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G3NO-2008-00020

November 24, 2008

U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Attention: Document Control Desk

DOCKET: No. 52-024

SUBJECT: Responses to NRC Requests for Additional Information, Letter No. 14 (GG3 COLA)

REFERENCE: NRC Letter to Entergy Nuclear, *Request for Additional Information Letter No. 14 Related to the SRP Section 09.02.01 for the Grand Gulf Combined License Application*, dated October 24, 2008 (ADAMS Accession No. ML082960046).

Dear Sir or Madam:

In the referenced letter, the NRC requested additional information on eight items to support the review of certain portions of the Grand Gulf Unit 3 Combined License Application (GG3 COLA). The responses to the following Requests for Additional Information (RAIs) in the referenced letter are provided in Attachments 1 through 8 to this letter as follows:

1. RAI Question 09.02.01-1, Cooling tower performance
2. RAI Question 09.02.01-2, Nonmetallic pipe impacts on SSCs
3. RAI Question 09.02.01-3, Material specifications for PSWS
4. RAI Question 09.02.01-4, Long-term corrosion preclusions
5. RAI Question 09.02.01-5, Plant-specific information vs. standard plant design information
6. RAI Question 09.02.01-6, Cooling tower design attributes
7. RAI Question 09.02.01-7, Modes of power operation
8. RAI Question 09.02.01-8, Design capability of the PSWS

D088
NRO

Should you have any questions, please contact me or Mr. Tom Williamson of my staff. Mr. Williamson may be reached as follows:

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This letter contains commitments as identified in Attachment 9.

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

Executed on November 24, 2008.

Sincerely,

WKH/ghd

Attachment(s):
1. Response to RAI Question No. 09.02.01-1
2. Response to RAI Question No. 09.02.01-2
3. Response to RAI Question No. 09.02.01-3
4. Response to RAI Question No. 09.02.01-4
5. Response to RAI Question No. 09.02.01-5
6. Response to RAI Question No. 09.02.01-6
7. Response to RAI Question No. 09.02.01-7
8. Response to RAI Question No. 09.02.01-8
9. Regulatory Commitments

cc (email unless otherwise specified):

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ATTACHMENT 1

G3NO-2008-00020

RESPONSE TO NRC RAI LETTER NO. 14

RAI QUESTION NO. 09.02.01-1

RAI QUESTION NO. 09.02.01-1

NRC RAI 09.02.01-1

Tier 1 of the ESBWR DCD, Section 4.1, specifies as a COL interface requirement that the plant-specific Plant Service Water System (PSWS) be capable of removing 2.02×10^7 MJ (1.92×10^{10} BTU) over a period of seven days without active makeup. The proposed Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) specify a cooling tower basin water inventory requirement as a way of demonstrating that the heat removal capability specified by the DCD has been satisfied. While water inventory is an important factor that must be addressed by the ITAAC, it does not demonstrate that the cooling towers are capable of dissipating the specified heat load. The capability of cooling towers to dissipate heat is dependent upon a number of other factors that should be taken into consideration, such as cooling tower design attributes; the capability to satisfy the PSWS pump minimum net positive suction head (NPSH) requirements for the most limiting cooling tower basin water level, temperature, and flow conditions; the maximum allowed PSWS water supply temperature; and the most limiting meteorological assumptions that pertain to the site for determining: (a) heat dissipation capability, and (b) water inventory requirements. Transient analyses that take these factors into consideration (including margin for expected degradation and operating flexibility) and confirmatory testing are usually necessary in order to adequately demonstrate that cooling tower performance satisfies the specified heat removal requirement. Also, the extent and basis for using the combined normal power heat sink (NPHS) and auxiliary heat sink (AHS) cooling tower basin inventories for Trains A and B were not described. Additional information is needed to address consideration of these factors such that the specified cooling tower performance capability is adequately demonstrated for both defense-in-depth and regulatory treatment of non-safety systems (RTNSS) functions, and the Final Safety Analysis Report (FSAR) and ITAAC need to be revised accordingly to describe the plant licensing basis in this regard.

Entergy Response

The PSWS design as described in the DCD contains, in part, conceptual design information (site-specific scope). DCD Figure 9.2-1 indicates the conceptual design information boundaries, which, as shown, consist of the cooling towers, basin, make-up, blowdown, and associated controls. The DCD scope includes the PSWS pumps, basin level instrumentation, heat exchangers, and associated piping and controls.

The RAI requests that Entergy provide additional information to address consideration of factors such that the specified cooling tower performance capability is adequately demonstrated for both defense-in-depth and RTNSS functions. The RAI also requests that the FSAR and ITAAC be revised accordingly to describe the plant licensing basis in this regard.

The PSWS RTNSS function, as described in DCD Table 19A-2, is to support the Reactor Component Cooling Water System (RCCWS). Based on this function, the system is categorized as RTNSS Criterion C (PRA Mitigating Systems). (This RTNSS criterion was changed in DCD Revision 5 from Criterion B2 to C.) As described in DCD Section 19A.8.3, systems that meet Criterion C must incorporate the defense-in-depth principles of redundancy

and physical separation to ensure adequate reliability and availability. The PSWS heat rejection facilities provide redundancy and physical separation, as shown in FSAR Figure 9.2-204 (see Attachment 7, "Response to RAI Question 09.02.01-7," to this letter) by providing two 100% trains of cooling tower fans. Entergy agrees that an ITAAC verifying functional arrangement and functionality of the PSWS cooling tower and basin is needed to demonstrate the defense-in-depth required by the DCD.

The interface requirements specified by the DCD for the PSWS heat sink are necessary to support the post-72 hour cooling function of PSWS. PSWS is required to remove 2.02×10^7 MJ (1.92×10^{10} BTU) over a period of 7 days without active makeup to the basin. This heat duty is based on operation of the diesel generators, nuclear island chillers, and the decay heat from the reactor core and spent fuel pool continuing through a 7-day period. [Compared to a normal operational load of 79.4 MW (2.71×10^8 Btu/hr), as specified in DCD Table 9.2-1, the RTNSS function represents a much smaller load on the tower.] The current site-specific ITAAC Part 10 Section 2.4.2 addresses the interface requirement to provide the volume of water (e.g., PSWS basin reserve storage capacity) necessary for PSWS to perform its RTNSS function, as defined in DCD Table 19A-2, without make-up for 7 days.

The PSWS cooling tower basin inventory calculation determines the water volume required to meet the interface requirement by determining the volume of water lost due to evaporation and cooling tower drift with no assumed make-up for 7 days. The simplified methodology used provides a conservative approach that provides a bounding value regardless of specific site conditions. The methodology is described below.

- Use the first law of thermodynamics to determine the cooling tower range:

  $Q = mC_p\Delta T$ rearranged to $\Delta T = Q / (mC_p * 7 \text{ days})$

  where:
  - Q = PSWS heat duty (over 7 days)
  - m = mass flow rate of PSWS flow (40,000 gpm)
  - C_p = specific heat of water
  - ΔT = cooling tower range

- Use the standard cooling tower equation obtained from the General Electric Water Purification Handbook, Chapter 31, "Open Recirculating Cooling Systems," General Electric Company.

  $E = F(\Delta T / ctc)$

  where:
  - E = evaporation
  - F = PSWS flow
  - ΔT = cooling tower range
  - ctc = cooling tower factor = 1000

  The evaporation rate amounts to 1% of the recirculation rate for every 10°F ΔT.

- Determine loss due to cooling tower drift using the standard cooling tower equation and drift correction factor provided in "Cooling Tower Fundamentals," The Marley Cooling Tower Company.

  $D = F * dc$

  where: D = drift
  F = PSWS flow
  dc = cooling tower drift correction factor = 0.0002

The volume calculated is 2.39×10^6 gallons. An additional 2×10^5 gallons is added to provide additional margin to ensure the volume specified for the cooling tower basin reserve storage capacity is bounding for any tower design.

The ITAAC acceptance criteria is written to define the cooling tower basin reserve storage capacity as the volume in the PSWS cooling tower basins (Trains A and B) above the pump minimum submergence water level and below the minimum normal operating level. The acceptance criteria ensure that this reserve volume is useable water. The volume for meeting this ITAAC does not credit any volume from the NPHS. Furthermore, as described in Attachment 7 of this letter (Response to RAI Question 09.02.01-7), NPHS is not used as the heat-rejecting medium for PSWS during normal plant operation. PSWS heat loads are rejected to AHS during plant operations, including shutdown.

The pump minimum submergence requirements and minimum normal operation level are determined as part of the detailed design process and meet the requirements of the Hydraulic Institute Standards. As discussed in the DCD Section 9.2.1.2, the design of the heat rejection facilities and PSWS pumps ensures that the pumps have sufficient available NPSH, or in this case minimum submergence, under worst case conditions.[1] As described in the response to DCD RAI 9.2-23, instrumentation is provided in the PSWS basin to facilitate indication of basin water level and annunciation for low basin water level in the Main Control Room.

Detailed design of the PSWS towers and basin is based on the design requirements specified in the DCD and FSAR. The tower and basin are designed to meet the safety and quality classification requirements specified in DCD Table 3.2-1. The normal operating heat load is provided in DCD Table 9.2-1 while the minimum heat load that the cooling towers must reject is specified in FSAR Table 9.2-201. The PSWS flow rate is specified in FSAR Table 9.2-201. The ambient wet-bulb temperature used in the detailed design is the site-specific 1% annual exceedance value for maximum non-coincident wet-bulb temperature specified in FSAR Table 2.0-201.

DCD Section 9.2.1.4 establishes that initial testing of the system includes performance testing of the heat rejection facilities and pumps for conformance with the design heat loads, water flows, and heat transfer capabilities. Additional testing details are incorporated by reference from DCD Sections 14.2.8.1.51 and 14.2.8.2.18.

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[1] Refer to the response to DCD RAI 9.2-23 S01, GEH letter MFN 08-473, ADAMS Accession No. ML081400759.

Additional ITAAC to verify PSWS cooling tower performance and capability are not required. As discussed in NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants*, (SRP) Section 14.3, Appendix A, Section IV, Subsection 4.A, and in DCD 14.3.2.1, ITAAC design descriptions address:

> "...the most safety-significant aspects of each of the systems of the design, and were derived from the detailed design information contained in Tier 2. The applicant should put the top-level design features and performance characteristics that were the most significant to safety in the Tier 1 design descriptions. The level of detail in Tier 1 is governed by a graded approach to the SSCs of the design, based on the safety significance of the functions they perform...This graded approach recognizes that although many aspects of the design are important to safety, the level of design detail in Tier 1 and verification of the key design features and performance characteristics should be commensurate with the significance of the safety functions to be performed."

DCD Tier 1, Section 2.12.7 addresses ITAAC for the portion of PSWS that is within the scope of the DCD. This ITAAC verifies functionality of PSWS but not system performance or capability (e.g., there are no ITAAC to verify RCCWS heat exchanger performance or PSWS flow requirements). In DCD RAI 14.3-326, the NRC requested that General Electric-Hitachi (GEH) justify why there are no design basis minimum flow requirements associated with PSWS and no ITAAC to verify such requirements. In response, GEH stated (this response was based on DCD Rev 4):

> "The safety significance of the Plant Service Water System (PSWS) functions were evaluated and determined to be RTNSS criterion B2 (refer to DCD Table 19A-2). The PSWS is not safety significant and is a support system that requires the same regulatory oversight as the systems that it supports. Therefore, the PSWS requires Low Regulatory Oversight similar to the RTNSS functions it supports. Support systems have diverse modes of operation that allow cross-ties. Individual component/system performance is not critical. Only a determination of system functionality, rather than system performance, is required."[2]

The NRC asked similar DCD questions regarding the ITAAC for RCCWS (DCD RAI 14.3-324) and the Chilled Water System (DCD RAI 14.3-325), both RTNSS systems. GEH responses to these questions were similar to the response to DCD RAI 14.3-326.

Therefore, consistent with guidance in SRP 14.3, the DCD ITAAC selection criteria in DCD Tier 2 Section 14.3, and the approach taken for other RTNSS ITAAC in the DCD, Entergy will include site-specific ITAAC in the COLA to address the functionality of the PSWS cooling tower. Cooling tower performance will be demonstrated through completion of PSWS initial test program testing described in DCD Section 14.2.8.1.51 (preoperational testing) and 14.2.8.2.18 (startup testing).

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[2] Refer to GEH Letter MFN 08-086 S2, dated February 22, 2008, ML080580331.

Proposed COLA Revision

FSAR Table 9.2-201 will be revised as indicated in the attached draft markup.

Part 10, ITAAC Section 2.4.2 will be revised as indicated in the attached draft markup to include additional ITAAC related to the functional arrangement and functionality of the PSWS cooling towers, and to revise the PSWS cooling tower basin inventory volume to 2.6×10^6 gallons.

To support the functional arrangement ITAAC, Part 10, Figure 2.4.2-201 will also be added.

Markup of Grand Gulf COLA

The following markup represents Entergy's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

GGNS CDI Delete "(NPHS or AHS)" from the parameter "Flow" in the "Plant Service Water System" section of DCD Table 9.2-1.

GGNS CDI Replace the "PSWS Cooling Towers and Basins" section of DCD Table 9.2-2 with the following.

TABLE 9.2-201
PSWS COMPONENT DESIGN CHARACTERISTICS

PSWS Mechanical-Draft Cooling Towers	
Type	Mechanical draft, multi-cell, redundant dual speed, reversible fans
Quantity	2
Heat Load Each[2]	[87.2 MW (2.98 x 10^8 BTU/h)]*
Flow Rate (Water)	2.524 m^3/s (40,000 gpm)
Ambient Wet Bulb Temperature	27.2°C (81°F)
Approach Temperature	3.9°C (7°F)
Cold Leg Temperature	31.1°C (88°F)
GGNS SUP 9.2.1-2 Basin Reserve Storage Capacity[1]	~~2.4~~2.6 million gallons

1. PSWS required to remove 2.02 x 10^7 MJ (1.92 x 10^{10} BTU) for period of 7 days without active makeup. The volume is defined as the minimum volume above the pump minimum submergence water level.

2. Minimum heat load cooling towers need to be able to reject.

*Per DCD Table 9.2-1.

2.4.2 ITAAC FOR PLANT SERVICE WATER SYSTEM (PORTION OUTSIDE THE SCOPE OF THE CERTIFIED DESIGN)

Design Description

The Plant Service Water System (PSWS) is the heat sink for the Reactor Component Cooling Water System (RCCWS). The PSWS does not perform any safety-related function. There is no interface with any safety-related component. The PSWS is subject to additional regulatory oversight to provide post-72 hour cooling to RCCWS.

The PSWS cooling towers and basins are not within the scope of the certified design. ~~A specific design for this portion of the PSWS is described in FSAR Section 9.2.1.~~ The functional arrangement of the cooling towers and basins is indicated in Figure 2.4.2-201. Interface requirements are necessary for supporting the post-72-hour cooling function of the PSWS. The plant-specific portion of the PSWS shall meet the following interface ~~requirement~~requirements:

1) The PSWS is required to remove 2.02×10^7 MJ (1.92×10^{10} BTU) over a period of 7 days without active makeup.

2) The functional arrangement of the PSWS cooling towers and basins is described in the Design Description of Section 2.4.2 and is shown on Figure 2.4.2-201.

3) The PSWS cooling towers provide the nonsafety-related functions to support post-72 hour cooling to the PSWS system to support RCCWS.

4) The PSWS cooling towers can be operated and controlled from the MCR.

5) PSWS cooling tower water flow and fan operation indication are provided in the MCR.

Inspections, Test, Analyses and Acceptance Criteria

Table 2.4.2-1 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria for the PSWS.

Table 2.4.2-1

ITAAC For Plant Service Water Reserve Storage Capacity

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The PSWS contains an inventory of cooling water sufficient for RCCWS cooling from hour zero (0) through day 7 (2.02×10^7 MJ (1.92×10^{10} BTU)) without active makeup.	1. Inspection of the as-built PSW cooling tower basin will be conducted.	1. Report(s) document that the usable water volume in the cooling tower basins (Trains A and B), defined as the volume above the pump minimum submergence water level and below the minimum normal operating level, is a minimum of ~~2.4~~2.6 million gallons.
2. The functional arrangement of the PSWS cooling tower and basin is described in the Design Description of Section 2.4.2 and is shown on Figure 2.4.2-201.	2. Inspection of the as-built system will be performed.	2. A report documents that the functional arrangement of the PSWS cooling tower and basin is described in the Design Description of Section 2.4.2 and is shown on Figure 2.4.2.-201.
3. The PSWS cooling towers provide the nonsafety-related functions to support post-72 hour cooling to the PSWS system to support RCCWS.	3. Testing will be performed to demonstrate PSWS water and air flow through the cooling towers.	3. A report documents that the PSWS cooling tower test demonstrates water and air flow through the cooling towers.
4. The PSWS cooling towers can be operated and controlled from the MCR.	4. Testing will be performed to demonstrate control of PSWS cooling tower air and water flow using controls in the MCR.	4. A report documents that MCR controls caused the PSWS cooling tower components to operate during the test.

Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
5. PSWS cooling tower water flow and fan operation indication are provided in the MCR.	5. Inspection will verify that PSWS cooling tower flow and fan operation indication can be observed in the MCR.	5. A report documents that the PSWS cooling tower flow and fan operation indication can be retrieved in the MCR.

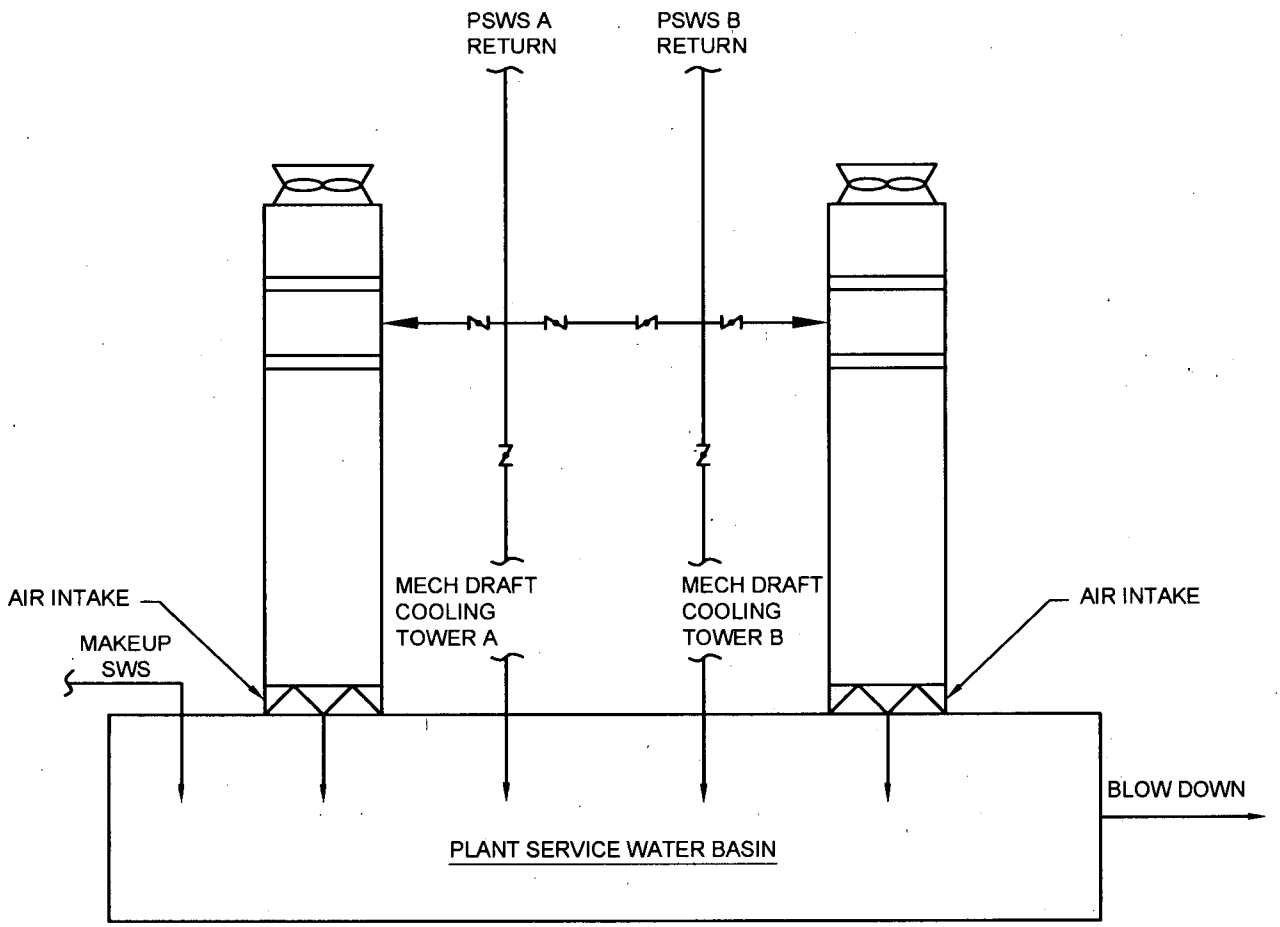

Figure 2.4.2-201.
PLANT SERVICE WATER COOLING TOWER AND BASIN FUNCTIONAL ARRANGEMENT

ATTACHMENT 2

G3NO-2008-00020

RESPONSE TO NRC RAI LETTER NO. 14

RAI QUESTION NO. 09.02.01-2

RAI QUESTION NO. 09.02.01-2

NRC RAI 09.02.01-2

In response to COL Information Item 9.2.1-1-A, "Material Selection," the applicant proposes to use fiberglass reinforced polyester pipe (FRPP) in locations where the Plant Service Water System (PSWS) pipe is buried to preclude long-term corrosion. The review criteria specified by the SRP relative to pipe failure is based on the use of metal pipe. In order to assure that the use of nonmetallic pipe will not adversely impact safety-related structures, systems, and components (SSCs) or those that satisfy the RTNSS criteria, the following additional information needs to be reflected in the applicable sections of the FSAR and plant-specific ITAAC as appropriate:

a) The criteria and limitations for using FRPP.

b) An evaluation of the impact of using FRPP on PSWS reliability and availability assumptions, especially during seismic events and water hammer transients that can occur.

c) A revised evaluation of the consequences (including flooding effects) of pipe failure during seismic events. Unless otherwise justified by the applicant, the evaluation should assume the failure of all FRPP in addition to the failures that are postulated for metallic pipe and the other considerations that are specified by the SRP Sections 3.6.1 and 3.6.2.

d) Operating experience considerations and measures being taken to address vulnerabilities that have been identified in this regard.

Entergy Response

The above requested information is provided below.

(a) Criteria and Limitations for Use of FRPP

Criteria and limitations for using FRPP are specified in the FSAR by incorporating DCD Chapter 3, Sections 9.2.1.1 and 19A, and Table 19A-4. Specifically:

- DCD Chapter 3, "Design of Structures, Components, Equipment, and Systems," and DCD Section 9.2.1.1, "Plant Service Water System Design Bases," specify the criteria and limitations that PSWS must meet to satisfy ESBWR standard plant design requirements.

- DCD Section 9.2.1.1 also defines PSWS as a nonsafety-related system that does not interface with any safety-related systems. Rather, it is categorized as a Regulatory Treatment of Non-Safety Systems (RTNSS) Criterion C, Low Regulatory Oversight, Maintenance Rule, system that supports the Reactor Component Cooling Water System (RCCWS).[1]

[1] See DCD Table 19A-2, Revision 5.

- Section 19A.8.3 and Table 19A-4 of DCD Revision 5 specify design criteria pertaining to flood protection, wind speed, wind-generated missiles, and seismic requirements for RTNSS Criterion C systems.

PSWS components, including FRPP, are designed and fabricated to meet the general design requirements for the system and the special requirements prescribed for RTNSS Criterion C systems that have been specified in the FSAR by incorporation of the DCD. Also, as a Maintenance Rule system, PSWS is monitored under the Maintenance Rule program and any degradation addressed.

(b) Impacts of Using FRPP on PSWS Reliability and Availability Assumptions

FRPP meets the design requirements specified for PSWS, as described in the response to Item (a) above. These requirements include design for a safe shutdown earthquake (SSE) to International Building Code (IBC) requirements. As stated in Section 19A.8.3 of DCD Revision 5, "RTNSS C systems and components are designed to the seismic requirements of IBC-2003 consistent with the above SSE ground motion" with "the above SSE ground motion" defined earlier in Section 19A.8.3 as "seismically designed using dynamic analysis method with the SSE ground input motion equal to two-thirds of the Certified Seismic Design Spectra taken from Figures 2.0-1 and 2.0-2 adjusted as required to their bases." Consequently, the use of FRPP will not have a negative impact on PSWS reliability or availability assumptions. Rather, the choice of FRPP is expected to enhance the reliability and availability of PSWS due to its long-term corrosion resistance and extended design life.

(c) Consequences of PSWS Pipe Failure During Seismic Events

As stated in Section 9.2.1.3 of DCD Revision 5, "Failure of the system does not compromise any safety-related system or component, nor does it prevent safe shutdown of the plant." That is, failure of all or any portion of PSWS, including FRPP, does not impact any plant safety function.

Also, as stated above, PSWS FRPP is designed and fabricated to meet the seismic requirements prescribed for RTNSS Criterion C systems. Section 9.2.1.5 of DCD Revision 5 specifies that flow elements and transmitters in PSWS provide monitoring of system flow in the Main Control Room and can be used to assist in leak detection. These flow elements and transmitters are located at the pump discharge and cooling tower inlet. By using these flow elements and transmitters placed at these locations, any unexpected flow differential (for example, due to gross system leakage) are identified and the effects of flooding minimized by shutting down the PSWS pumps to reduce system pressure and isolate the leak. The system configuration incorporates isolation valves and cross-ties to allow continuation of the cooling function when the leak is isolated, enhancing the system's reliability and availability. Table 19A-4 of the DCD describes the external flood protection design requirements for RTNSS systems. DCD Section 3.4 addresses flood protection for plant safety systems. No PSWS FRPP is located within any safety-related SSC. And since the ground level where PSWS is located slopes away from all safety-related SSCs, a leak or break in the FRPP portion of the PSWS is not a flooding challenge to any safety-related SSC.

(d) Operating Experience

FRPPs have gone through many improvements over the last 20 years and meet the design conditions for the PSWS. Reinforced epoxies, polyesters, and vinyl esters are the most common FRPP formulations. Variations of available piping sizes, maximum pressure ratings, and maximum temperature ratings exist among manufactures for these formulations. Performance requirements, including manufacturing, conform to ASTM standards. FRPP systems are designed and installed in accordance with ASME B31.1.

Proposed COLA Revision

None

ATTACHMENT 3

G3NO-2008-00020

RESPONSE TO NRC RAI LETTER NO. 14

RAI QUESTION NO. 09.02.01-3

RAI QUESTION NO. 09.02.01-3

NRC RAI 09.02.01-3

COL Information Item 9.2.1-1-A, "Material Selection," indicates that the applicant needs to specify plant-specific Plant Service Water System (PSWS) material selections based on water quality analysis in order to preclude long-term corrosion and fouling. The response to this COL Information Item only addressed material selection for buried piping but did not provide material specifications for any other parts of the PSWS, including those for the cooling towers [normal power heat sink (NPHS)/auxiliary heat sink (AHS)] and related components. Additional information is needed to specify and explain the material selections that pertain to the rest of the PSWS.

Entergy Response

The response to COL Item 9.2.1-1-A in FSAR Section 9.2.1.2 states that appropriate chemical treatment is added to NPHS or AHS to preclude long-term corrosion and fouling of PSWS based on site water quality analysis. This statement applies to all PSWS components, not just buried piping. Material selection for PSWS components takes into consideration PSWS water quality, a viable water treatment option to meet effluent discharge limits for the Mississippi River, economic considerations, and DCD-related RTNSS criteria.

Entergy has chosen not to use NPHS in support of PSWS. Information concerning NPHS operation in support of PSWS is being removed as indicated in the draft markup in Attachment 7, "Response to RAI Question 09.02.01-7," to this letter.

Proposed COLA Revision

FSAR Section 9.2.1.2, "Detailed System Description," will be revised as shown in the attached draft markup to reflect the separation of NPHS and PSWS (see Attachment 7 to this letter for other changes related to this design change), and include a statement that materials are selected based on the expected PSWS water treatment regime.

Markup of Grand Gulf COLA

The following markup represents Entergy's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

Detailed System Description

In the second paragraph, replace the fourth and fifth sentences with the following information.

GGNS CDI

The plant service water is returned via a common header to the mechanical draft cooling towers (AHS) in each train. Remote operated isolation valves and a crosstie line permit routing of the plant service water trains to either AHS cooling tower or directly to the basin.

In the sixth paragraph, replace the last sentence with the following information.

GGNS COL 9.2.1-1-A

Fiberglass reinforced polyester pipe is used for buried PSWS piping to preclude long-term corrosion. Appropriate chemical treatment is added to ~~the NPHS or the AHS, as required~~PSWS basin to preclude long-term corrosion and fouling of the PSWS components based on site water quality analysis. PSWS materials are compatible with the PSWS water treatment regime.

In the eighth paragraph, replace the first sentence with the following.

GGNS CDI

~~Unit 3~~The PSWS design heat loads are shown in DCD Table 9.2-1.

Replace the tenth paragraph with the following.

GGNS CDI

For meeting the action required by NRC Inspection and Enforcement Bulletin No. 80-10, routine sampling and analysis will be performed for the PSWS by obtaining grab samples from the PSWS basin. The samples provide the means to detect leakage into the PSWS from the RCCWS, which may contain low levels of radioactivity.

GGNS CDI

Delete the last paragraph.

Operation

ATTACHMENT 4

G3NO-2008-00020

RESPONSE TO NRC RAI LETTER NO. 14

RAI QUESTION NO. 09.02.01-4

RAI QUESTION NO. 09.02.01-4

NRC RAI 09.02.01-4

Tier 2 of the DCD, Section 9.2.1.6, "COL Information," specifies in part that the COL applicant needs to establish provisions to preclude long-term corrosion and fouling based on site water quality analysis. The FSAR does not explain what specific vulnerabilities are considered to be pertinent based upon operational experience that applies and why chemical treatment alone is sufficient for addressing these vulnerabilities. Chemical treatment is a common practice and suitable for addressing service water system corrosion and fouling problems to some extent, but it is usually implemented as part of a more comprehensive program (or collection of programs) to address service water system vulnerabilities. For example, considerations for precluding long-term corrosion and fouling of service water systems typically include: (i) establishing a program of surveillance and control techniques (such as chemical treatment) to prevent flow blockage problems due to biofouling; (ii) establishing a routine inspection and maintenance program to assure that corrosion, erosion, protective coating failure, silting, biofouling and others that are applicable cannot degrade defense-in-depth and RTNSS cooling functions that are credited; and (iii) establishing a test program to verify (initially and periodically) the heat transfer capability of heat exchangers that are important to safety has not degraded over time. Additional information needs to be included in the FSAR to: a) describe corrosion and fouling mechanisms and vulnerabilities that are anticipated based on industry operating experience and the plant-specific location, and b) describe programmatic controls that will be implemented to address these considerations and to assure that PSWS performance [including normal power heat sink (NPHS) and auxiliary heat sink (AHS)] will not degrade over time.

Entergy Response

The Plant Service Water System (PSWS) is a closed system with makeup water treated to preclude long-term corrosion and fouling, based on the site water quality analysis. NRC Generic Letter 89-13, *Service Water System Problems Affecting Safety-Related Equipment*, and its supplements are not applicable because the ESBWR has no safety-related service water.[1] The approach for maintaining PSWS against its site-specific vulnerabilities reflects Entergy's experience with the GGNS Unit 1 service water system.

PSWS is a nonsafety-related system that is designated as RTNSS, Criterion C, Low Regulatory Oversight, Maintenance Rule support system. As a Maintenance Rule system, system operation is monitored for degradation and deficiencies addressed in accordance with the Maintenance Rule program.

Based on the operation of the existing nuclear unit at Grand Gulf, Entergy has developed significant knowledge of the operating environment and the degradation mechanisms of the service water system. The water chemistry, inspections, trending, and maintenance activities address potential problems with algae, mollusks, bacteria, and general steel corrosion. The specific water treatment is strongly influenced by the characteristics of the Mississippi River. For Unit 3, use of cooling towers, water treatment, and material selection mitigate these site-

[1] See DCD Table 1C-1, Revision 5.

specific mechanisms. Under the plant chemistry program, periodic analysis assures that the desired chemical balance is maintained in PSWS. Additionally, monitoring and trending of system operating parameters of PSWS as a Maintenance Rule system are used to assess the ongoing effectiveness of the water treatment program.

NPHS is not being used to remove heat from PSWS. The draft markup included in Attachment 7 to this letter identifies removing NPHS as a PSWS heat sink. Attachment 7 is the response to RAI Question 09.02.01-7.

Proposed COLA Revision

None

ATTACHMENT 5

G3NO-2008-00020

RESPONSE TO NRC RAI LETTER NO. 14

RAI QUESTION NO. 09.02.01-5

RAI QUESTION NO. 09.02.01-5

NRC RAI 09.02.01-5

Tier 2 of the ESBWR DCD, Section 9.2.1.2, indicates that the heat rejection facilities are dependent upon actual site conditions and provides conceptual design information (CDI) for the standard plant design. Section 9.2.1.2 of the GGNS FSAR replaces the CDI with plant-specific information, but does not indicate what part of the information is plant-specific vs. what is standard plant design information. Additionally, the GGNS FSAR does not fully address all of the CDI that is discussed in the detailed system description under Section 9.2.1.2 of the DCD. In order to avoid possible confusion in the future relative to the GGNS design basis and the change process that applies, clarification is needed to indicate what part of the information in the FSAR is plant-specific (such as with double brackets).

Entergy Response

FSAR Table 1.1-201, "Left Margin Annotations," provides guidance on the definition and use of the left margin annotations (LMAs) used throughout the FSAR, including within Section 9.2.1.2.

As described in Table 1.1-201, plant-specific conceptual design information (CDI) is identified by the LMA "(Plant) CDI" which, in the case of GGNS-3 becomes "GGNS CDI". Standard CDI (applicable to the reference plant COLA and the subsequent COLAs) is identified by the LMA "STD CDI." Information in the ESBWR DCD indicated to be CDI, but that is incorporated into the COLA FSAR by reference without change, becomes the site-specific design and does not require the CDI LMA. Thus, the information presented in FSAR 9.2.1.2 that replaced the CDI information in DCD Section 9.2.1.2 is labeled "GGNS CDI," which means it is plant-specific to Grand Gulf.

Regarding possible confusion relative to the GGNS-3 design basis and the applicable change process, it is important to note that the CDI presented in the DCD is not reviewed and approved by the NRC staff as part of the design certification process. The actual design information presented in the FSAR (labeled either "GGNS CDI" or "STD CDI") is reviewed by the NRC staff during the COL review and approval process. Thus, once the COL is issued, the GGNS CDI and STD CDI information in the FSAR are controlled by Entergy using the appropriate change processes.

Proposed COLA Revision

None

ATTACHMENT 6

G3NO-2008-00020

RESPONSE TO NRC RAI LETTER NO. 14

RAI QUESTION NO. 09.02.01-6

RAI QUESTION NO. 09.02.01-6

NRC RAI 09.02.01-6

Tier 2 of the DCD, Section 9.2.1.2, indicates that the heat rejection facilities are dependent upon actual site conditions and provides conceptual design information (CDI) for the standard plant design. Section 9.2.1.2 of the Grand Gulf 3 FSAR replaced the CDI with plant-specific information (GGNS CDI), indicating that the heat rejection facility for GGNS 3 consists of natural draft and mechanical draft cooling towers. In order for the NRC to determine if the cooling towers are capable of performing their defense-in-depth and RTNSS functions, the GGNS CDI needs to include cooling tower design attributes that are credited (such as minimum number of fans needed); the minimum net positive suction head (NPSH) requirement for the PSWS pumps and available margin based on the most limiting cooling tower basin water level, temperature, and flow conditions; the maximum allowed PSWS water supply temperature; the most limiting meteorological assumptions that pertain to the site for determining: (a) heat dissipation capability, and (b) water inventory requirements; and cooling tower performance considerations related to proximity of structures and other cooling towers. The GGNS CDI also needs to describe plant-specific vulnerabilities and degradation mechanisms that are anticipated based on operational experience and site location, potential impacts of postulated cooling tower failures and other interactions on safety-related SSCs, and how these considerations are addressed. In addition to explaining bounding conditions and limiting assumptions, the GGNS CDI needs to describe programmatic controls being implemented to assure that the functional capability of the cooling towers will be maintained over the life of the plant.

Entergy Response

Design attributes, vulnerabilities, degradation mechanism and programmatic controls

The information requested by the subject RAI is of the type normally provided for a safety-related service water system. The Plant Service Water System (PSWS) is not a safety-related system; failure of the system does not compromise any safety-related SSC nor prevent safe shutdown. PSWS is not credited in any safety analysis. DCD Section 9.2.1.1 defines PSWS as a nonsafety-related system that does not interface with any safety-related system. It is categorized as a Regulatory Treatment of Non-Safety System (RTNSS) Criterion C, Low Regulatory Oversight, Maintenance Rule system that supports the Reactor Component Cooling Water System (RCCWS).[1] As a Maintenance Rule system, PSWS performance is monitored and trended under the Maintenance Rule program and adverse indications or trends are addressed and corrected.

Sufficient information is provided in FSAR Section 9.2.1.2, which incorporates by reference DCD Section 9.2.1.2, with its referenced tables, to demonstrate that PSWS is capable of meeting its RTNSS functions. For example, maximum allowed PSWS water supply temperature (cold leg temperature), limiting meteorological assumptions (ambient wet-bulb temperature), minimum heat dissipation requirement, and water inventory requirements are

[1] See DCD Table 19A-2 Revision 5.

listed in FSAR Table 9.2-201. The minimum NPSH for the PSWS pumps is ensured by maintaining the required water inventory above pump minimum submergence. The minimum water inventory requirements are met by maintaining the level in the PSWS cooling tower basin at or above the minimum operating level. Each cooling tower has a heat rejection capacity much greater than the RTNSS heat load (see FSAR Table 9.2-201); therefore, each tower is capable of meeting the system's RTNSS function to support cooling RCCWS.

Preoperational and startup testing is conducted to demonstrate that PSWS performs its intended functions. Those testing requirements are described in DCD Sections 14.2.8.1.51 and 14.2.8.2.18, respectively.

Functional arrangement and functionality of the PSWS cooling towers and basin are demonstrated as discussed in the response to RAI Question 09.02.01-1 included in Attachment 1 to this letter. Operational functionality is assured by the normal operation and monitoring of the system.

The specific vulnerabilities and degradation mechanisms that are anticipated, based on operational experience and site location, are long-term corrosion and fouling. Section 9.2.1.2 of the FSAR states that appropriate chemical treatment is added to the PSWS basin to preclude long-term corrosion and fouling of PSWS based on site water quality analysis.

Potential impacts of postulated cooling tower failures and other interactions on safety-related SSCs.

PSWS is a RTNSS Criterion C, Low Regulatory Oversight, Maintenance Rule system that is designed to applicable seismic requirements. Passive failure of components is not considered credible. However, failure of cooling tower components would not cause the potential for any adverse impacts on the intended design functions of safety-related SSCs. Water from a postulated PSWS cooling tower riser break not contained within the PSWS basin would drain westward and southward to the storm water basin, away from any safety-related SSCs. The effect of water being released from other cooling tower components is bounded by failure of a cooling tower riser, due to the larger size of the riser. Most of the water escaping from a failed cooling tower component would drop into and be contained in the respective basin below.

The cooling tower basin for each train is located below grade. The maximum water level in the basin is also located below grade. Thus, during any failure of the cooling tower basin, the water in the basin would remain below grade, which precludes an adverse impact to any safety-related SSC.

Proposed COLA Revision

None

ATTACHMENT 7

G3NO-2008-00020

RESPONSE TO NRC RAI LETTER NO. 14

RAI QUESTION NO. 09.02.01-7

RAI QUESTION NO. 09.02.01-7

NRC RAI 09.02.01-7

Section 9.2.1.2 (under Operation) specifies that "during normal power operation, plant service water system (PSWS) flow is directed to the normal plant heat sink (NPHS) cooling tower where heat removed from the reactor component cooling water system (RCCWS) and Turbine Component Cooling Water System (TCCWS) is rejected to the NPHS. During this mode of operation, the NPHS basin provides makeup to the alternate heat sink (AHS) basin. During other modes of power operation, PSWS flow is directed to the AHS cooling tower where heat removed from the RCCWS and TCCWS is rejected to the AHS. During this mode of operation, makeup to the AHS basin is provided from the Station Water System (SWS)". While this supplemental information explains how makeup is provided to the AHS depending on how the PSWS is aligned for heat rejection, it is not clear what the different "modes" of power operation are. This is especially confusing because the term "mode" has a specific meaning in the Technical Specifications, and specific modes of power operation are not assigned for when the NPHS or the AHS should be used. The FSAR needs to be revised to eliminate this confusion and to better explain when the NPHS vs. the AHS will be used for various operating, transient, and accident conditions.

Entergy Response

FSAR Section 9.2.1.2 is being revised to remove NPHS as the heat-rejecting medium for PSWS during normal plant operation. The PSWS heat loads are rejected to AHS during plant operations, including shutdown.

PSWS and Circulating Water System operation discussions in FSAR Section 10.4.5.8 are also being revised to address this change in design.

Proposed COLA Revision

FSAR Sections 1.2.2.12.7, 9.2.1.2, and 10.4.5.8, FSAR Tables 1.7-202, 1.8-203, and 10.4-3R and FSAR Figures 9.2-203, 10.4-203 and 10.4-204 will be revised as shown in the attached draft markups. In addition, an FSAR figure is being added, FSAR Figure 9.2-204.

Markup of Grand Gulf COLA

The following markup represents Entergy's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

1.2.2.12.7 Plant Service Water System

GGNS CDI

Delete the last sentence of the first paragraph; delete the second and third sentences of the second paragraph; and revise the first sentence of the second paragraph as follows.

The PSWS mechanical draft cooling towers (Alternate Heat Sink) are used to reject the heat removed from RCCWS and TCCWS.

1.2.2.12.13 Hydrogen Water Chemistry System

Replace this section with the following.

STD CDI

The HWC system consists of hydrogen and oxygen supply systems to inject hydrogen in the feedwater and oxygen in the offgas, plus monitoring systems to track the effectiveness of the system.

1.2.2.12.15 Zinc Injection System

Replace this section with the following.

STD CDI

The Zinc Injection System is not utilized.

1.2.2.12.16 Freeze Protection

Replace this section with the following.

STD CDI

Freeze protection is incorporated at the individual system level using insulation and heat tracing for all external tanks and piping that may freeze during winter weather.

GGNS SUP 1.7-2

TABLE 1.7-202
SUMMARY OF MECHANICAL SYSTEM CONFIGURATION DRAWINGS

FSAR Figure No.	Title
9.2-201	Potable Water System Simplified Diagram
9.2-202	Sanitary Waste Discharge System Simplified Diagram
9.2-203	Station Water System Simplified Diagram
9.2-204	Plant Service Water System Cooling Tower and Basin
9.5-201	Fire Protection System Yard Main Loop
10.4-201	Circulating Water Pumps and Natural Draft Cooling Tower
10.4-202	Main Circulating Water Supply Lines with Tube Cleaning Components
10.4-203	Mechanical Draft Cooling Tower
10.4-204	Natural Draft Cooling Tower with Blowdown

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GGNS SUP 1.8-5

TABLE 1.8-203 (Sheet 2 of 5)
CONCEPTUAL DESIGN INFORMATION (CDI)

Item in DCD	CDI in DCD adopted as actual design	CDI in DCD replaced with actual design	Evaluation	FSAR Section
1.2.2.12.6 Oxygen Injection System		X	Oxygen is supplied from the Unit 1 cryogenic skid.	1.2.2.12.6
1.2.2.12.7 Plant Service Water System		X	PSWS cooling is provided by the Alternate Heat Sink	1.2.2.12.7
1.2.2.12.13 Hydrogen Water Chemistry Table 3.2-1 P73 Note 9.3.9 Hydrogen Water Chemistry		X	Hydrogen water chemistry option utilized	1.2.2.12.13 Table 3.2-1 9.3.9
1.2.2.12.15 Zinc Injection System Table 3.2-1 P74 Note 9.3.11 Zinc Injection System		X	Zinc Injection System is not utilized.	1.2.2.12.15 Table 3.2-1 9.3.11
1.2.2.12.16 Freeze Protection		X	Freeze protection incorporated for external tanks and piping that may freeze during winter weather	1.2.2.12.16

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GGNS SUP 1.8-5

TABLE 1.8-203 (Sheet 3 of 5)
CONCEPTUAL DESIGN INFORMATION (CDI)

Item in DCD	CDI in DCD adopted as actual design	CDI in DCD replaced with actual design	Evaluation	FSAR Section
1.2.2.16.10 Other Building Structures		X	Site-specific buildings specified	1.2.2.16.10
1.8.2 Identification of BOP Interfaces	X		Not applicable	1.8.2
Appendix 3A Seismic Soil-Structure Interaction Analysis		X	Site-specific geotechnical data described in Chapter 2	Appendix 3A Chapter 2
Appendix 3A.2 ESBWR Standard Site Plan		X	Site-specific general site plan provided	Section 3A.2 Figure 1.1-201
9.2.1 Plant Service Water Table 9.2-2 Figure 9.2-1	~~Figure 9.2-1~~	X	Site-specific system description and design characteristics described	9.2.1 Table 9.2-201 Figure 9.2-204
9.2.3 Makeup Water System Table 9.2-9		X	Site-specific system description and design characteristics described	9.2.3 Table 9.2-202

9.2 WATER SYSTEMS

9.2.1 PLANT SERVICE WATER SYSTEM

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

9.2.1.2 SYSTEM DESCRIPTION

Summary Description

Replace the Summary Description with the following information.

GGNS CDI

~~The source of cooling water to the Plant Service Water system (PSWS) is from either the normal power heat sink (NPHS) or the auxiliary heat sink (AHS) depending on plant conditions. The PSWS rejects heat from nonsafety-related RCCWS and TCCWS heat exchangers to the environment via either the NPHS or the AHS. A combination of a natural draft cooling tower and mechanical draft cooling towers is utilized for the NPHS and mechanical draft cooling towers are utilized for the AHS. Table 9.2-201 provides information on the PSWS cooling tower design characteristics.~~The PSWS rejects heat from nonsafety-related RCCWS and TCCWS heat exchangers to the environment. The source of cooling water to the PSWS is from the auxiliary heat sink (AHS) basin, and the heat removed is rejected to the AHS. The PSWS design utilizes mechanical draft cooling towers for the AHS. Table 9.2-201 provides information on the PSWS cooling tower design characteristics.

GGNS COL 9.2.1-1-A

The materials for the various components of the PSWS are selected to preclude long-term corrosion and fouling of the PSWS based on site water quality.

Materials for the mechanical draft cooling towers and accessories contain, to the maximum extent practicable, noncombustible materials as defined in NFPA 220 (Reference 9.2.1-201).

GGNS CDI

A simplified diagram of the PSWS is shown in DCD Figure 9.2-1 as supplemented by FSAR Figure 9.2-204, which replaces the conceptual design portion of DCD Figure 9.2-1.

Detailed System Description

In the second paragraph, replace the fourth and fifth sentences with the following information.

GGNS CDI

The plant service water is returned via a common header to the mechanical draft cooling towers (AHS) in each train. Remote operated isolation valves and a crosstie line permit routing of the plant service water trains to either AHS cooling tower or directly to the basin.

In the sixth paragraph, replace the last sentence with the following information.

GGNS COL 9.2.1-1-A

Fiberglass reinforced polyester pipe is used for buried PSWS piping to preclude long-term corrosion. Appropriate chemical treatment is added to ~~the NPHS or~~ the ~~AHS, as required~~PSWS basin to preclude long-term corrosion and fouling of the PSWS components based on site water quality analysis. PSWS materials are compatible with the PSWS water treatment regime.

In the eighth paragraph, replace the first sentence with the following.

GGNS CDI

~~Unit 3~~The PSWS design heat loads are shown in DCD Table 9.2-1.

Replace the tenth paragraph with the following.

GGNS CDI

For meeting the action required by NRC Inspection and Enforcement Bulletin No. 80-10, routine sampling and analysis will be performed for the PSWS by obtaining grab samples from the PSWS basin. The samples provide the means to detect leakage into the PSWS from the RCCWS, which may contain low levels of radioactivity.

GGNS CDI

Delete the last paragraph.

Operation

Revise the last sentence of the second paragraph of this section as follows.

GGNS SUP 9.2.1-1CDI

~~During normal power operation, PSWS flow is directed to the NPHS cooling tower where heat removed from the RCCWS and TCCWS is rejected to the NPHS. During this mode of operation, the NPHS basin provides makeup to the AHS basin. During other modes of power operation, PSWS flow is directed to the AHS cooling tower where heat removed from the RCCWS and TCCWS is rejected to the AHS. During this mode of operation, makeup to the AHS basin is provided from the Station Water System (SWS).~~ Heat removed from the RCCWS and TCCWS is rejected to the AHS. Makeup to the AHS basin is provided from the Station Water System (SWS).

9.2.1.6 COL INFORMATION

9.2.1-1-A Material Selection

GGNS COL 9.2.1-1-A

This COL Item is addressed in Section 9.2.1.2.

9.2.1.7 REFERENCES

9.2.1-201 National Fire Protection Association (NFPA), "Standard on Types of Building Construction" NFPA 220.

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NOTES
1. ALL COMPONENT TAG NUMBERS ARE PRECEDED BY Y41-.

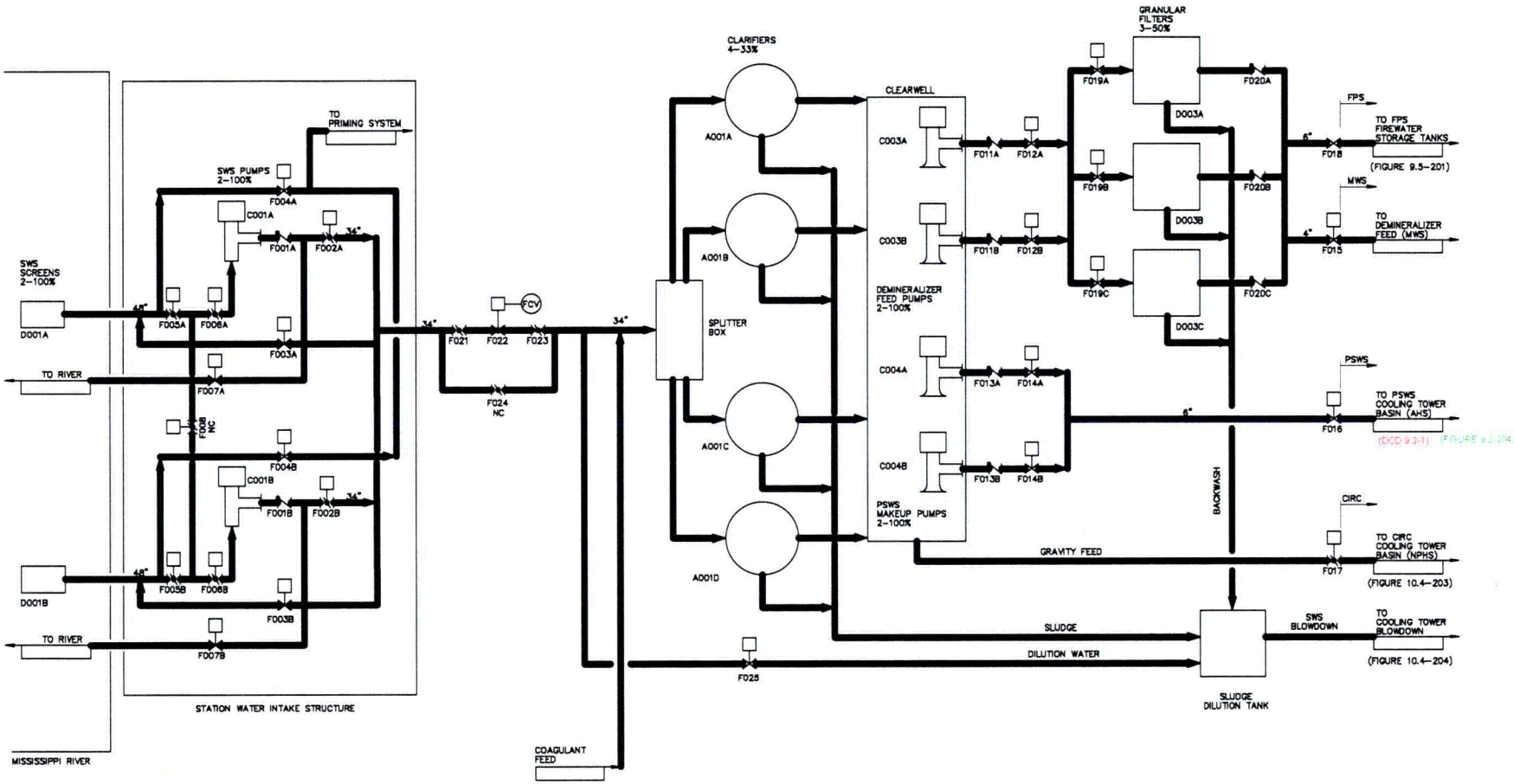

Figure 9.2-203. Station Water System Simplified Diagram

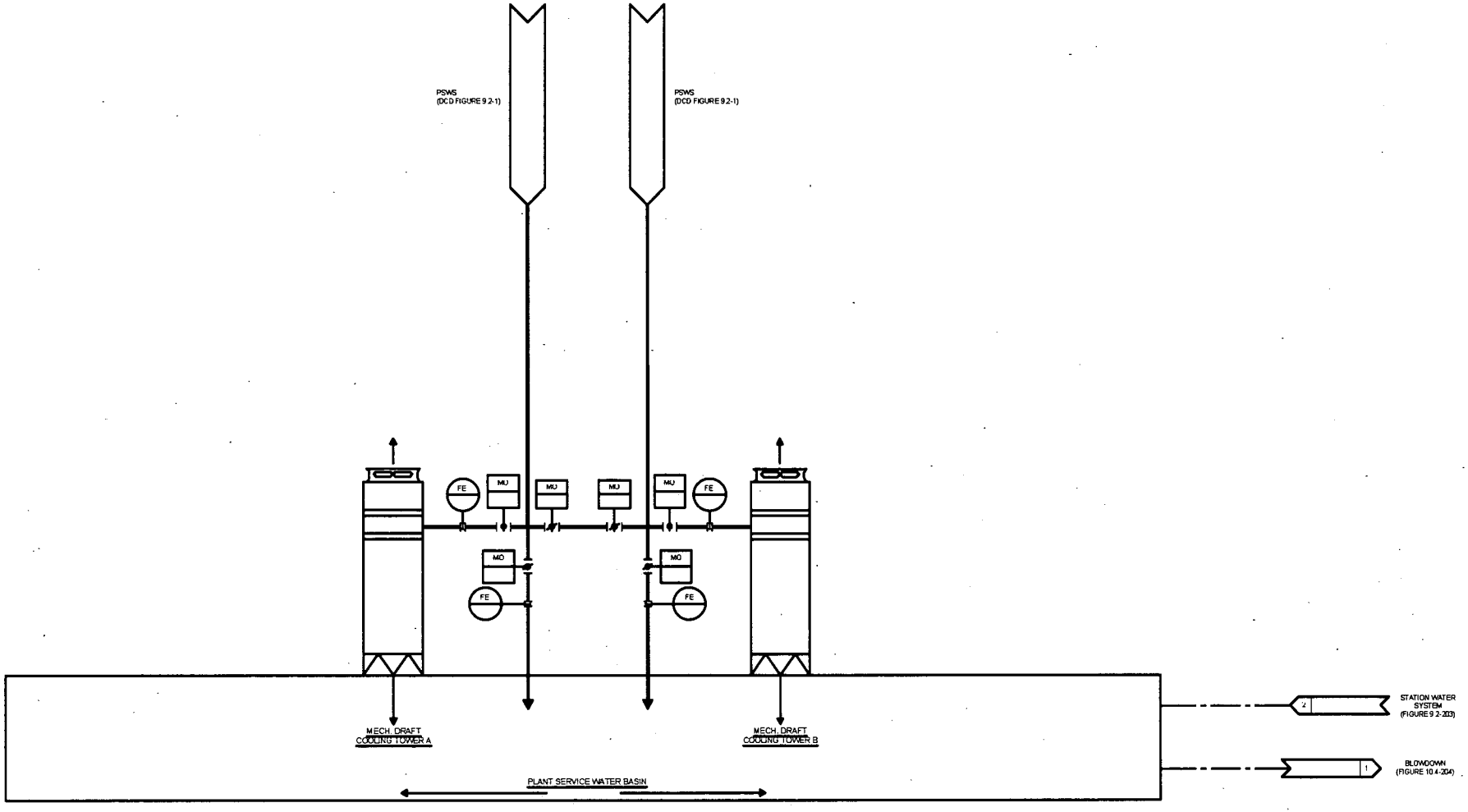

Figure 9.2-204. Plant Service Water Cooling Tower and Basin

10.4.5.5 Instrumentation Applications

Insert the following between the fourth and fifth paragraphs.

GGNS CDI

Level instrumentation provided in the circulating water pump pit controls makeup flow from the SWS to the NDCT basin. Level instrumentation in the pump pit initiates alarms in the main control room on abnormally low or high water level.

Pressure indication is provided on the circulating water pump discharge. Differential pressure instrumentation is provided between one inlet and outlet branch to the condenser and may be used to determine the frequency of operating the condenser tube cleaning system.

Local grab samples are used to periodically test the circulating water quality.

10.4.5.8 Normal Power Heat Sink

Replace the text with the following.

GGNS CDI

A NDCT, in conjunction with a MDCT, supports a maximum cold water temperature of 35°C (95°F).

The NDCT design flow rate is ~~163529.8~~154,500 m^3/hr (~~720,000~~680,000 gpm)~~-including Plant Service Water System supply~~. The operating flow rate varies from 100 percent to 66 percent of the total design flow depending on ambient conditions and heat load.

The MDCT is sized for approximately 33 percent of total circulating water flow. The MDCT is a fiber reinforced plastic counter-flow cluster design with low-clog PVC film fill.

The NDCT is located ~~at least~~more than 168m (550 ft.) away from any seismic Category 1 or 2 structures. Thus, if there were any structural failure of the cooling towers, no seismic Category 1 or 2 structures or any safety-related systems or components would be affected or damaged. Also, given the location of the cooling towers and the prevailing northeast wind at the plant site, cooling tower plumes are normally directed away from the plant toward the Mississippi River. Under prevailing conditions, the plumes will have no effect on the plant HVAC intakes or the plant switchyard. The direction of the prevailing wind and location of the towers make fogging near the plant unlikely. The NDCT is made of non-

GGNS CDI

TABLE 10.4-3R
CIRCULATING WATER SYSTEM

Parameter	Value
Circulating Water Pumps:	
Number of pumps	4
Pump type	Vertical, wet pit
Unit flow capacity**, m^3/hr (gpm)	Approx. 38300 (170000)
Driver Type	Electric motor
Ball Cleaning System	
Ball recirculation pump	2 (one for each condenser train)
Ball discharge pump	2 (one for each condenser train)
Chemical injection pumps	Various metering pumps
Mechanical draft fans, gearboxes, and motors	12
System design pressure MPa (psi)	0.448 (65)
Mechanical Draft Cooling Tower	
Number of towers	1
Basin diameter*, m (ft)	79.2 (260)
Height*, m (ft)	18.3 (60)
Natural Draft Cooling Tower	
Number of towers	1
Basin diameter*, m (ft)	140 (460)
Height*, m (ft)	168 (550)
Operating Temperatures:	
Temperature range of water delivered to the main condenser, °C (°F)	5*** to 37.8 (41 to 100)
CIRC temperature for rated turbine performance, °C (°F)	30 (86)
Maximum CIRC temperature to accommodate the bypass flow resulting from a turbine trip, 100% load reject, or island mode, in conjunction with the power reduction resulting from SRI/SCRRI function, °C (°F)	35.6 (96)

* Cooling tower dimensions are approximate.

** This capacity is for the condenser cooling requirements ~~only; see DCD Table 9.2-2 for potential additional capacity requirements for Plant Service Water~~.

*** If the Normal Power Heat Sink does not maintain temperatures above the minimum temperature, then the minimum temperature is maintained by warm water recirculation.

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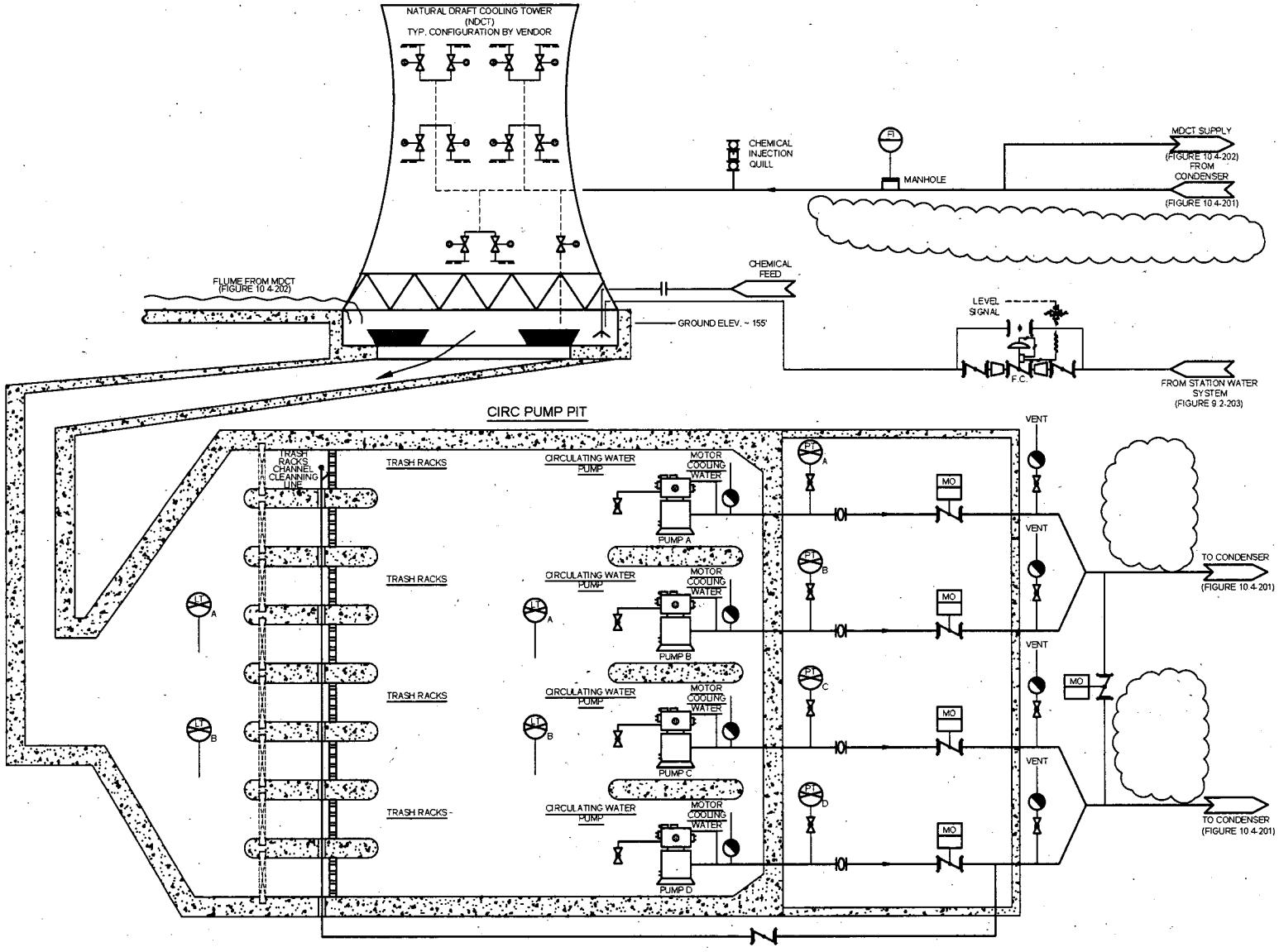

Figure 10.4-203. Mechanical Draft Cooling Tower

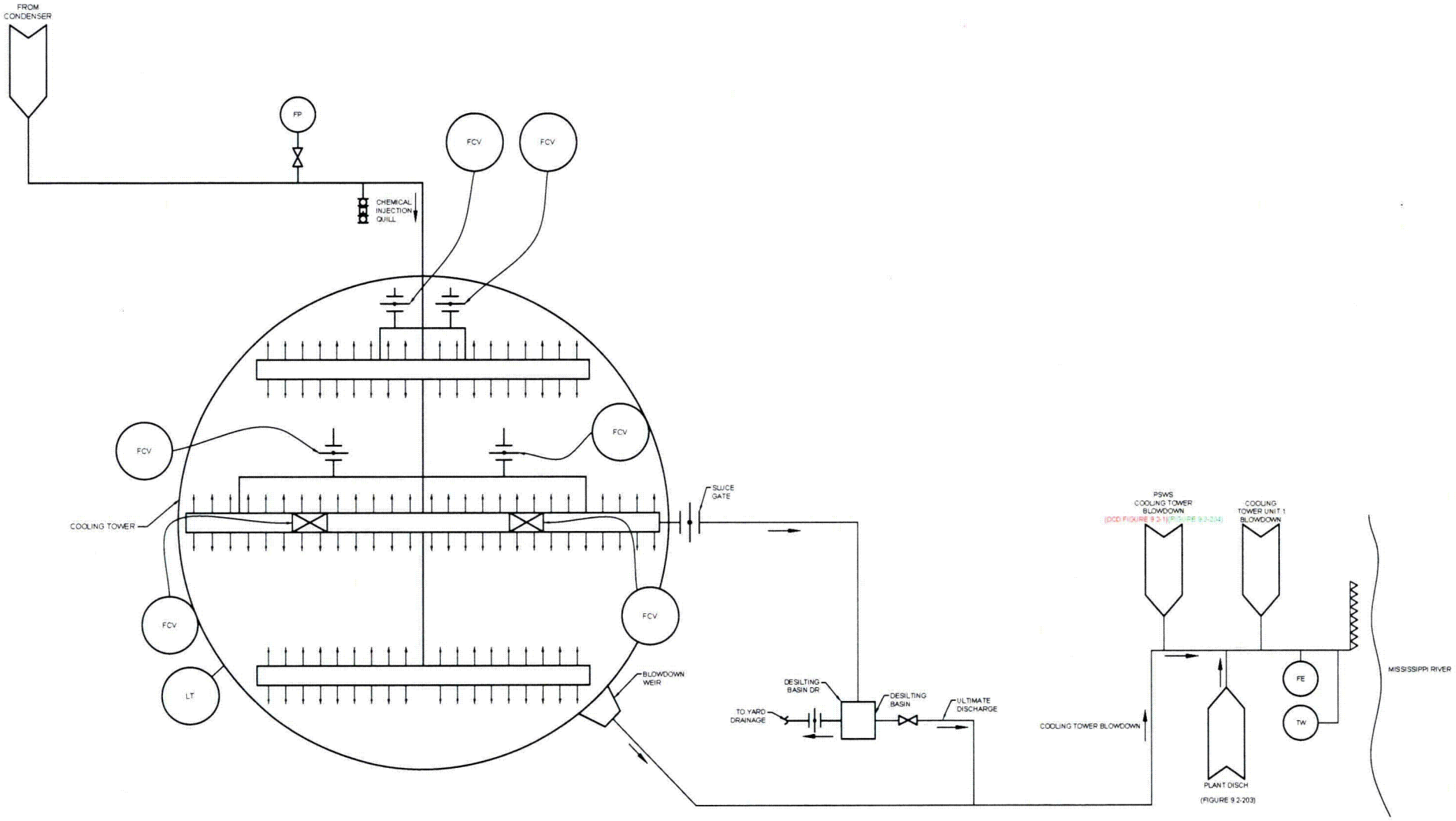

Figure 10.4-204. Natural Draft Cooling Tower with Blowdown

ATTACHMENT 8

G3NO-2008-00020

RESPONSE TO NRC RAI LETTER NO. 14

RAI QUESTION NO. 09.02.01-8

RAI QUESTION NO. 09.02.01-8

NRC RAI 09.02.01-8

Although the initial plant test program specified by Tier 2 of the DCD for plant service water system (PSWS) is incorporated by reference, the test program does not verify that performance of the PSWS [including normal power heat sink (NPHS)/alternate heat sink (AHS)] satisfies design specifications for the various configurations and heat loads. Consequently, additional information is needed to describe how the design capability of the PSWS will be verified by the initial plant test program.

Entergy Response

Preoperational and startup testing requirements for PSWS, which include the conceptual design information (CDI) portion of PSWS, are described in DCD Sections 9.2.1.4, 14.2.8.1.51, and 14.2.8.2.18. The DCD is incorporated by reference into the COLA FSAR.

NPHS is not used as a PSWS heat sink. The response to RAI Number 09.02.01-7 in Attachment 7 to this letter addresses the design change that removes the NPHS cross-tie to PSWS.

Proposed COLA Revision

None

ATTACHMENT 9

G3NO-2008-00020

RESPONSE TO NRC RAI LETTER NO. 14

REGULATORY COMMITMENTS

REGULATORY COMMITMENTS

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
Revise FSAR table 9.2-201 to reflect the PSWS cooling tower basin storage capacity.	✓		Future COLA submittal 2/28/2009
Revise Part 10, ITAAC Section 2.4.2 to include additional ITAAC related to the functional arrangement and functionality of the PSWS cooling towers, and to revise the PSWS cooling tower basin inventory volume to 2.6×10^6 gallons.	✓		Future COLA submittal 2/28/2009
Add Figure 2.4.2-201 to Part 10 To support the functional arrangement ITAAC.	✓		Future COLA submittal 2/28/2009
Revise FSAR Section 9.2.1.2, Detailed System Description to reflect the separation of NPHS and PSWS and include a statement that materials are selected based on the expected PSWS water treatment regime.	✓		Future COLA submittal 2/28/2009
Revise FSAR Sections 1.2.2.12.7, 9.2.1.2, and 10.4.5.8, FSAR Tables 1.7-202, 1.8-203, and 10.4-3R and FSAR Figures 9.2-203, 10.4-203 and 10.4-204 and add FSAR Figure 9.2-204 to reflect the separation of NPHS and PSWS.	✓		Future COLA submittal 2/28/2009