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April 13, 2011

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

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 3 AND 4
DOCKET NUMBERS 52-034 AND 52-035
SUPPLEMENTAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION NO. 4206 (SECTION 12.3-12.4)

Dear Sir:

Luminant Generation Company LLC (Luminant) submits herein a supplemental response to Request for Additional Information No. 4206 (CP RAI #135) for the Combined License Application for Comanche Peak Nuclear Power Plant Units 3 and 4. The supplemental response addresses design features incorporated to meet the requirements of 10 CFR 20.1406.

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

There are no commitments in this letter.

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

Executed on April 13, 2011.

Sincerely,

Luminant Generation Company LLC

Donald R. Woodlan for

Rafael Flores

Attachment: Supplemental Response to Request for Additional Information No. 4206 (CP RAI #135)

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NRO

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SUPPLEMENTAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Comanche Peak, Units 3 and 4

Luminant Generation Company LLC

Docket Nos. 52-034 and 52-035

RAI NO.: 4206 (CP RAI #135)

SRP SECTION: 12.03-12.04 - Radiation Protection Design Features

QUESTIONS for Health Physics Branch (CHPB)

DATE OF RAI ISSUE: 1/29/2010

QUESTION NO.: 12.3-12.4-11

10 CFR 20.1406, NUREG-0800, 'Standard Review Plan,' Section 12.03-12.04, Regulatory Guide (RG) 1.206, RG 4.21, RG 8.8, IEB 80-10

By letter dated September 30, 2009, the NRC staff issued RAI No. 3511 (CP RAI # 99). In Question 12.03-12.04-1 (13765), the NRC staff requested the applicant provide information regarding the design features and program elements needed to meet the requirements of 10 CFR 20.1406 for the systems structures and components for which the COL applicant has responsibility.

The applicant's response, dated November 11, 2009, noted several design features and program elements were provided to minimize contamination of the facility and the environment consistent with the guidance in Regulatory Guide 4.21 "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning" and Nuclear Energy Institute template NEI 08-08A "Generic FSAR Template Guidance for Life-Cycle Minimization of Contamination".

The NRC staff has reviewed the applicant's response and found the following examples of where question portions were not fully addressed by the applicant's response.

- The applicant was asked to describe the provisions for those portions cooling water systems, down stream of the Liquid Waste Processing System (LWPS) connection points. While the applicant noted that evaporation pond piping would use leakage detection and inspection ports, neither this response, nor the response to RAI No. 2747 (CP RAI # 29), Question 11.02-2, dated September 24, 2009, noted this provision in the COL FSAR changes. This response also does not address the piping down stream of where the discharge piping from the evaporation pond connects to the cooling water discharge piping. The "Liquid Radioactive Release Lessons Learned Task Force Final Report" describes industry-operating experience involving inadvertent releases from cooling water piping or components located down stream of LWPS connections.

- COL FSAR COL 10.4(2) notes that with abnormal chemistry, the Steam Generator Blowdown System (SGBDS) directs SGBDS water to Waste Water Management Pond C. However, this response does not describe the leakage prevention and leakage detection provisions for the piping to and from Waste Pond C and for the construction of Waste Pond C.

- The applicant was asked to describe leakage prevention and detection provisions for portions of the Steam and Condensate systems. The applicant's response only discussed the radiation monitoring detector installed on the condenser air ejector, and not prevention or early detection of releases from PWR secondary system piping. This radiation monitor is not capable of detecting tritium contamination. Electric Power Research Institute (EPRI) Technical Report (TR) 1008219 "PWR Primary-to-Secondary Leak Guidelines-Revision 3", notes that even without primary to secondary leakage, radioactive tritium will be present in PWR secondary side systems due to hydrogen diffusion through the Steam Generator u-tubes. Operating Experience regarding PWR secondary system underground piping leakage is discussed in Indian Point Nuclear Generating Unit 2 - NRC Integrated Inspection Report 05000247/2009002, dated May 14, 2009 (ML091340445), and May 24, 2004, Event Number 40771 for Surry Power Station.

- The applicant was asked to describe provisions for leakage prevention and detection from systems receiving water from the boron recycle system. The applicant's response addressed leakage prevention provisions for valves, but did not discuss the leakage prevention and detection methods for piping containing recycled fluid, especially those portions of piping that originated in one building, and terminated in a separate building, such as the piping to and from the Primary Makeup Water Storage Tanks.

- The applicant's response stated that heat exchangers separate radioactive fluid from non-radioactive fluid by tube walls. As noted in the USAPWR Design Control Document FSAR Tier 2 Section 9.1.3.2.1.3, the CCW/SFP heat exchanger is a plate type heat exchanger. Operating Experience from EPRI TR 1013470 "Plant Support Engineering: Guidance for Replacing Heat Exchangers at Nuclear Power Plants with Plate Heat Exchangers", notes that Plate Type heat exchanger gaskets are subject to leakage due to fouling of the gasket sealing surfaces during maintenance, and as a result of pressure spikes due to operational transients and events. The applicant did not discuss how the elements of the contamination minimization program will address operating experience showing the increased risk of leakage with Plate Type heat exchangers.

The examples provided are illustrative in nature, and do not portray an exhaustive review of the systems, structures and components, which should be considered during the 10 CFR 20.1406 review process.

Please revise and update the COL FSAR to describe in Comanche Peak FSAR Chapter 12, the design features, and related maintenance and inspection requirements, to prevent or mitigate contamination of the environment from COL applicant provided systems, structures and components, which may contain radioactive material. Alternately, describe and justify the specific approaches employed to prevent contamination of the environment and facility from COL Applicant provided Systems, Structures or Components containing radioactive material.

SUPPLEMENTAL INFORMATION:

1. NRC Feedback: Drawing CPNPP 12.3-201 shows a line from the CST to the hotwell, however, there is no discussion of the CST overflow line depicted on DCD Figure 9.2.6-1 Condensate Storage Facilities System Flow Diagram. Since overflowing of the CST is fairly common, clarification of where this line runs would be useful.

   <u>Response:</u>

   The overflow from the CST is directed to the CST sump inside the dike area. The sump is equipped with an instrument to detect fluid level and initiate alarms in the MCR for operator action to stop condensate transfer and to investigate the extent of condition. After analysis for level of contamination, the contents inside the dike area can be trucked to the wastewater system (at CPNPP

Units 3 and 4, this is Waste Management Pond C) for disposal or to the LWMS for treatment and release.

FSAR Subsection 9.2.6.2.4 has been revised to include this site-specific information. DCD Subsection 9.2.6.2.4, Figure 9.2.6-1, and Table 12.3-8 Sht 15 have been revised to include the overflow piping to the CST sump.

2. NRC Feedback: CPNPP Figure 12.3-201 shows the Auxiliary Boiler building, however, there is no discussion about the site-specific aspects of this building, or the site-provided piping and loads. Since this system can use the CST as a makeup water source, about the how potential contamination of loads is addressed. Also, since the Aux Boiler acts as a non-volatile contaminant concentrator, some discussion of the Aux Boiler blowdown lines may be warranted.

   Response:

   DCD Subsection 10.4.11.2.1 includes a discussion of the Auxiliary Boiler Building and its piping. All the piping to and from the Auxiliary Boiler Building is above ground. The boiler blowdown connection has been added to DCD Subsection 10.4.11.2.1 and Table 12.3-8 Sht 60. DCD Subsection 10.4.11.2.1 was added as part of the response to DCD RAI 578 - 4483 (ML102240274), which has been included in DCD Revision 3. It is included here for completeness.

   > The ASSS supplies steam for plant system heating when main steam is not available. The auxiliary boiler takes condensate makeup from the auxiliary steam drain tank inside the A/B, or from the condensate storage tank (CST) in the yard. The auxiliary boiler is located in the yard near the plant area. The condensate piping from the ASSS drain tank is a single-walled carbon steel pipe run above ground in pipe chases from the A/B to the T/B, and is then connected to double-walled welded carbon steel piping through the T/B wall penetration to the auxiliary boiler. Since this is not a high traffic area, this segment of pipe is run above ground and is slightly sloped so that any leakage is collected in the outer pipe and drained to the auxiliary boiler building. At the auxiliary boiler building end, a leak detection instrument is provided to monitor leak. A drain pipe is provided to direct any drains to the building sump. The steam piping is jacketed with insulation and heat protection. **The Auxiliary Boiler is designed with a blowdown connection from the boiler drum to the building sump. The boiler blowdown is drained directly into the sump for transfer into the Turbine Building sump. The T/B sump contents are then pumped to the Waste Holdup Tanks in the LWMS for processing.** This design is supplemented by operational programs which includes periodic hydrostatic or pressure testing of pipe segments, instrument calibration, and when required, visual inspection and maintenance of piping, trench and instrument integrity.
   >
   > A discussion of the radiological aspects of the system leakage is contained in DCD Section 11.1. Design and system features addressing RG 4.21 are captured in Section 12.3.1.3 of the DCD.

   The Auxiliary Boiler provides steam to the boric acid batching tank, boric acid evaporator, pre-heater, and non-safety related HVAC equipment. It also supplies steam to the turbine gland seal, deaerator seal, and deaerator heating when main steam is not available.

   The boric acid batching tank, the boric acid evaporator pre-heater and reboiler, and the air preheater for the HVAC equipment are located inside the Auxiliary Building. Floor drains are provided in the corresponding equipment areas. Any condensate leakage and/or contents is collected in the floor drain sump and is pumped to the waste holdup tank for processing. Turbine gland seal, deaerator seal, and deaerator heater are located in the Turbine Building. Any leakage is collected in the turbine building drain sump. If contamination in the sump content is detected to be above a pre-determined setpoint, the sump contents are pumped to the waste holdup tank in the LWMS for processing.

3. NRC Feedback: While the response discussed testing of buried piping in several locations, it is not clear from the response that the systems will contain the necessary isolation mechanism (valves, blank flanges, pipe access ports etc.) to allow hydrostatic or other non-destructive testing.

   Response:

   The effluent piping is divided into five segments as follows (refer to FSAR Figure 12.3-201):

   - The first segment starts from the waste monitoring tank pumps located inside the Auxiliary Building (A/B) and extends through wall of the A/B into a pipe chase through the Power Supply Building (PS/B) and the Turbine Building (T/B) to the outside wall of the T/B. This segment of pipe is made of carbon steel with isolation valves provided for testing. The waste monitoring tank pumps are part of the Liquid Waste Management System discussed in DCD Subsection 11.2.2.
   - The second segment extends from the outside wall of the T/B and runs through a concrete trench to the last manhole provided at the edge of the plant pavement (transition manhole). This segment of the pipe is either single-wall carbon steel or double-wall HDPE in a concrete trench. Isolation mechanisms (valves, blank flanges, pipe access ports etc.) are provided in the transition manhole to facilitate testing of this pipe segment.
   - The third segment extends from the transition manhole to the radwaste evaporation pond. This segment is double-wall HDPE pipe buried underground. Two intermediate manholes are provided because of the distance to the pond. Isolation mechanisms (valves, blank flanges, pipe access ports etc.) are provided in the manholes for the underground piping segments to facilitate testing of buried piping.
   - The fourth segment extends from the evaporation pond to the Unit 1 Flow Receiver and Head Box. This segment is also double-wall HDPE pipe buried underground. Two manholes are provided for this segment. Isolation mechanisms (valves, blank flanges, pipe access ports etc.) are provided in the manholes for the underground piping segments to facilitate testing of buried piping.
   - The fifth segment extends from the transition manhole to the Unit 1 Flow Receiver and Head Box, which is a relatively short distance. This segment is also double-wall HDPE pipe buried underground. Since isolation mechanisms are provided in the transition manhole, no additional manhole is required. A flange connection is provided at the piping exit at the Unit 1 Flow Receiver and Head Box for isolation to facilitate testing.

   The effluent piping from the startup SGBDS heat exchanger to waste management pond C is divided into four segments as follows:

   - The first segment starts from the SGBDS heat exchanger outlet and extends to the outside wall of the Turbine Building (T/B). This segment of pipe is made of double-wall carbon steel and runs above ground.
   - The second segment is single-wall carbon steel pipe extending through the wall of the T/B into pipe chases running through the T/B.
   - The third segment runs through the T/B wall via a penetration into the concrete trench to the transition manhole provided at the edge of the plant pavement. This segment is single-wall carbon steel with isolation mechanisms (valves, blank flanges, pipe access ports etc.) provided in the transition manhole to facilitate testing of this pipe segment.

- The fourth segment extends from the transition manhole to waste management pond C. This segment is double walled HDPE pipe buried underground. Because of the short distance, no additional manhole is needed. A flange connection and a test connection are added at the end of the HDPE pipe for testing purpose.

The single-wall stainless steel piping from the condenser hotwell to the condensate storage tank (CST) has isolation mechanisms (valves, blank flanges, pipe access ports etc.) at the CST and at the hotwell to facilitate testing.

4. NRC Feedback: The Startup SGBD system appears to be located outside of a building; however, there is no discussion of any provisions for containment of leakage from those components.

   Response:

   FSAR Subsection 10.4.8.2.1 and Table 12.3-201 have been updated to include the requested information.

5. NRC Feedback: Section 2 of the RAI response indicates that there is no buried piping, and refers to above ground piping. Section 4 also refers to above ground piping. These points do not appear to be clearly indicated in either the DCD markup or Figure 12.3-201.

   Response:

   The piping inside the Turbine Building, Power Source Building, Reactor Building, and Auxiliary Building, and transiting between these buildings, is routed in aboveground pipe chases because these buildings are close to each other. This information has been added to DCD Subsection 10.4.8.2.1 and to FSAR Figure 12.3-201.

   The piping to and from the Primary Makeup Water Tanks is single-wall stainless steel that runs aboveground and penetrates the building wall directly next to the tank. DCD Subsection 9.2.6.2.6 was revised as part of the response to DCD RAI 578 - 4483 (ML102240274) to add this information, which was included in DCD Revision 3.

Impact on R-COLA

See marked-up FSAR Revision 1 pages 9.2-17, 9.2-18, 10.4-8, 10.4-9, and 12.3-6 and revised Figure 12.3-201.

Impact on DCD

See attached marked-up DCD Revision 3 pages 9.2-40, 9.2-109, 10.4-66, 10.4-124, 12.3-66, and 12.3-111 taken from MHI Letter UAP-HF-11091 dated April 6, 2011. The right margin notation on pages 12.3-66 and 12.3-111 is incorrect and will be corrected to read "RCOL2_12.03-12.04-11 S02" in a future DCD tracking report.

The inspection and testing provisions described above are subject to programmatic requirements and procedural controls as described in FSAR Section 13.5. RCOL2_09.02.05-12 RCOL2_09.02.05-13

Manholes, handholes, inspection ports, ladder, and platforms are provided, as required, for periodic inspection of system components.

9.2.5.5 Instrumentation Requirements

CP COL 9.2(24) Replace the sentence in DCD Subsection 9.2.5.5 with the following.

Water level in each of the basins is controlled by level instrumentation that opens or closes the automatic valves in the makeup lines.

Two level transmitters and associated signal processors are provided for each basin to indicate water level in the basin and annunciate in the MCR for both the high and low water levels in the basin.

A water level signal at six inches below the normal water level causes the makeup water control valve to open. A signal at normal water level then causes the makeup control valve to close. A low level alarm annunciates in the MCR whenever the water level falls one foot below the normal water level.

During accident condition, level indications from the operating basins are used to alert the MCR operator to start the UHS transfer pump to transfer water from the idle basin to the operating basins.

Blowdown rate is controlled manually. The blowdown control valves close automatically upon receipt of a low water level signal or emergency core cooling system actuation signal. The valve is designed to fail in the close position. Failure of the valve to close is indicated in the MCR.

The conductivity cells are provided at the ESW pump discharge line and conductivity are indicated in the MCR.

Temperature elements are provided in each basin and temperatures are indicated in the MCR.

Local flow rate and pressure indicators located in each UHS transfer pump discharge header are used for pump performance testing.

The cooling tower fan is equipped with vibration sensors that alarm in the control room in the event of high vibration.

9.2.6.2.4 Condensate Storage Tank

RCOL2_12.03-12.04-11 S02

Replace the last sentence of the first paragraph in DCD Subsection 9.2.6.2.4 with the following.

After analysis for level of contamination, the content inside the dike area can be trucked to Waste Management Pond C for disposal; or to the LWMS for treatment and release. RCOL2_12.03-12.04-11 S02

9.2.7.2.1 Essential Chilled Water System

STD COL 9.2(27) Replace the last paragraph in DCD Subsection 9.2.7.2.1 with the following.

The operating and maintenance procedures regarding water hammer are included in system operating procedures in Subsection 13.5.2.1. A milestone schedule for implementation of the procedures is also included in Subsection 13.5.2.1.

9.2.10 Combined License Information

Replace the content of DCD Subsection 9.2.10 with the following.

CP COL9.2(1) ***9.2(1)*** *The evaluation of ESWP at the lowest probable water level of the UHS and the recovery procedures when UHS approaches low water level*

This COL item is addressed in Subsection 9.2.1.3.

CP COL 9.2(2) ***9.2(2)*** *The protection against adverse environmental, operating and accident condition that can occur such as freezing, thermal over pressurization*

This COL item is addressed in Subsection 9.2.1.3.

CP COL 9.2(3) ***9.2(3)*** *Source and location of the UHS*

This COL item is addressed in Subsection 9.2.5.2.

CP COL 9.2(4) ***9.2(4)*** *The location and design of the ESW intake structure*

This COL item is addressed in Subsection 9.2.5.2.

CP COL 9.2(5) ***9.2(5)*** *The location and the design of the discharge structure*

This COL item is addressed in Subsection 9.2.5.2.

CP COL 9.2(6)
STD COL 9.2(6) ***9.2(6)*** *The ESWP design details – required total dynamic head, NPSH available, and the mode of cooling the pump motor.* RCOL2_09.02.01-4 CTS-01140

This COL item is addressed in Subsection 9.2.1.2.2, 9.2.1.2.2.1, ~~and~~ Table 9.2.1-1R, and 9.4.5.1.1.6.

CP COL 9.2(7)
STD COL 9.2(7) ***9.2(7)*** *The design of ESWS related with the site specific UHS* CTS-01140

This COL item is addressed in Subsections 9.2.1.2.1, 9.2.1.3~~, 9.2.1.5.4~~ and Figure 9.2.1-1R. RCOL2_09.02.01-4

Tanks (CST). This portion of the piping is in the same concrete trench as the condensate transfer piping to the CST. The concrete trench is sloped and has an epoxy coating to facilitate drainage. This design eliminates liquid accumulation in the trench and thus minimizes unintended release. Using single-wall carbon steel pipe in the trench facilitates additional radial cooling of the fluid and enables the use of High Density Polyethylene (HDPE) piping for underground burial; RCOL2_12.03-12.04-11

5. From the transition manhole, the discharge piping is connected to a buried double-walled HDPE piping to an existing waste water management Pond C for discharge. A transition manhole is constructed near the plant pavement boundary. HDPE pipe has the property of good corrosion resistance in the soil environment;

6. The trench and the double-walled HDPE piping are both sloped towards the nearby manhole so that leakage can be collected at the manholes. This approach also facilitates the determination of the segment of pipe that is leaking. Analysis of samples of the liquid collected in the manholes can also differentiate whether the leakage is rain water, groundwater or condensate.

Additional manholes are provided for testing and inspection for the buried piping. Each manhole is equipped with drain collection basins and leak detection instruments. This design approach minimizes unintended releases and provides accessibility to facilitate periodic hydrostatic or pressure testing and visual inspection to maintain pipe integrity. This design feature is in compliance with the guidance of RG 4.21, provided in Subsection 12.3.1.3.1. 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.

The startup SGBDS is housed in a separate structure located outside the T/B consisting of a concrete foundation and pre-fabricated walls around the startup SGBD equipment. The surface of the startup SGBD housing foundation is slightly sloped to facilitate drainage to a pit with leak detection capabilities and to avoid unintended release to the environment. The concrete foundation, the walls, and the pit are coated with epoxy to facilitate decontamination. Leakage collected in RCOL2_12.03-12.04-11 S02 the drainage pit is pumped back to the T/B sumps for collection and analysis. The T/B sump contents are pumped to the LWMS if a significant level of radioactive contamination is present. RCOL2_12.03-12.04-11 S02

CPSTD COL 10.4(2) Add the following text after last bullet of the seventeenth paragraph in DCD Subsection 10.4.8.2.1. CTS-01140

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

10.4.8.2.2.4 Steam Generator Drain

CP COL 10.4(5) Replace the first paragraph in DCD Subsections 10.4.8.2.2.4 with the following.

Pressurized nitrogen is used to send secondary side water in the steam generators under pressure to the existing waste water management Pond C or the condenser. An approximate 20 psig pressure is maintained. This pressure facilitates draining steam generators without using a pump. If the SG drain temperature exceeds the operating temperature limit of the existing waste water management Pond C prior to discharging to this Pond C, the SG drain is cooled in the Startup SG blowdown Heat Exchanger.

10.4.8.2.3 Component Description

CPSTD COL 10.4(2) Replace the first sentence of first paragraph in DCD Subsections 10.4.8.2.3 with the following. CTS-01140

Component design parameters are provided in Table 10.4.8-1R.

CP COL 10.4(2) Add the following text after the last paragraph in DCD Subsection 10.4.8.2.3.

(9)Startup SG blowdown flash tank

The startup SG blowdown flash tank is located outdoors. During plant startup operation and abnormal secondary water chemistry conditions, up

CP COL 12.3(10)

RCOL2_12.03-12.04-11

Table 12.3-201

Regulatory Guide 4.21 Design Objectives and Applicable FSAR Subsection Information for Minimizing Contamination and Generation of Radioactive Waste (Sheet 2 of 5)

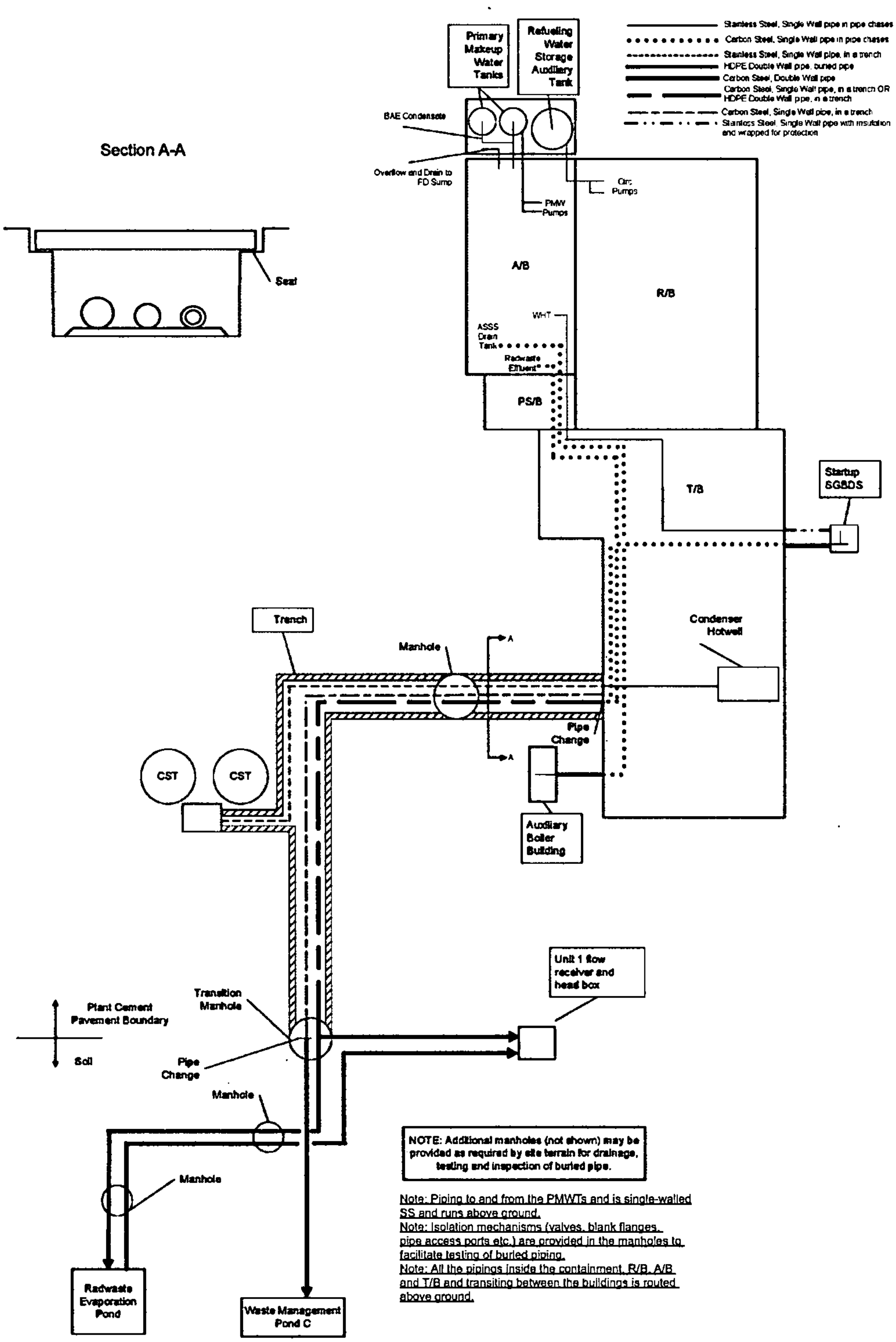
Steam Generator Blowdown System

**(Note: This table addresses the site-specific components and must be reviewed in parallel with the DCD Table 12.3-8 for standard components.
The "System Features" column consists of excerpts from the FSAR)**

Objective		System Features	FSAR Reference
2		5. From the transition manhole, the discharge piping is connected to a buried double-walled HDPE piping to an existing waste water management Pond C for discharge. A transition manhole is constructed near the plant pavement boundary. HDPE pipe has the property of good corrosion resistance in the soil environment; 6. The trench and the double-walled HDPE piping are both sloped towards the nearby manhole so that leakage can be collected at the manholes. This approach also facilitates the determination of the segment of pipe that is leaking. Analysis of samples of the liquid collected in the manholes can also differentiate whether the leakage is rain water, groundwater or condensate. Additional manholes are provided for testing and inspection for the buried piping. Each manhole is equipped with drain collection basins and leak detection instruments. This design approach minimizes unintended releases and provides accessibility to facilitate periodic hydrostatic or pressure testing and visual inspection to maintain pipe integrity. This design feature is in compliance with the guidance of RG 4.21. The startup SGBDS is housed in a separate structure located outside the T/B consisting of a concrete foundation and pre-fabricated walls around the startup SGBD equipment. The surface of the startup SGBD housing foundation is slightly sloped to facilitate drainage to a pit with leak detection capabilities and to avoid unintended release to the environment. The concrete foundation, the walls, and the pit are coated with epoxy to facilitate decontamination. Leakage collected in the drainage pit is pumped back to the T/B sumps for collection and analysis. The T/B sump contents are pumped to the LWMS if a significant level of radioactive contamination is present.	

RCOL2_12.03-12.04-11 S02

RCOL2_12.03-12.04-11



Note: Piping to and from the PMWTs and is single-walled SS and runs above ground.
Note: Isolation mechanisms (valves, blank flanges, pipe access ports etc.) are provided in the manholes to facilitate testing of buried piping.
Note: All the pipings inside the containment, R/B, A/B and T/B and transiting between the buildings is routed above ground.

RCOL2_12.03-12.04-11 S02

CP COL 12.3(10) **Figure 12.3-201 Yard Piping Routing and Building Penetration Schematic (Not to scale)** RCOL2_12.03-12.04-11

The primary makeup water system consists of two PMWTs, each of 140,000 gallon capacity, two 100% capacity primary makeup water pumps, and associated valves, piping, and instrumentation.

All system components meet design code requirements consistent with the component quality group and seismic design classification in provided in Section 3.2.

The DWST, CST, and the PMWTs are non-safety related and non-seismic (Section 3.2.). These tanks have no safety-related function and failure of their structural integrity would not impact the seismic category I SSCs or cause adverse system interaction. A dike is provided for the PMWTs and CST for mitigating the environmental effects of system leakage or storage tank failure.

The CSF system is shown schematically in Figures 9.2.6-1, 9.2.6-2 and 9.2.6-3.

9.2.6.2.1 Demineralized Water Storage Tank

The DWST is the normal source of demineralized water for supplying water CST, the secondary side chemical injection system, condensate polishing system and the emergency feedwater pits. It is also the normal source for supplying deaerated water to primary makeup water tanks and various primary system users, as shown in Figure 9.2.6-1. The DWST also supplies demineralized water to other users, as shown in Figure 9.2.6-2. Makeup to the CST is provided from the DWST.

Design parameters of the DWST are shown in Table 9.2.6-1.

9.2.6.2.2 Demineralized Water Transfer Pumps

Two 100% capacity demineralized water transfer pumps are provided. The demineralized water transfer pumps take suction from the DWST and discharge into a header that supplies demineralized water to various plant users, as shown in Figure 9.2.6-1. Design parameters of the demineralized water transfer pumps are shown in Table 9.2.6-1

9.2.6.2.3 Deaeration Package

The deaeration package reduces the oxygen concentration of the demineralized water.

9.2.6.2.4 Condensate Storage Tank

The CST is the normal source of water for make up to certain plant systems including the main condenser. The CST is a source of water for supply to various locations such as areas near equipment that need water for maintenance and drain tanks. Makeup to the CST is provided from the DWST. The CST overflow goes to a dike which is provided to control the release of chemicals and radioactive materials. This CST overflow is directed to the Condensate Storage Tank sump inside the dike area. The sump is equipped with a level instrument to detect fluid level and initiates alarms via representative alarm in the MCR for operator actions to stop condensate transfer and to investigate the extent of condition. After analysis for level of contamination, the content inside the dike area can be trucked to WWS for disposal; or to the LWMS for treatment and release.

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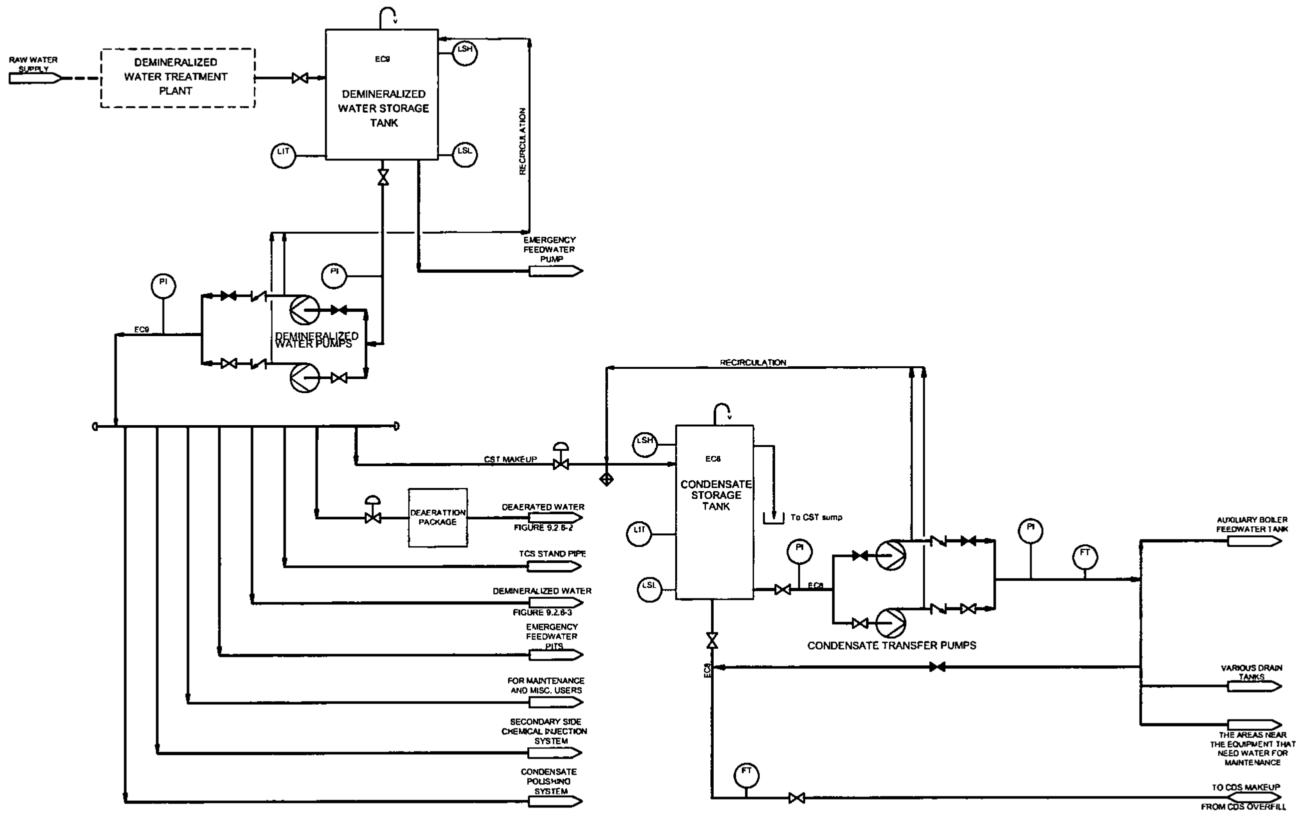

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Figure 9.2.6-1 Condensate Storage Facilities System Flow Diagram

- Divert from the blowdown demineralizers to [[WWS]] or the condenser if the blowdown water temperature exceeds the predetermined temperature to protect demineralizers resin.

10.4.8.2 System Description

10.4.8.2.1 General Description

The SGBDS flow diagrams are shown in Figures 10.4.8-1 and 10.4.8-2. Classification of equipment and components in the SGBDS is provided in Section 3.2.

The SGBDS equipment and piping are located in the containment, the reactor building, the auxiliary building and the turbine building (T/B). The piping inside these buildings and transiting between buildings is all routed above ground. RCOL2_12.03-12.04-11 S02

The SGBDS consists of a flash tank, regenerative heat exchangers, non-regenerative coolers, filters, demineralizers, piping, valves and instrumentation. The flash tank, regenerative heat exchangers and non-regenerative coolers are provided to cool the blowdown water with heat recovery, while the filters and demineralizers are provided to purify the blowdown water.

One blowdown line per steam generator is provided. The blowdown from each steam generator flows independently to the flash tank. The blowdown water from the flash tank flows via one common line to regenerative heat exchangers and non regenerative coolers. Blowdown is split into two trains ahead of the heat exchangers. Common discharge from the coolers flows to the filters and demineralizers, where the flow is split into two trains. The purified water from the demineralizers flows to the condenser via a common discharge line.

The blowdown line from each steam generator is provided with two flow paths, a line for purifying blowdown water used during normal plant operation and a line for discharging the blowdown water to the [[WWS]] or the condenser used during startup and abnormal water chemistry conditions.

The US-APWR SG's utilize a "peripheral" blowdown system arrangement. In this arrangement, blowdown holes are drilled from approximately 7 inches below the secondary surface of the tubesheet and intersect with the peripheral groove on the secondary face of the tubesheet. This arrangement is shown as Figure 10.4.8-3 and facilitates effective sludge removal from the tubesheet. The blowdown from each steam generator is depressurized by a throttle valve located downstream of the isolation valves. The throttle valves can be manually adjusted to control the blowdown rate.

The depressurized blowdown water flows to the flash tank, where water and flashing vapor are separated. The vapor is diverted to deaerator and the water is transferred to regenerative and non-regenerative heat exchangers for further cooling. When the pressure in the flash tank is low, the vapor is diverted to condenser. The condensate and feedwater system (CFS) provides the condensate in regenerative heat exchanger(s) to recover thermal energy.

Condensed water from these components is collected in the auxiliary steam drain tank and then, by using the auxiliary steam drain pump, is transferred to the condenser during plant normal operation, or to the auxiliary boiler during the period in which the main steam is not available.

- Boric acid (B/A) evaporator
- B/A batching tank
- Non safety-related HVAC equipment

The ASSS supplies steam for plant system heating when main steam is not available. The auxiliary boiler takes condensate makeup from the auxiliary steam drain tank inside the A/B, or from the condensate storage tank (CST) in the yard. The auxiliary boiler is located in the yard near the plant area. The condensate piping from the ASSS drain tank is a single-walled carbon steel pipe run above ground in pipe chases from A/B to the T/B, and is then connected to double-walled welded carbon steel piping through the T/B wall penetration to the auxiliary boiler. Since this is not a high traffic area, this segment of pipe is run above ground and is slightly sloped so that any leakage is collected in the outer pipe and drained to the auxiliary boiler building. At the auxiliary boiler building end, a leak detection instrument is provided to monitor leak. A drain pipe is provided to direct any drains to the building sump. The steam piping is jacketed with insulation and heat protection. The Auxiliary Boiler is designed with a blowdown connection from the boiler drum to the building sump. The boiler blowdown is drained directly into the sump for transfer into the Turbine Building sump. The T/B sump contents are then pumped to the Waste Holdup Tanks in the LWMS for processing. This design is supplemented by operational programs which includes periodic hydrostatic or pressure testing of pipe segments, instrument calibration, and when required, visual inspection and maintenance of piping, trench and instrument integrity. RCOL2_12.03-12.04-11 S02

A discussion of the radiological aspects of the system leakage is contained in DCD Section 11.1. Design and system features addressing RG 4.21 are captured in Section 12.3.1.3 of the DCD.

Monitoring the leakage from the primary side of the evaporator, the radiation monitor is attached to the downstream of the auxiliary steam drain pump. The high alarm of the monitor isolates the pump discharge line and steam supply line from main steam and trips the pump.

Group II components served by the system are shown below. These components are supplied auxiliary steam from the auxiliary boiler during plant startup, shutdown or regular inspections due to unavailable of the main steam.

- Turbine gland seal
- Deaerator seal
- Deaerator heating

Table 12.3-8 Regulatory Guide 4.21 Design Objectives and Applicable DCD Subsection Information for Minimizing Contamination and Generation of Radioactive Waste (Sheet 15 of 61)

Water Systems **(Note: The "System Features" column consists of excerpts/summary from the DCD)**

Condensate Storage Facility

Objective		System Features	DCD Reference
1	Minimize leaks and spills and provide containment in areas where such events may occur.	The CST overflow is directed to the Condensate Storage Tank sump inside the dike area. The sump is equipped with a level instrument to detect fluid level and initiates alarms via representative alarm in the MCR for operator actions to stop condensate transfer and to investigate the extent of condition. After analysis for level contamination, the content inside the dike area can be trucked to WWS for disposal; or two the LWMS for treatment and release.	9.2.6.2.4
		The transfer piping running between the CST and the hotwell is single-walled welded stainless steel piping in a coated trench with removable but sealed covers. This design is supplemented by periodic hydrostatic or pressure testing of pipe segments, instrument calibration, and when required, visual inspection and maintenance of piping, trench and instrument integrity, in compliance with the guidance of RG 4.21 and industry operating experience.	9.2.6.2.4
2	Provide for adequate leak detection capability to provide prompt detection of leakage for any structure, system, or component which has the potential for leakage.	Piping in a coated trench with removable but sealed covers, this design is supplemented by periodic hydrostatic or pressure testing of pipe segments, instrument calibration, and when required, visual inspection and maintenance of piping, trench and instrument integrity.	9.2.6.2.4

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Table 12.3-8 Regulatory Guide 4.21 Design Objectives and Applicable DCD Subsection Information for Minimizing Contamination and Generation of Radioactive Waste (Sheet 60 of 61)

Auxiliary Steam Supply System **(Note: The "System Features" column consists of excerpts/summary from the DCD)**

Objective		System Features	DCD Reference
1	Minimize leaks and spills and provide containment in areas where such events may occur.	The condensate piping from the ASSS drain tank is a single-walled carbon steel pipe run above ground in pipe chases from the A/B to the T/B, and is then connected to double-walled welded carbon steel piping through the T/B wall penetration to the auxiliary boiler. Since this is not a high traffic area, this segment of pipe is run above ground and is slightly sloped so that any leakage is collected in the outer pipe and drained to the auxiliary boiler building. At the auxiliary boiler building end, a leak detection instrument is provided to monitor leak. A drain pipe is provided to direct any drains to the building sump. The steam piping is jacketed with insulation and heat protection. The Auxiliary Boiler is designed with a blowdown connection from the boiler drum to the building sump. The boiler blowdown is drained directly into the sump for transfer into the Turbine Building sump. The T/B sump contents are them pumped to the Waste Holdup Tanks in the LWMS for processing. This design is supplemented by operational programs which includes periodic hydrostatic or pressure testing of pipe segments, instrument calibration, and when required, visual inspection and maintenance of piping, trench and instrument integrity.	10.4.11.2.1
2	Provide for adequate leak detection capability to provide prompt detection of leakage for any structure, system, or component which has the potential for leakage.	The auxiliary steam drain monitors the leakage of the radioactive materials from the boric acid evaporator to the condensed water of the ASSS.	10.4.11.1.2
		Monitoring the leakage from the primary side of the evaporator, the radiation monitor is attached to the downstream of the auxiliary steam drain pump. The high alarm of the monitor isolates the pump discharge line and steam supply line from main steam and trips the pump.	10.4.11.2.1
		Leakage of radioactive materials from primary side in the B/A evaporator.	10.4.11.2.3

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