	0.01	0.01	0.02	0.02
1.99	3200	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.04	0.07	0.01	0.01	0.01	0.01	0.01	0.02	0.02
2.05	3300	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.07	0.01	0.01	0.01	0.01	0.01	0.02	0.02
2.11	3400	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.02
2.17	3500	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.02
2.24	3600	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.02

RCOL2_02.03.02-2

Table 2.3-328 (Sheet 3 of 3) Chlorides Deposition

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
2.3	3700	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.02
2.36	3800	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.02
2.42	3900	0.02	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.02
2.49	4000	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.01
2.55	4100	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Note: Values can be converted to lbm/100-acre-month by multiplying by 0.893.

RCOL2_02.03.02-2

Table 2.3-329 (Sheet 1 of 3)
~~Annual~~ Total Dissolved Solids Deposition

CP COL 2.3(1)

Directions are data to which the plume is headed.
kg/(km[2]-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.06	100	46.1	34.7	25.0	26.4	23.3	32.2	7.8	10.9	311.7	55.9	23.5	16.0	13.0	16.3	2.9	4.4
0.12	200	31.5	23.8	11.4	11.6	17.2	24.5	7.4	10.5	209.7	39.3	11.7	8.1	9.5	11.2	2.5	3.7
0.19	300	3.8	2.8	2.8	2.3	4.4	5.4	7.3	10.4	13.4	4.1	4.1	2.7	1.7	1.7	2.2	3.4
0.25	400	1.5	1.1	2.7	2.2	2.8	3.5	7.3	10.4	5.3	1.9	3.9	2.6	1.0	0.8	2.0	3.2
0.31	500	1.3	1.0	2.7	2.1	2.6	3.4	6.9	9.7	4.9	1.8	3.8	2.4	0.8	0.7	1.7	2.7
0.37	600	1.3	0.9	1.8	1.4	2.1	2.6	5.6	8.2	4.2	1.6	2.5	1.6	0.7	0.7	1.4	2.0
0.43	700	1.2	0.9	1.0	0.8	1.3	1.4	3.9	6.7	3.2	1.2	1.4	0.9	0.6	0.7	1.2	1.6
0.5	800	1.2	0.9	0.1	0.1	1.3	1.4	3.5	6.3	3.1	1.1	0.2	0.1	0.6	0.7	1.1	1.6
0.56	900	1.0	0.7	0.1	0.1	1.1	1.2	3.3	6.3	2.6	1.0	0.2	0.1	0.5	0.5	1.1	1.6
0.62	1000	0.9	0.7	0.1	0.1	1.1	1.2	2.4	4.4	2.5	0.9	0.2	0.1	0.5	0.5	0.8	1.1
0.68	1100	0.9	0.7	0.1	0.1	1.0	1.1	0.7	0.9	2.4	0.9	0.2	0.1	0.5	0.5	0.3	0.3
0.75	1200	0.7	0.4	0.1	0.1	0.6	0.6	0.7	0.9	1.9	0.6	0.2	0.1	0.3	0.4	0.3	0.3
0.81	1300	0.7	0.4	0.1	0.1	0.5	0.6	0.7	0.9	1.8	0.6	0.2	0.1	0.3	0.4	0.3	0.3
0.87	1400	0.6	0.4	0.1	0.1	0.4	0.5	0.7	0.9	1.7	0.5	0.2	0.1	0.3	0.3	0.3	0.3
0.93	1500	0.6	0.4	0.1	0.1	0.4	0.5	0.7	0.9	1.7	0.5	0.2	0.1	0.3	0.3	0.3	0.3
0.99	1600	0.6	0.3	0.1	0.1	0.4	0.5	0.7	0.9	1.5	0.5	0.2	0.1	0.3	0.3	0.3	0.3
1.06	1700	0.4	0.2	0.1	0.1	0.2	0.2	0.7	0.9	0.9	0.3	0.2	0.1	0.2	0.2	0.3	0.3
1.12	1800	0.3	0.1	0.1	0.1	0.2	0.2	0.7	0.9	0.7	0.2	0.2	0.1	0.1	0.1	0.3	0.3

RCOL2_02.03.02-2

Table 2.3-329 (Sheet 2 of 3)
~~Annual~~ Total Dissolved Solids Deposition

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
1.18	1900	0.2	0.1	0.1	0.1	0.1	0.2	0.7	0.9	0.6	0.2	0.2	0.1	0.1	0.1	0.3	0.3
1.24	2000	0.2	0.1	0.1	0.1	0.1	0.1	0.7	0.9	0.6	0.1	0.2	0.1	0.1	0.1	0.3	0.3
1.3	2100	0.2	0.1	0.1	0.1	0.1	0.1	0.6	0.7	0.6	0.1	0.1	0.1	0.1	0.1	0.3	0.3
1.37	2200	0.2	0.1	0.1	0.1	0.1	0.1	0.5	0.7	0.5	0.1	0.1	0.1	0.1	0.1	0.2	0.2
1.43	2300	0.2	0.1	0.1	0.1	0.1	0.1	0.6	0.6	0.5	0.1	0.1	0.1	0.1	0.1	0.2	0.2
1.49	2400	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.5	0.4	0.1	0.1	0.1	0	0.1	0.2	0.2
1.55	2500	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.4	0.4	0.1	0.1	0.1	0	0.1	0.1	0.2
1.62	2600	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.68	2700	0.1	0.1	0.1	0	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.74	2800	0.1	0.1	0.1	0	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.8	2900	0.1	0.1	0.1	0	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.86	3000	0.1	0.1	0.1	0	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.93	3100	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.99	3200	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
2.05	3300	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
2.11	3400	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
2.17	3500	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0	0.1	0.1
2.24	3600	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0	0.1	0.1

Table 2.3-329 (Sheet 3 of 3)
~~Annual~~ Total Dissolved Solids Deposition

RCOL2_02.03.02-2

CP COL 2.3(1)

Directions are data to which the plume is headed.
kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
2.3	3700	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1
2.36	3800	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1
2.42	3900	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1
2.49	4000	0.1	0.1	0	0	0.1	0.1	0.1	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1
2.55	4100	0.1	0.1	0	0	0.1	0.1	0.1	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1
2.61	4200	0.1	0.1	0	0	0.1	0.1	0.1	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1

~~Note: Values can be converted to lbm/100 acre-month by multiplying by 0.893.~~

RCOL2_02.03.02-2

Table 2.3-329 (Sheet 1 of 3)
Total Dissolved Solids Deposition

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.06	100	47.2	35.6	25.6	27.1	23.9	33.0	7.9	11.2	319.4	57.3	24.1	16.4	13.4	16.7	3.0	4.5
0.12	200	32.3	24.4	11.7	11.9	17.6	25.1	7.6	10.8	214.9	40.2	12.0	8.3	9.7	11.5	2.6	3.8
0.19	300	3.9	2.8	2.9	2.3	4.5	5.6	7.5	10.7	13.7	4.2	4.2	2.8	1.7	1.8	2.2	3.4
0.25	400	1.6	1.2	2.8	2.2	2.8	3.6	7.4	10.7	5.4	2.0	4.0	2.6	1.1	0.8	2.1	3.3
0.31	500	1.4	1.0	2.7	2.2	2.7	3.5	7.0	9.9	5.0	1.9	3.9	2.5	0.8	0.8	1.7	2.8
0.37	600	1.3	1.0	1.8	1.5	2.1	2.7	5.7	8.4	4.3	1.6	2.6	1.7	0.7	0.7	1.4	2.0
0.43	700	1.2	0.9	1.1	0.8	1.3	1.5	4.0	6.8	3.2	1.2	1.4	1.0	0.7	0.7	1.2	1.6
0.5	800	1.2	0.9	0.1	0.1	1.3	1.4	3.5	6.5	3.2	1.2	0.2	0.1	0.6	0.7	1.2	1.6
0.56	900	1.0	0.8	0.1	0.1	1.2	1.3	3.4	6.4	2.7	1.0	0.2	0.1	0.6	0.5	1.2	1.6
0.62	1000	1.0	0.7	0.1	0.1	1.1	1.2	2.4	4.5	2.5	0.9	0.2	0.1	0.5	0.5	0.8	1.2
0.68	1100	0.9	0.7	0.1	0.1	1.1	1.2	0.7	0.9	2.5	0.9	0.2	0.1	0.5	0.5	0.3	0.3
0.75	1200	0.7	0.4	0.1	0.1	0.6	0.7	0.7	0.9	1.9	0.7	0.2	0.1	0.4	0.4	0.3	0.3
0.81	1300	0.7	0.4	0.1	0.1	0.5	0.6	0.7	0.9	1.8	0.6	0.2	0.1	0.3	0.4	0.3	0.3
0.87	1400	0.6	0.4	0.1	0.1	0.5	0.5	0.7	0.9	1.7	0.6	0.2	0.1	0.3	0.4	0.3	0.3
0.93	1500	0.6	0.4	0.1	0.1	0.5	0.5	0.7	0.9	1.7	0.6	0.2	0.1	0.3	0.4	0.3	0.3
0.99	1600	0.6	0.4	0.1	0.1	0.5	0.5	0.7	0.9	1.7	0.6	0.2	0.1	0.3	0.4	0.3	0.3
1.06	1700	0.4	0.2	0.1	0.1	0.2	0.2	0.7	0.9	0.9	0.3	0.2	0.1	0.2	0.2	0.3	0.3
1.12	1800	0.3	0.2	0.1	0.1	0.2	0.2	0.7	0.9	0.7	0.2	0.2	0.1	0.1	0.2	0.3	0.3

RCOL2_02.03.02-2

Table 2.3-329 (Sheet 2 of 3)
Total Dissolved Solids Deposition

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
1.18	1900	0.2	0.1	0.1	0.1	0.1	0.2	0.7	0.9	0.7	0.2	0.2	0.1	0.1	0.1	0.3	0.3
1.24	2000	0.2	0.1	0.1	0.1	0.1	0.1	0.7	0.9	0.6	0.1	0.2	0.1	0.1	0.1	0.3	0.3
1.3	2100	0.2	0.1	0.1	0.1	0.1	0.1	0.6	0.8	0.6	0.1	0.1	0.1	0.1	0.1	0.3	0.3
1.37	2200	0.2	0.1	0.1	0.1	0.1	0.1	0.6	0.7	0.6	0.1	0.1	0.1	0.1	0.1	0.2	0.2
1.43	2300	0.2	0.1	0.1	0.1	0.1	0.1	0.5	0.6	0.5	0.1	0.1	0.1	0.1	0.1	0.2	0.2
1.49	2400	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.5	0.4	0.1	0.1	0.1	0	0.1	0.2	0.2
1.55	2500	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.4	0.4	0.1	0.1	0.1	0	0.1	0.1	0.2
1.62	2600	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.68	2700	0.1	0.1	0.1	0	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.74	2800	0.1	0.1	0.1	0	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.8	2900	0.1	0.1	0.1	0	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.86	3000	0.1	0.1	0.1	0	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.93	3100	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
1.99	3200	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
2.05	3300	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
2.11	3400	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0.1	0.1	0.1
2.17	3500	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0	0.1	0.1
2.24	3600	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0	0.1	0.1

RCOL2_02.03.02-2

Table 2.3-329 (Sheet 3 of 3)
Total Dissolved Solids Deposition

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
2.3	3700	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1
2.36	3800	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1
2.42	3900	0.1	0.1	0	0	0.1	0.1	0.2	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1
2.49	4000	0.1	0.1	0	0	0.1	0.1	0.1	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1
2.55	4100	0.1	0.1	0	0	0.1	0.1	0.1	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1
2.61	4200	0.1	0.1	0	0	0.1	0.1	0.1	0.2	0.4	0.1	0.1	0	0	0	0.1	0.1

Note: Values can be converted to lbm/100-acre-month by multiplying by 0.893.

Table 2.3-330 (Sheet 1 of 3)
~~Annual~~ Water Deposition

RCOL2_02.03.02-2

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.06	100	11000	8600	5600	6000	5700	7900	1800	2500	78000	14000	5300	3600	3200	4000	660	970
0.12	200	7800	5900	2600	2600	4200	6000	1700	2400	52000	9700	2600	1800	2300	2800	540	840
0.19	300	900	630	630	510	980	1200	1600	2400	3200	960	890	600	360	410	480	760
0.25	400	330	220	610	480	520	660	1600	2300	1100	380	850	560	180	180	450	720
0.31	500	280	180	590	470	480	620	1400	2100	960	350	820	540	150	160	370	590
0.37	600	270	180	390	310	380	480	1200	1800	830	310	550	360	130	150	310	450
0.43	700	250	170	230	180	230	260	890	1600	630	230	310	210	130	140	280	380
0.5	800	250	170	24	20	230	250	810	1500	620	220	33	32	120	140	270	380
0.56	900	200	130	24	20	190	210	790	1500	500	180	33	32	100	110	270	380
0.62	1000	190	120	24	20	180	200	570	1100	460	170	33	32	96	98	200	270
0.68	1100	180	120	24	20	180	200	160	200	450	170	33	32	94	97	74	69
0.75	1200	160	94	24	20	130	140	160	200	400	140	33	32	79	87	74	69
0.81	1300	150	85	24	20	110	120	160	200	370	130	33	32	72	81	74	69
0.87	1400	140	79	24	20	99	110	160	200	340	120	33	32	68	77	74	69
0.93	1500	140	79	24	20	99	110	160	200	340	120	33	32	68	77	74	69
0.99	1600	130	73	24	20	89	99	160	200	310	110	33	32	64	73	74	69
1.06	1700	78	41	24	20	45	49	160	200	170	56	33	32	34	44	74	69
1.12	1800	56	29	24	20	30	35	160	200	120	36	33	32	21	30	74	69

Table 2.3-330 (Sheet 2 of 3)
~~Annual~~ Water Deposition

RCOL2_02.03.02-2

CP COL 2.3(1)

Directions are data to which the plume is headed.
kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
1.18	1900	48	25	24	20	25	29	160	200	100	30	33	32	18	25	74	69
1.24	2000	41	20	24	20	21	23	160	200	85	23	33	32	15	20	74	69
1.3	2100	41	20	21	15	21	23	130	160	85	23	30	27	15	20	58	65
1.37	2200	38	19	20	15	19	21	120	140	79	21	30	26	13	19	54	51
1.43	2300	29	14	20	15	15	16	100	120	64	15	30	26	10	15	46	45
1.49	2400	21	10	20	15	12	13	81	96	49	11	30	26	7	10	36	37
1.55	2500	21	10	17	13	12	13	63	74	49	11	27	23	7	10	29	30
1.62	2600	21	10	16	12	12	13	37	44	49	11	25	22	7	10	17	20
1.68	2700	21	10	12	9	12	13	36	43	49	11	19	17	7	10	17	20
1.74	2800	17	9	12	8	9	11	36	43	42	9	18	17	5	8	17	20
1.8	2900	14	8	12	8	8	9	35	42	37	8	18	17	4	7	17	20
1.86	3000	14	8	9	7	8	9	33	39	37	8	15	14	4	7	16	19
1.93	3100	14	8	7	6	8	9	27	33	37	8	12	11	4	7	13	16
1.99	3200	14	8	6	5	8	9	26	31	37	8	10	10	4	7	13	15
2.05	3300	14	8	5	4	8	9	22	26	37	8	8	9	4	7	11	13
2.11	3400	13	7	5	4	8	9	19	23	36	8	8	9	4	6	9	12
2.17	3500	10	6	5	4	6	7	19	23	32	7	8	9	3	5	9	12
2.24	3600	10	6	5	4	6	7	19	23	32	7	8	9	3	5	9	12

RCOL2_02.03.02-2

Table 2.3-330 (Sheet 3 of 3)
Annual Water Deposition

CP COL 2.3(1)

Directions are data to which the plume is headed.
kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
2.3	3700	10	6	4	4	6	7	19	23	32	7	6	7	3	5	9	12
2.36	3800	10	6	4	4	6	7	19	23	32	7	6	7	3	5	9	12
2.42	3900	10	6	4	4	6	7	18	22	32	7	6	7	3	5	9	11
2.49	4000	10	6	4	4	6	7	15	19	32	7	6	7	3	5	7	9
2.55	4100	10	6	4	4	6	7	15	19	32	7	6	7	3	5	7	9
2.61	4200	10	6	4	4	6	7	15	19	32	7	6	7	3	5	7	9

Note: these can be converted to in/yr of increased precipitation by multiplying by 4.7×10^{-7}

Table 2.3-330 (Sheet 1 of 3) Water Deposition

RCOL2_02.03.02-2

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
0.06	100	12000	8800	5800	6100	5900	8100	1800	2600	80000	14000	5400	3700	3300	4100	680	1000
0.12	200	8000	6000	2600	2700	4300	6100	1700	2500	53000	10000	2700	1900	2400	2800	550	860
0.19	300	920	650	640	520	1000	1300	1700	2500	3200	980	910	610	370	420	490	770
0.25	400	330	220	620	500	530	670	1600	2400	1100	390	870	580	190	180	460	740
0.31	500	290	190	610	490	490	630	1500	2200	980	360	840	560	150	160	380	600
0.37	600	280	180	400	320	390	490	1200	1900	850	310	560	370	140	160	320	460
0.43	700	260	170	240	190	240	270	910	1600	650	230	320	220	130	150	280	390
0.5	800	250	170	25	20	230	250	830	1500	640	230	34	33	120	140	280	390
0.56	900	200	140	25	20	200	220	810	1500	510	190	34	33	100	110	270	390
0.62	1000	190	130	25	20	190	210	580	1100	470	170	34	33	98	100	200	280
0.68	1100	190	120	25	20	180	200	170	200	470	170	34	33	96	99	75	70
0.75	1200	170	97	25	20	130	150	170	200	410	140	34	33	81	89	75	70
0.81	1300	150	87	25	20	110	130	170	200	380	130	34	33	74	83	75	70
0.87	1400	140	81	25	20	100	110	170	200	350	120	34	33	70	79	75	70
0.93	1500	140	81	25	20	100	110	170	200	350	120	34	33	70	79	75	70
0.99	1600	130	74	25	20	91	100	170	200	320	110	34	33	66	75	75	70
1.06	1700	80	42	25	20	46	50	170	200	170	57	34	33	35	45	75	70
1.12	1800	58	30	25	20	31	35	170	200	120	37	34	33	22	31	75	70

Table 2.3-330 (Sheet 2 of 3) Water Deposition

RCOL2_02.03.02-2

CP COL 2.3(1)

Directions are data to which the plume is headed.

kg/(km²-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
1.18	1900	49	25	25	20	26	30	170	200	110	30	34	33	18	26	75	70
1.24	2000	42	21	25	20	21	24	170	200	87	24	34	33	15	21	75	70
1.3	2100	42	21	21	15	21	24	130	160	87	24	31	28	15	21	60	56
1.37	2200	39	13	21	15	19	21	120	150	81	21	30	27	13	20	55	52
1.43	2300	30	14	21	15	15	16	100	130	66	16	30	27	10	16	47	46
1.49	2400	21	11	21	15	12	13	83	98	50	12	30	27	7	11	37	38
1.55	2500	21	10	18	13	12	13	65	76	50	12	27	24	7	11	30	31
1.62	2600	21	11	16	12	12	13	38	45	50	12	26	22	7	11	18	21
1.68	2700	21	11	12	9	12	13	37	44	50	12	20	18	7	11	17	20
1.74	2800	17	9	12	8	10	11	37	44	43	10	19	17	5	8	17	20
1.8	2900	14	8	12	8	8	10	36	43	38	8	19	17	4	7	17	20
1.86	3000	14	8	9	7	8	10	34	40	38	8	15	14	4	7	17	19
1.93	3100	14	8	7	6	8	10	28	33	38	8	12	11	4	7	14	16
1.99	3200	14	8	6	5	8	10	27	32	38	8	10	10	4	7	13	15
2.05	3300	14	8	5	5	8	10	22	27	38	8	9	9	4	7	11	13
2.11	3400	14	8	5	5	8	9	19	24	37	8	9	9	4	6	10	12
2.17	3500	11	6	5	5	6	7	19	24	32	7	9	9	3	5	10	12
2.24	3600	11	6	5	5	6	7	19	24	32	7	9	9	3	5	10	12

Table 2.3-330 (Sheet 3 of 3)
Water Deposition

RCOL2_02.03.02-2

CP COL 2.3(1)

Directions are data to which the plume is headed.
kg/(km^2-month)

(mi)	(m)	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
2.3	3700	11	6	4	4	6	7	19	24	32	7	7	7	3	5	10	12
2.36	3800	11	6	4	4	6	7	19	24	32	7	7	7	3	5	10	12
2.42	3900	11	6	4	4	6	7	18	23	32	7	7	7	3	5	9	11
2.49	4000	11	6	4	4	6	7	15	19	32	7	7	7	3	5	7	9
2.55	4100	11	6	4	4	6	7	15	19	32	7	7	7	3	5	7	9
2.61	4200	11	6	4	4	6	7	15	19	32	7	7	7	3	5	7	9

Note: These can be converted to inches/yr of increased precipitation by multiplyinh by 4.7×10^{-7}

CP COL 2.3(1)

Table 2.3-332
CPNPP Meteorological System Accuracies

CTS-00703

Parameter	Recording Type	System Accuracy (ANSI/ANS-2.5-1984)[1]~~*~~	Actual System Accuracy[2]	Resolution	
					RCOL2_02.03.03-5
Wind Speed	Digital	±0.5 mph, WS<5mph ±10%, otherwise	±0.39mph, WS<25mph ±1.10%, otherwise	0.1 mph	RCOL2_02.03.03-5
	Paperless Digital	±0.75mph, WS<5mph ±15%, otherwise	±0.58mph, WS<25mph ±1.18%, otherwise		
Wind Direction	Digital	±5°	±3.4°	1°F	RCOL2_02.03.03-5
	Paperless Digital	±7.5°	±4.5°		
Temperature	Digital	±0.9°F	±0.6°F	0.1°F	RCOL2_02.03.03-5
	Paperless Digital	±0.9°F	±0.9°F		
Delta Temperature	Digital	±0.27°F	±0.17°F	0.01°F	RCOL2_02.03.03-5
	Paperless Digital	±0.27°F	±0.19°F		
Precipitation	Digital	Rain gauge with ±0.01 in resolution ±10% measured value for total accumulated catch greater than 0.2 in	Rain gauge with ±0.01 resolution ±0.011 in or ±1.1%	0.01 in	RCOL2_02.03.03-5
	Paperless Digital	Rain gauge with ±0.01 in resolution +10% measured value for total accumulated catch greater than 0.2 in	Rain gauge with ±0.01 resolution ±0.013 in or ±1.3%		

Notes:

1. Endorsed by Reg. Guide 1.23, Second Proposed Revision 1, ~~March 2007~~April 1986. CTS-00703

RCOL2_02.03.02-2

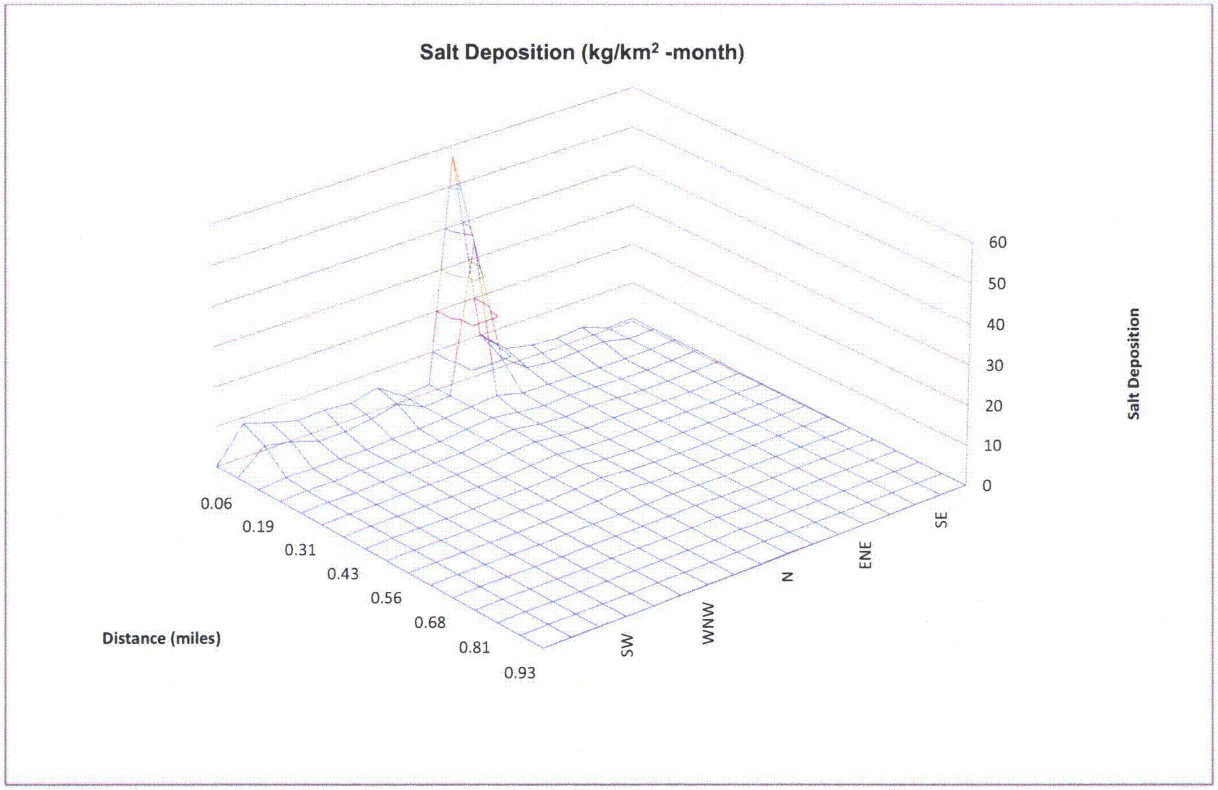


Figure 2.3-373 CPNPP Cooling Tower ~~Annual~~ Sodium Salt Deposit

RCOL2_02.03.02-2

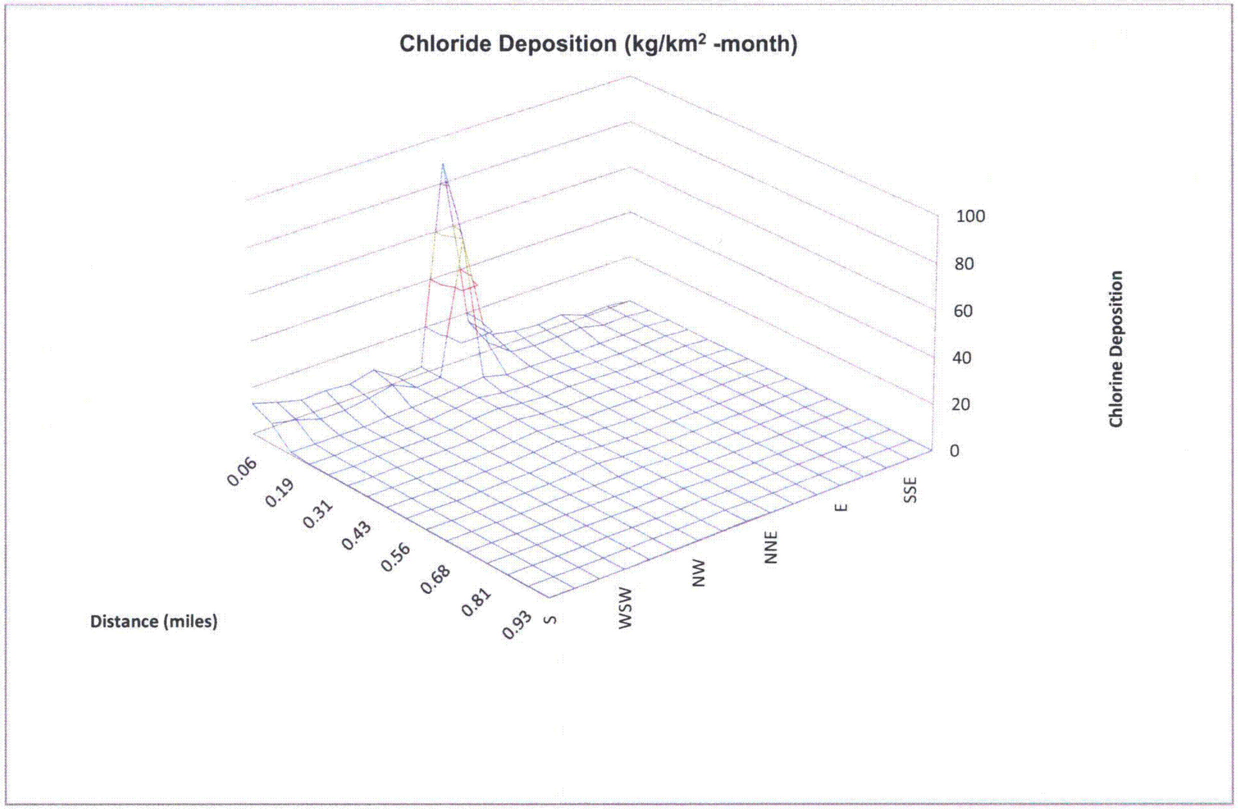
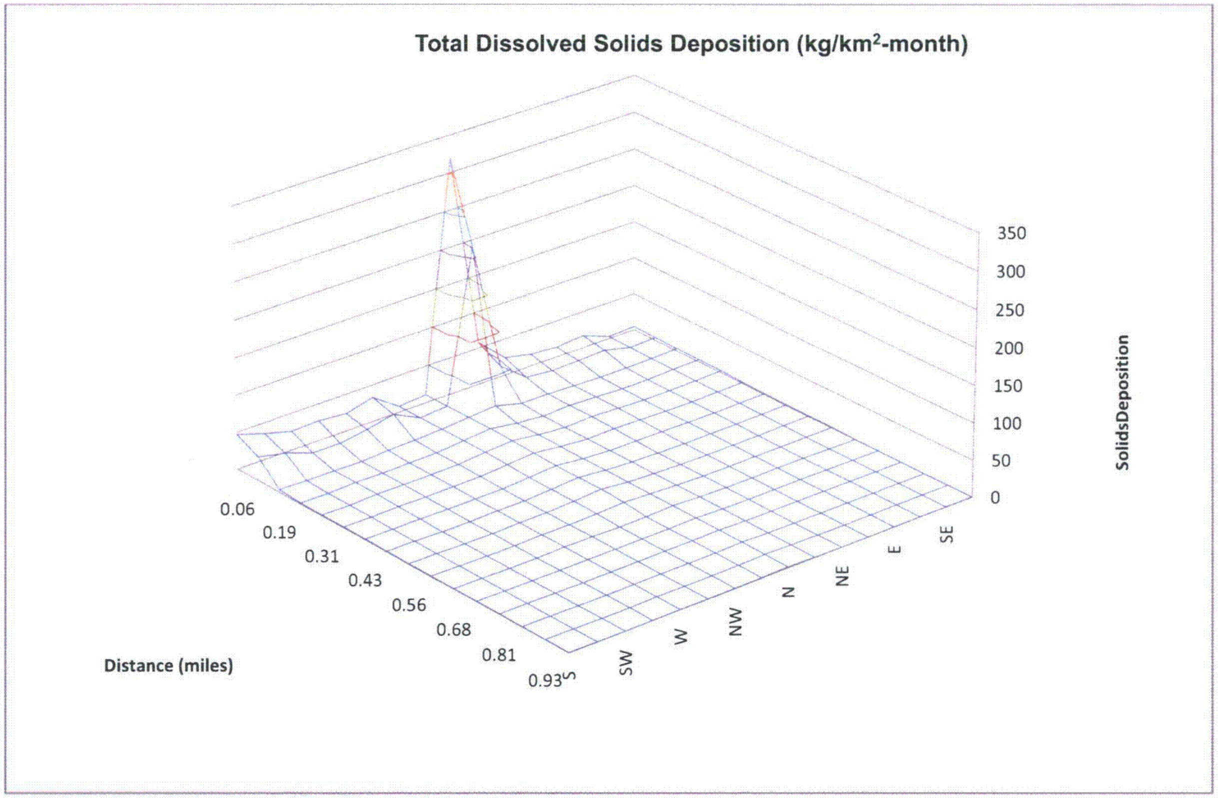


Figure 2.3-374 CPNPP Cooling Tower ~~Annual~~ Chloride Deposit

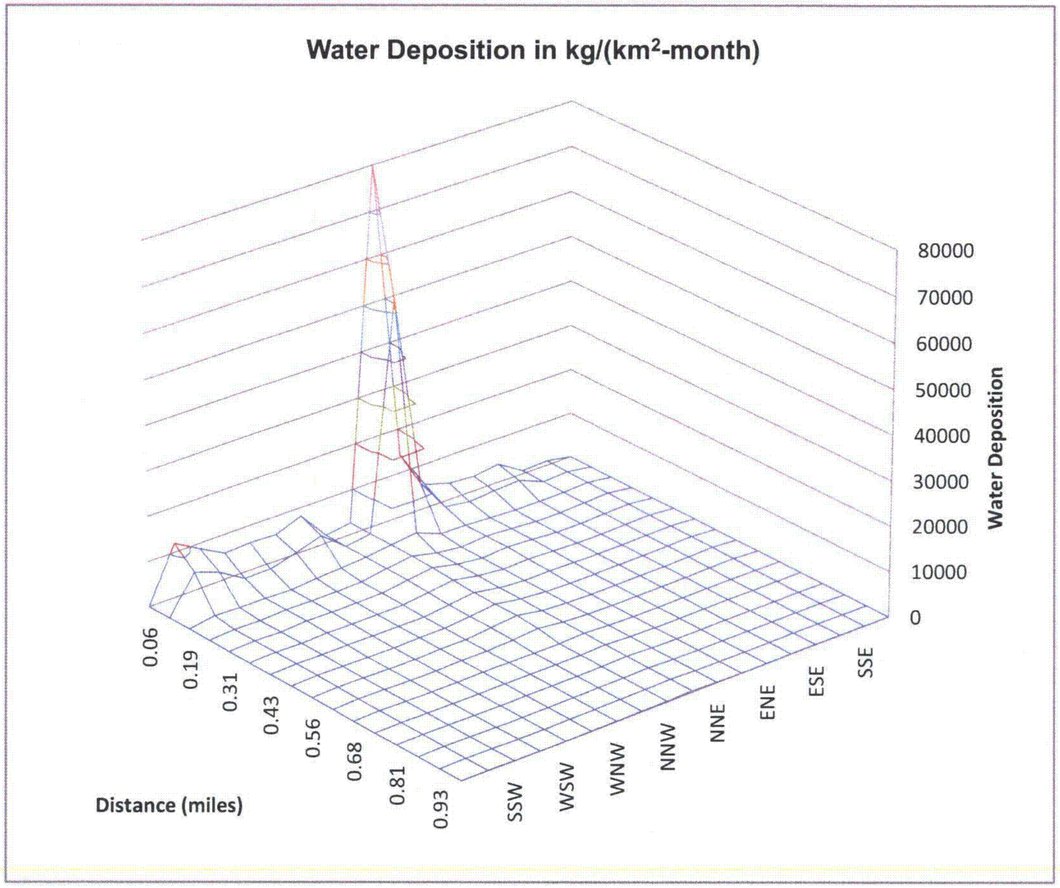
RCOL2_02.03.02-2



Note: Directions are directions that the plume is headed. Values can be converted to lbm/100-acre-month by multiplying by 0.893.

Figure 2.3-375 CPNPP Cooling Tower ~~Annual~~ Total Dissolved Solids Deposition

RCOL2_02.03.02-2



Notes: Directions are directions that the plume is headed. Deposition values converted to inches/yr of increased precipitation by multiplying by $4.7x10^{-7}$.

Figure 2.3-376 CPNPP Cooling Tower ~~Annual~~ Water Deposition in kg/(km2-month)

CP COL 3.2(4)
CP COL 3.2(5)

Table 3.2-201 (Sheet 1 of 3)

Classification of Site-Specific Mechanical and Fluid Systems, Components, and Equipment

System and Components	Equipment Class	Location	Quality Group	10 CFR 50 Appendix B (Reference 3.2-8)	Code and Standards[3]	Seismic Category	Notes
1. ESWS							
Basin blowdown line piping and valves from and excluding essential service water supply header piping up to the following valves: Ultimate heat sink (UHS) basin blowdown control valves ESW-~~HVC~~CV-2000, 2001, 2002, 2003 UHS basin blowdown control bypass valves ESW-VLV-544A, B, C, D	3	ultimate heat sink related structures (UHSRS)	C	YES	3	I	
Essential service water (ESW) supply line piping connected to the fire protection system in the UHSRS, and valves from and excluding ESW supply header piping up to the following isolation valves: ESW-VLV-551A, B, C, D	3	UHSRS	C	YES	3	I	
ESW supply line piping connected to the fire protection system in the reactor building (R/B), and valves from and excluding ESW supply header piping up to the following isolation valves: ESW-VLV-552A, B, C, D	3	R/B	C	YES	3	I	

RCOL2_03.02.01-2

5.2 INTEGRITY OF REACTOR COOLANT PRESSURE BOUNDARY

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

5.2.1.1 Compliance with 10 CFR 50, Section 50.55a RCOL2_05.02.01.01-1

Replace the third sentence of the second paragraph in DCD Subsection 5.2.1.1 with the following.

CPNPP Unit 3 and 4 use the same ASME Code editions and addenda specified in the referenced US-APWR DCD TAble 5.2.1-1 and DCD Subsection 3.9.10, Reference 3.9-13.

5.2.1.2 Compliance with Applicable Code Cases

Replace the third paragraph in DCD Subsection 5.2.1.2 with the following.

CP COL 5.2(1) CP COL 5.2(2) Comanche Peak Nuclear Power Plant (CPNPP) Units 3 and 4 uses no Code Cases listed in Regulatory Guide (RG) 1.84 beyond those listed in the referenced DCD. The use of Code Cases including those listed in ~~Regulatory Guide (~~RG~~)~~ 1.147 is identified in the inservice inspection (ISI) program (Subsection 5.2.4 and Section 6.6). The use of Code Cases including those listed in RG 1.192 is identified in the inservice testing (IST) program (Subsection 3.9.6 and 5.2.4). CTS-00675 CTS-00528

5.2.2.4 Equipment and Component Description

STD COL 5.2(10) Replace the last paragraph in DCD Subsection 5.2.2.4 with the following.

The actual throat area for the pressurizer safety valves and the containment spray / residual heat removal (CS/RHR) pump suction relief valves will be determined at the procurement stage.

The SGBDS also includes startup SG blowdown flash tank, startup blowdown heat exchanger, piping, valves and instrumentation used during plant startup and abnormal water chemistry conditions.

CP COL 10.4(2) Replace the thirteenth and fourteenth paragraph

in DCD Subsection 10.4.8.2.1 with the following.

During plant startup, the blowdown rate is up to approximately 3 % of maximum steaming rate (MSR) at rated power. The blowdown from each SG flows to the startup SG blowdown flash tank. The blowdown lines from SGs A and B and the blowdown lines from SGs C and D are joined together before flowing to the startup SG blowdown flash tank.

The blowdown water from each SG is depressurized by a throttle valve located downstream of the isolation valves located in the startup blowdown line. The throttle valves can be manually adjusted to control the blowdown rate.

The depressurized blowdown water flows to the startup SG blowdown flash tank, where water and flashing vapor are separated. The vapor is diverted to the condenser and the water flows to the startup SG blowdown heat exchanger for cooling. The CWS cools blowdown water in this heat exchanger before discharging to the existing waste water management Pond C. Pond C has $6.7x10^6$ gal storage capacity. A radiation monitor located downstream of the startup SG blowdown heat exchanger measures radioactive level in the blowdown water. When an abnormally high radiation level is detected, the blowdown lines are isolated and the blowdown water included in the SGBDS is transferred to waste holdup tank in the LWMS. The location and other technical details of the monitor (RMS-RE-110) is described in Subsection 11.5.2.5.3 and Table 11.5-201~~will be developed during the detail design phase~~. RCOL2_11.05-2

With abnormal water chemistry, the flow of blowdown rate up to approximately 3 % of MSR at rated power is directed to the existing waste water management pond C via the startup SG blowdown flash tank for processing. In this mode, flashed vapor from the startup SG blowdown flash tank flows to the deaerator.

During normal operation, blowdown rate is approximately 0.5 to 1 % of MSR at rated power. At the 1% of MSR at rated power blowdown rate, both cooling trains are used.

CP COL 10.4(2) Add the following text after last bullet of the seventeenth paragraph in DCD Subsection 10.4.8.2.1.

- High radiation signal from startup SG blowdown water radiation monitor
- High water level in the startup SG blowdown flash tank

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.

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.

11.2.1.6 Mobile or Temporary Equipment

CP COL 11.2(1) Add the following text at the end of the paragraph in DCD Subsection 11.2.1.6.

Process piping connections ~~are designed to~~ 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. As such the purchase or lease contracts for any temporary and mobile equipment will specify the applicable criteria. CTS-00839 RCOL2_11.02-1

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 RCOL2_11.02-6 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 liquid leakage and is routed to the waste holdup tanks, which are located on a floor below, for reprocessing. Provisions are included to mitigate contamination of the facility. Demineralized water piping is provided for decontaminating the facility. The floor in the area for the mobile system is sloped away from the truck bay door and the stairwell. The floor is sloped toward the plant west wall, where contamination from leaks from the mobile systems can enter the floor drain for processing by the LWMS. A level detector is provided within the drain collection header. RCOL2_11.02-6

11.2.2 System Description

CP COL 11.2(6)
CP COL 11.2(2)

Replace third paragraph in DCD Subsection 11.2.2 with the following.

Process flow diagrams with process equipment, flow data, tank batch capabilities, and key control instrumentation are provided to indicate process design, method of operation, and release monitoring for the site specific liquid waste management system (LWMS).

Figure 11.2-201, Sheets 1 through ~~9~~10 illustrate the piping and process equipment, instrumentation and controls for Comanche Peak Nuclear Power Plant (CPNPP) Units 3 and 4 LWMS. RCOL2_11.02-2

The Liquid Waste Management System (LWMS) boundary ends at the discharge isolation valve and the radiation monitor of the discharge header from the waste monitor tanks, which is considered the controlled discharge point. The evaporation pond is not part of the LWMS because the pond only contains treated effluent for discharge. Unlike the waste monitor tanks, which could contain off-specification effluent that may need to be re-processed; the evaporation pond is designed to manage the tritium concentration in the SCR by providing temporary holdup of treated effluent for discharge. RCOL2_11.02-8

The treated liquid effluents released from the CPNPP Units 3 and 4 and the evaporation pond are piped directly into the Unit 1 Waste Management System (WMS) flow receiver and head box, which includes the discharge flume. The effluents enter from the top of the receiver and head box and are above the liquid level in the box so that they flow freely into the box, from where the content flows to the Unit 1 WMS discharge flume, and by gravity to the Unit 1 Circulating Water System (CWS), via an existing Unit 1 pipeline connecting the WMS to the CWS. At this pipeline intersection, the Unit 3 and 4 treated effluent and the Unit 3 and 4 evaporation pond effluents are commingled with various Unit 1 and 2 waste effluent streams. This Unit 1 circulating water flow path then goes to the Unit 1 condenser water box outlet, where it joins the Unit 2 condenser water box outlet RCOL2_11.02-2 flow, the CPNPP Units 3 and 4 waste holdup tanks (WHTs) and waste monitor tanks (WMTs) have enough capacity to store more than a month of the daily waste input. The evaporation pond can also receive 100 percent of the CPNPP Units 3 and 4 liquid effluent on a temporary basis. ~~It is noted that before CPNPP Units 1 and 2 retire, an evaluation is needed to address the requirement of the circulating water as dilution water to CPNPP Units 3 and 4 effluents.~~ CTS-00730 CTS-00730 HPSV-02

~~CPNPP Units 3 and 4 discharge header and the evaporation pond discharge lines are connected to the circulating water return line for CPNPP Units 1 and 2 in two locations before the circulating water is discharged into Squaw Creek Reservoir. The locations of the connections provide sufficient distance for thorough mixing before the liquid is released into Squaw Creek Reservoir.~~The treated effluent release piping is non-safety and does not have any safety function. In addition, the Unit 1 flow receiver and head box, circulating water system and discharge box are not required to perform any safety function or important to safety functions.~~The exact locations of the connections into the circulating water discharge header is determined in the detail design phase with consideration of the impact of sharing structure, system, and components (SSCs) among the nuclear units.~~ RCOL2_11.02-2 CTS-00731

The evaporation pond is designed to provide sufficient surface area for natural evaporation based on the local area rainfall, ~~and~~ evaporation ~~rate~~, and half of the liquid effluent. The evaporation pond is sized to prevent overflow due to local maximum rainfall condition. Rainfall is the primary contributing source for dilution of the pond. The pond design includes a transfer pump and discharge line ~~and transfer pump. A discharge line connects into CPNPP Units 1 and 2 circulating water return line~~ to keep the pond from overflowing during periods of extreme weather conditions, and to forward the effluent to Squaw Creek Reservoir. The effluent is sampled before discharge and is monitored for radionuclide concentration by a radiation monitor which can turn off the pump, shut off the discharge valve and initiate an alarm signal to the Main Control Room and the Radwaste Control Room for operator actions. Doses from airborne particulates from the evaporation pond are described in Subsection 11.3.3. CTS-00732 RCOL2_11.02-8 CTS-00733 CTS-00902 HPSV-02 HPSV-02

The evaporation pond is designed with two layers of high density polyethylene (HDPE) with smooth surfaces and a drainage net in between for leak detection and collection. The bottom of the pond is sloped towards the leak drainage pit and a separate discharge pump pit. The leak drainage pit is a small pit underneath the two layers of HDPE, and leakage through the HDPE is caught and detected in this pit. The discharge pump pit is designed to faciliate pumping water out of the pond and is equipped with a discharge pump. An operating requirement is established to wash the pond and discharge the wash water to a flow receiver and head box for disposal each time the pond is drained. Based on the design evaluation, the pond does not need to be used continuously, because during normal operating conditions and anticipated operational occurrences, diversion of flow is not required. Diversion is required only when the tritium concentration in the SCR is approaching the set limit due to adverse meteorological conditions (e. g., drought condition leading to minimal spillover). The pond also has a berm to minimize RCOL2_11.02-3

Texas Commission of Environmental Quality (TCEQ), as applicable RCOL2_11.02-8

Texas Administrative Code (TAC), Title 30 on Environmental Quality, Part 1 Texas Commission on Environmental Quality (TCEQ), Chapter 321, Rule 321.255 on Requirements for Containment of Wastes and pond(s).

TCEQ 330, Municipal Solid Waste HPSV-02

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_11.02-8

Geosynthetic Research Institute Standard GM13 will be utilized for HDPE

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. HPSV-02

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.

The evaporation pond is constructed with a layer of clay with permeability less than 1E-7 centimeter per second to support the pond. The overall construction meets or exceeds the requirements for waste water pond stipulated by TCEQ. Some TCEQ requirements are as follows:

- In situ clay soils or placed and compacted meeting:

i. more than 30% passing a Number 200 mesh sieve HPSV-02

ii. liquid limit greater than 30%

iii. plasticity index greater than 15

iv. a minimum thickness of two feet

v. Permeability equal to or less than $1x10^{-7}$ centimeter per second

- Soil compaction will be 95% standard proctor density at optimum moisture content
- The pond is protected from inundation by a ten-year 2 hour rainfall event

The evaporation pond is equipped with a centrifugal pump to return the contents to the Squaw Creek Reservoir as tritium concentration in Squaw Creek Reservoir permits. The return piping leaving the evaporation pond is connected to the circulating water return line discharge box upstream of the discharge point. A radiation monitor is provided close to the pump discharge to monitor radiation level of the content, and provides a signal to automatically turn off the pump, shut off the discharge valve, and initiate a signal to alarm in the Main Control Room and the Radwaste Control Room for operator actions.

The piping for transporting the fluid from the discharge valve inside the Auxiliary Building to the pond, and the piping from the pond to the discharge point near Squaw Creek Reservoir, are High Density Polyethylene material. Leak collection and detection instrumentation are provided along the path of the pipe. Inspection ports are also provided to allow access for inspection of the integrity of the pipe. A back flow preventer is provided near the CPNPP Units 1 and 2 discharge boxes to prevent back flow from the circulating pipe.

Evaporation Pond Design Summary:

Volume: 2.1 million gallon net capacity RCOL2_11.02-8

Surface area: 1.5 acre

Depth: Total 6 feet deep (4 feet liquid depth with 2 feet freeboard) HPSV-02

Type: Open with no cover

Liner material: High Density Polyethylene, 60 mils, two layers

Permeability: $1x10^{-7}$cm/sec

The evaporation pond contains treated liquid effluents in trace amounts that meet discharge requirements specified in 10 CFR 20 Appendix B, Table 2, and has radionuclide contents below that of the boric acid tank contents. Hence, the contamination level due to the failure of the evaporation pond is bounded by the failure of the boric acid tanks. HPSV-02

The evaporation pond is designed to meet and operate in accordance with RG 4.21. Preventive maintenance, monitoring and routine surveillance programs are an important part to minimize the potential for contamination. Leakage detection design and its instruments, 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_11.02-8

Operating procedures will need to be developed to limit the use of the pond to receive treated effluent on as needed basis and the pond will need to be washed after each time the pond is emptied. Sampling procedures will also need to be established to confirm the tritium concentration in the SCR is below the pre-determined setpoint, and that the tritium concentration in the evaporation pond is acceptable for release.

11.2.4 Combined License Information

Replace the content of DCD Subsection 11.2.4 with the following.

CP COL 11.2(1) ***11.2(1)*** *The mobile and temporary liquid radwaste processing equipment*

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.

CP COL 11.2(5) ***11.2(5)*** *Site-specific cost benefit analysis*

This COL item is addressed in Subsection 11.2.1.5.

CP COL 11.2(6) ***11.2(6)*** *Piping and instrumentation diagrams*

This COL item is addressed in Subsection 11.2.2 *and* Figure 11.2-201.

11.2.5 References

CP COL 11.2(4)

Table 11.2-14R (Sheet 1 of 2)
Input Parameters for the LADTAP II Code

Parameter	Value
Midpoint of Plant Life(yr)	30
Circulating Water System discharge rate (gpm)	247,500
Water type selection	Freshwater
Reconcentration model index	1 (Complete mix)
Discharge rate to receiving water(ft^3/sec)	1.5(1) 45.4(2)
Total impoundment volume(ft^3)	6.3E+09
Shore-width factor	0.2 (Squaw Creek) 0.3(Whitney Reservoir)
Dilution factor -Squaw Creek(3)	1.0
Dilution factor - Brazos River(4)	822.7(1) 27.2(2)
Dilution factor - Whitney Reservoir(5)	1645.4 (1) 54.4 (2)
Transit time – Squaw Creek (hr)	7.3
Transit time – Brazos River (hr)	66
Transit time – Whitney Reservoir (hr)	77
Irrigation rate(Liter/m^2-month)	74.6
Animals considered for milk pathway	Cows and Goats
Fraction of animal feed not contaminated	0
Fraction of animal water not contaminated	0
Source terms	Table 11.2-10R
Source term multiplier	1
50 mile population	3,493,553
Total Production within 50 miles(kg/yr,L/yr)	Leafy Vegetable : 25,000 kg/yr Vegetable : 5,270,000 kg/yr Milk : 943,000 L/yr Meat : 281,000 kg/yr
Annual local harvest for sports harvest fishing(kg/yr)	324,375
Annual local harvest for commercial fishing harvest(kg/yr)	None
Annual local harvest for sports invertebrate harvest (kg/yr)	None
Annual local harvest for commercial invertebrate harvest (kg/yr)	None

CTS-00481

RCOL2_11.02-9

Note:
1. The conditions for maximum individual dose calculation.
2. The conditions for population dose calculation.
3. The water of Squaw Creek is considered following evaluations.
   - Dose from fish (Maximum individual dose)
   - Dose from shoreline (Maximum individual dose)
4. The water of Brazos River is considered following evaluation.
   - Dose from drinking water in Cleburne (Maximum individual dose and population dose)
   - Dose from irrigation water (Maximum individual dose and population dose)
   - Dose from sports fishing (Population dose)
5. The water of Whitney Reservoir is considered following evaluation.
   - Dose from drinking water in Whitney (Population dose)
   - Dose from shoreline, swimming and boating (Population dose)

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

11.4.8 Combined License Information

Replace the content of DCD Subsection 11.4.8 with the following.

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

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 COL 11.4(3) ***11.4(3)*** *Plan for the process control program describing the process and effluent monitoring and sampling program*

This COL item is addressed in Subsection 11.4.3.2.

CP COL 11.4(4) ***11.4(4)*** *Mobile/portable SWMS connections*

This COL item is addressed in Subsection 11.4.4.5.

CP COL 11.4(5) ***11.4(5)*** *Offsite laundry facility processing and/or a mobile compaction*

This COL item is addressed in Subsections 11.4.1.3 and 11.4.1.6.

CP COL 11.4(6) ***11.4(6)*** *Site-specific cost benefit analysis*

This COL item is addressed in Subsection 11.4.1.5.

CP COL 11.4(7) ***11.4(7)*** *Site-specific solid waste processing facility*

This COL item is addressed in Subsections 11.4.1.6 and 11.4.4.5.

CP COL 11.4(8) ***11.4(8)*** *Piping and instrumentation diagrams*

This COL item is addressed in Subsection 11.4.2.2.1 and Figure 11.4-201.

11.5 PROCESS EFFLUENT RADIATION MONITORING AND SAMPLING SYSTEMS

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

CP SUP 11.5(1) Add the following text to the end of the last paragraph in DCD Section 11.5.

Essential service water(ESW) pipe tunnel structure at elevation 793'-1" has been changed in site-specific layout. However, the location of process effluent radiation monitors in DCD Chapter 11 is not affected by the modification of ESW pipe tunnel structure, and Figures 11.5-2 can be used except for the structure of ESW pipe tunnel remains valid. The structure of ESW pipe tunnel is shown on Figure 1.2-2R.

Add the following Subsections after DCD Subsection 11.5.2.5.2 RCOL2_11.05-2

CP COL 11.5(1)

11.5.2.5.3 Startup Steam Generator Blowdown Heat Exchanger Downstream Radiation Monitor (RMS-RE-110)

The startup steam generator blowdown heat exchanger downstream radiation monitor is a gamma detector; the detection range and other details are summarized in Table 11.5-201, item number 201. A process schematic for this monitor is shown in Figure 11.5-201.

This monitor is located downstream of the startup steam generator blowdown heat exchanger in the Steam Generator Blowdown System (refer to Section 10.4.8.2.1). RMS-RE-110 measures the total gamma content in the discharge stream of the Startup Steam Generator Blowdown System. When an abnormally high radiation level is detected, the blowdown lines are isolated and the blowdown water included in the Steam Generator Blowdown System is transferred to a waste holdup tank in the LWMS. The monitor is not safety-related and does not perform any safety function.

CP COL 11.5(1)

11.5.2.5.4 Evaporation Pond Discharge Radiation Monitor (RMS-RE-111)

The evaporation pond discharge radiation monitor is a gamma detector; the detection range and other details are summarized in Table 11.5-202, item number 202. A process schematic for this monitor is shown in Figure 11.5-201.

This monitor is located downstream of the evaporation pond (refer to Section 11.2.3.4). RMS-RE-111 measures the total gamma content in the discharge stream of the evaporation pond. When an abnormally high radiation level is detected, the discharge line is isolated, the discharge pump is secured, and the

Main Control Room and Radwaste Control Room are alarmed automatically. The monitor is not safety-related and does not perform any safety function. RCOL2_11.05-2

11.5.2.6 Reliability and Quality Assurance

CP COL 11.5(4)
CP COL 11.5(5)

Replace the first sentence in the third paragraph in DCD Subsection 11.5.2.6 with the following.

The procedures for acquiring and evaluating samples of radioactive effluents, as well as procedures for inspection, calibration, and maintenance of the monitoring and sampling equipment are developed in accordance with RG 1.21 and RG 4.15. The procedures for the radioactive waste systems are developed in accordance with RG 1.33. The analytical procedures are developed in accordance with RG 1.21. These procedures, described in Subsection 13.5.2, are prepared and implemented under the quality assurance program referenced in Chapter 17. CTS-00766

11.5.2.7 Determination of Instrumentation Alarm Setpoints for Effluents

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CP COL 11.5(2)

Replace the second sentence in DCD Subsection 11.5.2.7 with the following.

The methodology for the calculation of the alarm setpoints is part of the ODCM described in Subsection 11.5.2.9.

11.5.2.8 Compliance with Effluent Release Requirements

CP COL 11.5(4)
CP COL 11.5(5)

Replace the last sentence in DCD Subsection 11.5.2.8 with the following.

Site-specific procedures on equipment inspection, calibration, maintenance, and regulated record keeping, which meet the requirements of 10 CFR 20.1301, 10 CFR 20.1302, and 10 CFR 50 Appendix I, are prepared and implemented under the quality assurance program referenced in Chapter 17.

11.5.2.9 Offsite Dose Calculation Manual

Replace the first sentence in DCD Subection 11.5.2.9 with the following.

CP COL 11.5(1) ***11.5(1)*** *Site-specific aspects*

This COL item is addressed in Subsections 11.5.2.5.3, 11.5.2.5.4 and 11.5.2.9. RCOL2_11.05-2

CP COL 11.5(2) ***11.5(2)*** *Offsite dose calculation manual*

This COL item is addressed in Subsection 11.5.2.7 and 11.5.2.9.

CP COL 11.5(3) ***11.5(3)*** *Radiological and environmental monitoring program*

This COL item is addressed in Subsection 11.5.2.10.

CP COL 11.5(4) ***11.5(4)*** *Inspection, decontamination, and replacement*

This COL item is addressed in Subsections 11.5.2.6 and 11.5.2.8.

CP COL 11.5(5) ***11.5(5)*** *Analytical procedures*

This COL item is addressed in Subsections 11.5.2.6 and 11.5.2.8.

CP COL 11.5(6) ***11.5(6)*** *The site-specific cost benefit analysis*

This COL item is addressed in Subsection 11.5.2.11.

11.5.6 References

Add the following reference after the last reference in DCD Subsection 11.5.6.

11.5-201 *Offsite Dose Calculation Manual for CPNPP Units 1 & 2*, Revision 26.

CP COL 11.5(1)

RCOL2_11.05-2

Table 11.5-201

Effluent Liquid Monitors (Site-Specific)

Item No.	Monitor Number	Service	Type	Range µCi/cm[3]	Calibration Isotopes	Check Source	Safety-Related	Control Function	Quantity	Schematic Number	GA Drawing Number
201	RMS-RE-110	1 for each unit	γ	1E-7 to 1E-2	Cs-137	Yes	No	Diverse	1 for each unit	11.5 – 1d	(Note 1)
202	RMS-RE-111	1	γ	1E-7 to 1E-2	Cs-137	Yes	No	Diverse	1	11.5 – 1d	(Note 2)

Note 1: The monitor is located adjacent to Startup Generator Blowdown Equipment shown in Figure 1.2-1R (Sheet 2 of 2)

Note 2: The monitor is located adjacent to radwaste evaporation pond shown in Figure 1.2-1R (Sheet 1of 2)

RCOL2_11.05-2

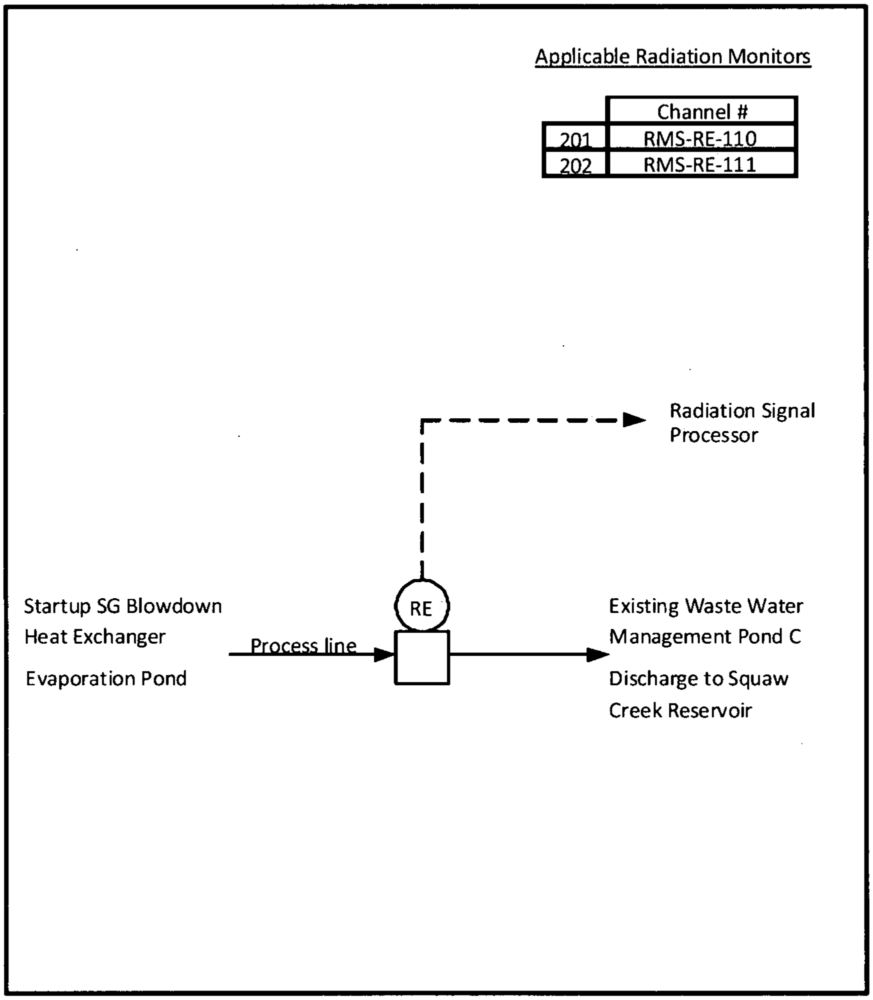

Figure11.5-201 **<u>Typical Process In-Line Radiation Monitor Schematic</u>**

The Plant Manager approves station administrative procedures. Security plan implementing procedures and emergency plan implementing procedures are approved in accordance with provisions of the security plan and the emergency plan, respectively. All procedures are reviewed by qualified personnel, and these reviews are documented. Quality-related procedures and instructions are reviewed by at least one individual other than the preparer and approved by an appropriate manager. This designation of the appropriate manager is stated in writing and approved by the Plant Manager.

Changes to approved quality-related procedures and instructions that clearly do not change the intent of the procedure and that require urgent implementation may be approved by two members of the nuclear operations staff, at least one of whom has been licensed as a SRO. The original approval authority shall approve these changes within 14 days of implementation.

Other changes to procedures and instructions are reviewed and approved in the same manner as a permanent revision to that document.

13.5.2 Operating and Maintenance Procedures

STD COL 13.5(3)
STD COL 13.5(4)
STD COL 13.5(5)
STD COL 13.5(6)

Replace the content of DCD Subsection ~~13.5.1~~13.5.2 with the following. RCOL_13.05.02.01-1

Development of Computer Based Procedures (CBPs) will be performed in accordance with the regulations and guidance provided in NUREG's 0700, 0711, and 0899, and ISG-04 Digital Instrumentation and Controls, dated September 28, 2007. In addition, CBPs with backup Paper Based Procedures (PBPs) will be developed in accordance with Section 18.8.

PBPs will be available in the event of a CBP failure. The content and presentation of procedure information in the PBPs and CBPs will be consistent. Smooth transition between the CBPs and PBPs (and visa versa) will be facilitated by consistency in formatting. This will also facilitate training in use of the procedures. Upon transfer to PBPs, the user will have ready access to currently open procedures, location in the procedures, completed and not completed steps, and currently monitored steps. (See Section 18.8).

13.5.2.1 Operating and Emergency Operating Procedures

STD COL 13.5(3)
STD COL 13.5(4)
STD COL 13.5(5)
STD COL 13.5(6)

Replace the content of DCD Subsection 13.5.2.1 with the following.

Operating procedures for all anticipated conditions affecting reactor safety are written prior to initial fuel loading. These procedures are grouped into the following classifications:

- System Operating Procedures - These procedures include instructions for energizing, filling, venting, draining, starting up, shutting down, changingmodes of operation, returning to service following testing or maintenance, and other instructions appropriate for operation of systems important to safety.

- General Plant Procedures - These procedures provide instructions for the integrated operation of the plant (e.g., startup, shutdown, power operation and load changing, process monitoring, fuel handling, maintenance, surveillance, and periodic testing).
- Abnormal Condition Procedures - These procedures specify operator actions for restoring an operating variable to its normal controlled value when it departs from its normal range, or restoring normal operating conditions following a transient. Such actions are invoked following an operator observation or an annunciator alarm indicating a condition that, if not corrected, could degenerate into a condition requiring action under an Emergency Operating Procedure.
- Emergency Operating Procedures (EOPs) – These procedures direct actions necessary for the operators to mitigate the consequences of transients and accidents that cause plant parameters to exceed reactor protection system or engineering safety feature actuation setpoints.

The Procedure Generation Package (PGP) will be developed and provided to the NRC at least three months prior to commencing formal operator training on the EOPs. The PGP will include a detailed description of the process for developing the ~~Generic~~Plant-Specific Technical Guidelines (P-STGs) from the US-APWR generic technical guidelines, a plant-specific writer's guide ~~Writer's Guide~~ that details the specific methods for preparing the EOPs based on the P-STGs, a description of the program for verfication and validation (V&V) of the EOPs and a brief description of the operator training program for the EOPs (~~Reference 13.5-201~~See NUREG-0737, Supplement 1). The PGP development process also includes the identification of safety significant deviations from the generic technical guidelines (including the identification of additional equipment beyond that identified in the generic technical guidelines) and engineering evaluations or analyses as necessary to support the adequacy of each deviation. In accordance with the human factors program summarized in Section 18.8, the PGP describes the process used to identify operator information and control requirements.

RCOL_13.05.02.01-3 RCOL_13.05.02.01-4 RCOL_13.05.02.01-5 RCOL_13.05.02.01-6 CTS-00486 RCOL_13.05.02.01-3 RCOL_13.05.02.01-4 RCOL_13.05.02.01-5 RCOL_13.05.02.01-6

The EOPs are symptom-based with clearly specified entry and exit conditions. Transitions between and within the normal operating, alarm response, and abnormal operating procedures and the EOPs are appropriately laid out, well defined, and easy to follow (See Section 18.8). The use of human factored, functionally oriented, EOPs will improve human reliability and the ability to mitigate the consequence of a broad range of initiating events and subsequent multiple failures or operator errors, without the need to diagnose specific events.

The general objectives of the EOP V&V process are to ensure the EOPs: RCOL_13.05.02.01-6

- correctly reflect the generic technical guidelines
- reflect the procedure writer's guide

- are useable RCOL_13.05.02.01-6
- correctly refer to controls, equipment and indications
- provide language and level of information consistent with minimum staff qualifications and composition
- provide a high level of assurance they will effectively guide the operator in mitigating transients and accidents.

- Alarm Response Procedures – These procedures guide operator actions for responding to plant alarms.

13.5.2.2 Maintenance and Other Operating Procedures

STD COL 13.5(7) Replace the content of DCD Subsection 13.5.2.2 with the following.

The following maintenance and other operating procedures are classified as General Plant Procedures:

- Plant Radiation Protection Procedures - Detailed written and approved procedures and instructions are used to ensure that occupational radiation exposure is maintained ALARA. It is the responsibility of the Radiation and Industrial Safety Manager to prepare and maintain the plant radiation protection procedures and instructions. Careful administrative control of the use of these procedures and instructions ensures that a sound health physics philosophy becomes an integral part of station operation and maintenance.
- Emergency Preparedness Procedures - The Emergency Planning Manager is responsible for preparing and maintaining procedures that implement the protective measures outlined in Emergency Plan.
- Instrument Calibration and Test Procedures - The Director, Maintenance is responsible for preparing procedures and instructions for proper control and periodic calibration of plant measuring and test equipment to maintain accuracy within necessary limits and to confirm adequacy of calibration frequency. Specific procedures are prepared for surveillance tests performed on safety-related equipment and instrumentation. These procedures have provisions for assuring measurement accuracies are adequate to keep safety parameters within operational and safety limits. A master surveillance schedule reflecting the status of all planned in-plant surveillance testing is maintained. Control measures exist to assure appropriate documentation, reporting, and evaluation of test results.
- Chemical/Radiochemical Control Procedures - The preparation of detailed, written, and approved chemical and radiochemical procedures and instructions are the responsibility of the Chemistry Manager. These procedures and instructions ensure primary and secondary side

PART 10 - APPENDIX A.5

PLANT-SPECIFIC PROCESS EFFLUENT RADIATION MONITORING AND SAMPLING (PERMS)

RCOL2_11.05-2

A.5.1 Inspections, Tests, Analysis, and Acceptance Criteria

Table A.5-1 specifies the inspections, tests, analyses, and associated acceptance criteria for the plant-specific PERMS.

Table A.5-1 Process Effluent Radiation Monitoring and Sampling (Perms) System Inspections, Tests, Analyses, and Acceptance Criteria

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The PERMS includes the radiation monitors as described in Table A.5-2.	1. An inspection of the as-built PERMS will be performed.	1. The as-built PERMS include the radiation monitors as described in Table A.5-2.

Table A.5-2 Process Effluent Radiation Monitoring and Sampling System Equipment Characteristics

PERMS Monitor Name	Detector Number	Safety Related	Seismic Category I	Class 1E/ Harsh
Startup Steam Generator Blowdown Heat Exchanger Downstream Radiation Monitor	RMS-RE-110	No	No	No/No
Evaporation Pond Discharge Radiation Monitor	RMS-RE-111	No	No	No/No

Attachment 16

Electronic Attachments (on CD)

RAI No. 3398 (CP RAI #49) Question 11.02-8
- Calculation 28831-LWM-25-05-500-001, Rev D
- Calculation 28831-LWM-25-05-500-002, Rev C

RAI No. 3398 (CP RAI #49) Question 11.02-9
- Calculation TXUT-001-ER-5.4-CALC-010, Rev. 0

RAI No. 3556 (CP RAI #45) Question 02.03.02-2
- Calculation TXUT-001-ER-5.3-CALC-005, Rev. 2 with SACTI Input Files

RAI No. 3557 (CP RAI #46) Question 02.03.03
- Filtered Meteorological Data 2001-2004 and 2006 (Native Files)