Entergy

Entergy Operations, Inc.
1340 Echelon Parkway
Jackson, MS 39213

William K. Hughey
Director, Licensing – New Plant
(601) 368-5327
whughey@entergy.com

G3NO-2008-00010

November 5, 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. 08 (GG3 COLA)

REFERENCE: NRC Letter to Entergy Nuclear, *Request for Additional Information Letter No. 08 Related to the SRP Sections 11.2, 11.3, 11.4 and 11.5 for the Grand Gulf Combined License Application*, dated October 6, 2008 (ADAMS Accession No. ML082800238).

Dear Sir or Madam:

In the referenced letter, the NRC requested additional information on four items to support the review of certain portions of the Grand Gulf Unit 3 Combined License Application (COLA). The responses to the following Requests for Additional Information (RAIs) are provided as Attachments 1, 2, 3 and 4 to this letter as follows:

1. RAI Question 11.02-1, Cost Benefit Analysis, NEI Template 07-11
2. RAI Question 11.03-1, Cost Benefit Analysis, NEI Template 07-11
3. RAI Question 11.04-1, Long-Term Storage of Low-Level Radioactive Wastes
4. RAI Question 11-05 Branch Technical Position-1, Footnote Inconsistencies – Sampling Provisions

D088
NRO

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

Telephone: (601) 368-5786

Mailing Address: 1340 Echelon Parkway
Mail Stop M-ECH-21
Jackson, MS 39213

E-Mail Address: twilli2@entergy.com

This letter contains commitments as identified in Attachment 5.

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

Executed on November 5, 2008.

Sincerely,

WKH/ghd

Attachment(s): 1. Response to RAI Question No. 11.02-1
2. Response to RAI Question No. 11.03-1
3. Response to RAI Question No. 11.04-1
4. Response to RAI Question No. 11-05 Branch Technical Position-1
5. Regulatory Commitments

cc (email unless otherwise specified):

Mr. T. A. Burke (ECH)
Mr. S. P. Frantz (Morgan, Lewis & Bockius)
Mr. B. R. Johnson (GE-Hitachi)
Ms. M. Kray (NuStart)
Mr. P. D. Hinnenkamp (ECH)

NRC Project Manager – GGNS COLA
NRC Director – Division of Construction Projects (Region II)
NRC Regional Administrator - Region IV
NRC Resident Inspectors' Office - GGNS

ATTACHMENT 1

G3NO-2008-00010

RESPONSE TO NRC RAI LETTER NO. 08

RAI QUESTION NO. 11.02-1

RAI QUESTION NO.11.02-1

NRC RAI 11.02-1

FSAR Section 11.2.1, STD SUP 11.2-1 includes, by reference, draft NEI Template 07-11 as the basis of the cost-benefit analysis in justifying the design of the LWMS. The NEI template presented a bounding envelope of population doses associated with liquid effluent releases, which, if met, would demonstrate compliance with ALARA cost-benefit requirements of Section II.D of Appendix I to Part 50. However, NEI Template 07-11 was withdrawn from further consideration by NEI. As a result, NEI Template 07-11 is no longer relevant and the applicant needs to develop a plant and site-specific cost-benefit analysis demonstrating compliance with Section II.D of Appendix I to Part 50. Accordingly, provide an updated cost-benefit analysis in FSAR Section 11.2.1 for the LWMS and provide sufficient information for the staff to evaluate the bases and assumptions used in the analysis and for conducting an independent confirmation of compliance with NRC regulations and guidance.

Entergy Response

A plant-specific cost-benefit analysis has been developed demonstrating compliance with Section II.D of Appendix I to Part 50 with respect to the liquid waste management system. This cost-benefit analysis eliminates the need for use of NEI Template 07-11; thus, reference to NEI Template 07-11 will be removed from the FSAR. The total annual costs of the liquid radwaste system augments listed in Regulatory Guide 1.110 were developed using the methodology and parameters provided in the regulatory guide. Conservative values were chosen for parameters not specified in the regulatory guide. Site-specific values for the variable parameters are provided in the revised FSAR section. FSAR Section 11.2.1 will be revised to describe the methodology for and incorporate the results of this analysis. Section 11.2.7 and Table 1.6-201 will be revised to remove the NEI 07-11 template reference.

FSAR Section 12.2.2.4 provides a discussion of the methodology and analysis for determining off-site doses due to the liquid pathway, and provides results for the maximally exposed individual by reference to FSAR Table 12.2-203. However, population dose results were not provided. Therefore, Section 12.2.2.4 will be revised to include these population dose results.

Proposed COLA Revision

FSAR Table 1.6-201 will be revised as indicated in the attached draft markup to remove the NEI 07-11 entry on Sheet 2.

FSAR Sections 11.2.1 and 11.2.7 will be revised as indicated in the attached draft markup.

FSAR Section 12.2.2.4 will be revised to include these population dose results as indicated in the attached draft markup.

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 SUP 1.6-1

TABLE 1.6-201 (Sheet 2 of 2)
REFERENCED TOPICAL REPORTS

Report No.	Title	Section No.
NEI 07-10	Nuclear Energy Institute, "Generic FSAR Template Guidance for Process Control Program (PCP) Description," NEI 07-10, Revision 1, October 2007	11.4
~~NEI 07-11~~	~~Nuclear Energy Institute, "Generic FSAR Template Guidance for Cost-Benefit Analysis for Radwaste Systems for Light Water Cooled Nuclear Power Reactors," NEI 07-11, Revision 0, September 2007~~	~~11.2~~

11.2 LIQUID WASTE MANAGEMENT SYSTEM

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

11.2.1 DESIGN BASES

Safety Design Bases

~~Add the following paragraph at the end of this section.~~

~~STD SUP 11.2-1~~ ~~NEI 07-11, Generic FSAR Template Guidance for Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Reactors, which is currently under review by the NRC staff, is incorporated by reference. (Reference 11.2-201)~~Add the following at the end of this section.

GGNS SUP 11.2-1 Regulatory Guide (RG) 1.110 methodology is applied to satisfy the cost-benefit analysis requirements of 10 CFR 50, Appendix I, Section II.D. Some of the parameters used in calculating the Total Annual Cost are fixed and are given for each radwaste treatment system augment in RG 1.110. The fixed parameters used to calculate the Total Annual Cost (TAC) are: the Annual Operating Cost (AOC), Annual Maintenance Cost (AMC), Direct Cost of Equipment and Materials (DCEM), and Direct Labor Cost (DLC). The data for the fixed parameters is given below:

- Annual Operating Costs (AOC) - The annual operating cost for liquid and gaseous radwaste system augments is given in Regulatory Guide 1.110, Table A-2.
- Annual Maintenance Costs (AMC) - The annual maintenance cost for liquid and gaseous radwaste system augments is given in RG 1.110, Table A-3.
- Direct Cost of Equipment and Material (DCEM) - The direct cost of equipment and material for liquid and gaseous radwaste system augments is given in Regulatory Guide 1.110, Table A-1.
- Direct Labor Cost (DLC) - The direct labor cost for liquid and gaseous radwaste system augments is given in RG 1.110, Table A-1.

The variable parameters used in the cost benefit analysis are as follows (all costs are in 1975 $1000):

- Indirect Cost Factor (ICF) - This factor takes into account whether the radwaste system is unitized or shared (in the case of a multi-unit site). The ICFs for single or multi-units are given in Table A-5 of RG 1.110. A single unit site with a unitized radwaste system has an ICF of 1.75. The Unit 3 radwaste system is not shared with Unit 1; therefore, the ICF is 1.75.

- Labor Cost Correction Factor (LCCF) - This factor takes into account the differences in relative labor costs between geographical regions. The GGNS site is in geographical area V from Figure A-1 of RG 1.110. The LCCF for this geographical area is 1.1 from Regulatory Guide 1.110, Table A-4.

- Capital Recovery Factor (CRF) - Obtained from RG 1.110, Table A-6. This factor reflects the cost of money for capital expenditures. A cost-of-money value of 7 percent per year is assumed in this analysis, consistent with "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs" (OMB Circular A-94) (Reference 11.2-201). Based on a 30 year service life, Table A-6 gives a CRF of 0.0806.

A value of $1,000 per person-rem is prescribed in 10 CFR 50, Appendix I.

If it is conservatively assumed that each radwaste treatment system augment is a "perfect" technology that reduces the effluent dose by 100 percent, the annual cost of the augment can be determined and the lowest annual cost can be considered a threshold value. The lowest-cost option for augments is a 20 gpm cartridge filter at $11,540 per year, which yields a threshold value of 11.54 person-rem whole body or thyroid dose from liquid effluents. Population doses from liquid effluents would therefore need to be reduced by 11.54 person-rem, whole body or thyroid, for any augment to potentially be cost beneficial.

The total body and thyroid doses to the population for liquid effluents from Unit 3 are given in Section 12.2.2.4 as 0.57 person-rem total body and 0.05 person-rem thyroid, which are both below the threshold. None of the augments provided in RG 1.110 are found to be cost beneficial in reducing the annual population doses.

11.2.2.3 DETAILED SYSTEM COMPONENT DESCRIPTION

11.2.2.3.3 Processing Systems

Replace the first two paragraphs with the following.

STD COL 11.2-1-A Specific equipment connection configuration and plant sampling procedures are used to implement the guidance in Inspection and Enforcement (IE) Bulletin 80-10 (DCD Reference 11.2-10). The permanent and mobile/portable non-radioactive systems, which are connected to radioactive or potentially radioactive portions of process LWMS, are protected from contamination with an arrangement of double check valves in each line. The configuration of each line is also equipped with a tell-tale connection, which permits periodic checks to confirm the integrity of the line and its check valve arrangement. Plant procedures describe sampling of non-radioactive systems that could become contaminated by cross-connection with systems that contain radioactive material. In accordance with the guidance in RG 1.109, exposure pathways that may arise due to unique conditions are considered for incorporation into the plant-specific ODCM if they are likely to contribute significantly to the total dose.

STD COL 11.2-2-A Section 12.6 discusses how ESBWR design features and procedures for operation will minimize contamination of the facility and environment, facilitate decommissioning, and minimize the generation of radioactive wastes, in compliance with 10 CFR 20.1406. Section 13.5 describes the requirement for procedures for operation of radioactive waste processing system. Operating procedures for LWMS process systems required by Section 12.4, Section 12.5, and Section 13.5 address the requirements of 10 CFR 20.1406.

11.2.6 COL INFORMATION

11.2-1-A Implementation of IE Bulletin 80-10

STD COL 11.2-1-A This COL item is addressed in Section 11.2.2.3.

11.2-2-A Implementation of Part 20.1406

STD COL 11.2-2-A This COL item is addressed in Section 11.2.2.3.

11.2.7 REFERENCES

11.2-201 ~~NEI 07-11, Generic FSAR Template Guidance for Cost-Benefit Analysis for Radwaste Systems for Light-Water Cooled Nuclear Power Reactors.~~ OMB Circular A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs," October 29, 1992, Office of Management and Budget.

1.109 were used. The liquid effluent pathway off-site dose calculation bases are provided in Tables 12.2-201 and 12.2-202. The LADTAP-II code (NUREG/CR-4013) is used to perform the liquid effluent dose analysis. The results of the dose calculation are given in Table 12.2-203.

Discharge from the liquid radwaste is combined with the discharge from the cooling tower blowdown before discharging to the Mississippi River. Other dilution from clarifier blowdown and from Unit 1 are not considered, which adds conservatism to the calculation. Mixing of the diluted radioactive effluent with the Mississippi River water is analyzed for the mean river level of 54 feet msl, corresponding to a discharge of 560,000 cfs. The isotopic releases in the liquid effluent are given in DCD Table 12.2-19b. The outflow from the combined discharge mixes with the Mississippi River water, resulting in additional dilution of the effluent.

Pathway Doses

Maximum dose rate estimates to man due to liquid effluent releases were determined in the following ways:

- Eating fish or invertebrates caught near the point of discharge;
- Using the shoreline for activities, such as sunbathing or fishing; and
- Swimming and boating on the Mississippi River near the point of discharge.

The calculated whole-body and critical organ doses from these interactions are presented in Table 12.2-203. These doses are within the limits given in 10 CFR 50, Appendix I and would only occur under conditions that maximize the resultant dose. It is unlikely that any individual would receive doses of the magnitude calculated because of little or no shoreline activities at or near the site, and very limited swimming (if any) occurs in the river at or downstream of the site. The population dose due to liquid effluent releases is 0.57 person-rem whole body and 0.05 person-rem thyroid.

12.2.2.4.1 Compliance with 10 CFR 50, Appendix I, Section II.A

The maximum exposed individual annual doses from the discharge of radioactive materials in liquid effluents meet the guidelines of Appendix I, Section II.A, to 10 CFR Part 50. In addition, the maximally exposed individual dose calculated was compared to and meets the 40 CFR 190 criteria (Table 12.2-204) for liquid effluents.

12.2.2.4.2 Compliance with 10 CFR 50, Appendix I, Section II.D

A site-specific cost benefit analysis of the liquid radwaste system augments suggested in Regulatory Guide 1.110 is presented in Section 11.2.1. The results

ATTACHMENT 2

G3NO-2008-00010

RESPONSE TO NRC RAI LETTER NO. 08

RAI QUESTION NO. 11.03-1

RAI QUESTION NO.11.03-1

NRC RAI 11.03-1

FSAR Section 11.3.1, GGNS SUP COL 11.3-1 incorporates by reference the current draft of NEI Template 07-11 as the basis of the cost-benefit analysis intended to justify the design of the GWMS. NEI, however, withdrew NEI Template 07-11 from further consideration. As a result, NEI Template 07-11 is no longer relevant. Accordingly, please provide an updated plant- and site-specific cost-benefit analysis in FSAR Section 11.3.1 for the GWMS. This cost/benefit analysis should provide sufficient information for the staff to evaluate the bases and assumptions used in the analysis and to conduct an independent confirmation of compliance with NRC regulations and guidance.

Entergy Response

A plant-specific cost-benefit analysis has been developed demonstrating compliance with Section II.D of Appendix I to Part 50 with respect to the gaseous waste management system. This cost-benefit analysis eliminates the need for use of NEI Template 07-11; thus, reference to NEI Template 07-11 will be removed from the FSAR. The total annual costs of the gaseous radwaste system augments listed in Regulatory Guide 1.110, were developed using the methodology and parameters provided in the regulatory guide. Conservative values were chosen for parameters not specified in the regulatory guide. Site-specific values for the variable parameters are provided in the revised FSAR section. FSAR Section 11.3.1 will be revised to describe the methodology for and incorporate the results of this analysis. FSAR Section 11.3.9, References, will be deleted.

Proposed COLA Revision

FSAR Sections 11.3.1 and 11.3.9 will be revised as indicated in the attached draft markup.

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.

11.3 GASEOUS WASTE MANAGEMENT SYSTEM

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

11.3.1 DESIGN BASIS

~~Add the following paragraph at the end of this section.~~

~~The cost benefit analysis for the gaseous radwaste system is addressed in NEI 07-11, Generic FSAR Template Guidance for Cost Benefit Analysis for Radwaste Systems for Light Water Cooled Nuclear Power Reactors (Reference 11.3-201) which is currently under review by the NRC staff, and in Section 12.2. The NEI 07-11 template is incorporated by reference into Section 11.2.~~

GGNS SUP 11.3-1 Add the following at the end of this section.

The methodology for performing cost-benefit analysis for the gaseous and liquid radwaste systems is presented in Section 11.2.1.

The lowest-cost option for a gaseous radwaste treatment system augment that applies to BWRs is the 1000 cfm Charcoal/HEPA Filtration System at $8,100 per year, which yields a threshold value of 8.1 person-rem whole body or thyroid from gaseous effluents. Population doses from gaseous effluents would therefore need to be reduced by 8.1 person-rem, whole body or thyroid, for any augment to be potentially beneficial.

The Unit 3 annual whole body population dose from gaseous effluents is 1.03 person-rem/yr, which is below the 8.1 person-rem/yr threshold value (see Table 12.2-211). The thyroid population dose from gaseous effluents is 2.61 person-rem, which is also below the threshold value. Based on this comparison, no gaseous radwaste treatment system augment is cost-beneficial in reducing annual population doses, and the cost-benefit analysis demonstrates compliance with 10 CFR 50, Appendix I, Section II.D. None of the gaseous radwaste augments are cost-beneficial in reducing the annual thyroid dose from gaseous effluents for Unit 3.

11.3.2 OFFGAS SYSTEM DESCRIPTION

Releases

GGNS COL 12.2-2-A Replace the last sentence of the 1st paragraph of the Releases portion of this section with the following.

As indicated in Section 12.2.2.2 and Table 12.2-206, releases from the plant stack or vent do not exceed the maximum permissable concentration to the environment.

~~11.3.9 REFERENCES~~

~~11.3-201 NEI 07-11, Generic FSAR Template Guidance for Cost Benefit Analysis for Radwaste Systems for Light Water Cooled Nuclear Power Reactors~~

ATTACHMENT 3

G3NO-2008-00010

RESPONSE TO NRC RAI LETTER NO. 08

RAI QUESTION NO. 11.04-1

RAI QUESTION NO.11.04-1

NRC RAI 11.04-1

FSAR Section 11.4.1, STD COL 11.4-4-A states that the proposed plant will not utilize temporary low-level radioactive waste storage facilities to support plant operation. The ESBWR DCD, however, provides the capacity to store the amount of low-level radioactive waste that could be generated in 6 months of operation. Accordingly, the staff requests the applicant to describe the facilities planned for long-term storage of low-level radioactive wastes projected to be generated during the operation of Grand Gulf Unit 3, and the operational program addressing the long-term management and storage of such wastes using the guidance of Regulatory Guide 1.206 and Section 11.4 of the Standard Review Plan (NUREG-0800, Rev. 3).

Entergy Response

As of July 1, 2008, the Low Level Waste (LLW) disposal facility in Barnwell, South Carolina is no longer accepting Class B and C waste from LLW generators in states other than Connecticut, South Carolina, and New Jersey. The disposal facility in Clive, Utah, can be used to dispose of Class A LLW from Grand Gulf Unit 3. Class B and C LLW will be processed by one or both of the following methods:

1. Disposal at a LLW disposal facility that accepts Class B and C LLW from the new unit. It is anticipated that such a disposal facility will be available well before the unit loads fuel and begins operation.
2. If Option 1 is not a viable alternative at the time of unit operation, the following interim measures could be implemented:
    a. With prompt disposal of Class A LLW at a facility that accepts Class A LLW (e.g., Clive, Utah), the onsite storage space described in DCD Section 11.4 would provide Class B and C LLW storage space for significantly longer than 6 months.
    b. If additional onsite storage of LLW is necessary, Class B and C LLW could be converted into Class A LLW by mixing with other Class A LLW and disposed at a facility that accepts Class A LLW. Such mixing could be done on site or by a licensed third party at another location. This action would provide additional storage capacity beyond that provided by only prompt disposal of Class A LLW.
    c. If additional storage capacity were needed, the COL Holder could construct and manage an on-site temporary LLW facility, as described in DCD Section 11.4.1, using the guidance in Standard Review Plan Section 11.4 and BTP ETSB 11-3. This temporary storage facility and an associated overall site waste management plan would allow the station to operate while methods for further waste minimization and volume reduction are considered.

The FSAR will be revised to reflect the options described above.

Proposed COLA Revision

FSAR Section 11.4.1 will be revised as indicated in the attached draft markup.

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.

11.4 SOLID WASTE MANAGEMENT SYSTEM

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

11.4.1 SWMS DESIGN BASES

Add the following after the second paragraph.

STD SUP 11.4-1 The LWMS offsite dose calculations, which are described in Section 12.2.2.4, include the offsite doses from the SWMS liquid effluents, as they are processed by the LWMS. Similarly, the GWMS offsite dose calculations, which are described in Section 12.2.2.2, include the offsite doses from the SWMS gaseous effluents, as they are inputs processed by the GWMS. The cost-benefit analyses in Section 11.2.1 for the LWMS and in Section 11.3.1 for the GWMS address the liquid and gaseous effluents that are generated from solid waste processing by the SWMS. Because these two cost-benefit analyses include the liquid and gaseous effluents from the SWMS, the augments considered for the LWMS and GWMS apply to the SWMS, which provides inputs to those systems. As described in Sections 11.2.1 and 11.3.1, no augments are needed for the LWMS and GWMS to comply with 10 CFR 50, Appendix I, Section II.D. Therefore, no augments are needed for the SWMS to comply with 10 CFR 50, Appendix I, Section II.D.

~~Add the following to the seventh bullet~~Delete the parenthetical at the end of the seventh bullet and add the following.

~~STD~~GGNS COL 11.4-4-A ~~The site does not utilize any temporary storage facilities to support plant operation.~~Class A, B and C low level wastes (LLW) are disposed of at facilities that accept Class A, B and C LLW. In the event a disposal facility is not available for Class B and C LLW at any time following initial fuel load, these wastes will be processed by one or a combination of the following methods:

- With prompt disposal of Class A LLW at a facility that accepts Class A LLW, the onsite storage space described in DCD Section 11.4 would provide Class B and C LLW storage space for significantly longer than 6 months.

- If additional onsite storage of LLW is necessary, Class B and C LLW could be converted into Class A LLW by mixing with other Class A LLW and disposed at a facility that accepts Class A LLW. Such mixing could be done on site or by a licensed third party at another location. This action would provide additional storage capacity beyond that provided by only prompt disposal of Class A LLW.

- If additional storage capacity were needed, the COL Holder could construct and manage an on-site temporary LLW facility, as described in DCD Section 11.4.1, using the guidance in Standard Review Plan Section 11.4 and BTP - ETSB 11-3. This temporary storage facility and an associated overall site waste management plan would allow the station to continue to operate while methods for further waste minimization and volume reduction are considered.

Replace the fourth sentence of the fifth paragraph with the following.

STD COL 11.4-5-A Section 12.6 discusses how the ESBWR design features and procedures for operation will minimize contamination of the facility and environment, facilitate decommissioning, and minimize the generation of radioactive wastes, in compliance with 10 CFR 20.1406. Section 13.5 describes the requirement for procedures for operation of the radioactive waste processing system. Operating procedures for SWMS required by Section 12.4, Section 12.5, and Section 13.5 address requirements of 10 CFR 20.1406.

11.4.2.3 Detailed System Component Description

11.4.2.3.5 Wet Solid Waste Processing Subsystems

Replace the last three sentences of the second paragraph with the following.

STD COL 11.4-1-A Testing of the SWMS includes testing specified in Table 1 of RG 1.143. Implementation of the programs described in Section 12.1, for maintaining occupational dose ALARA, and Section 12.5, Radiation Protection Program, ensure that operation, maintenance, and testing of the SWMS satisfy the guidance contained in RG 8.8.

STD COL 11.4-2-A Specific equipment connection configuration and plant sampling procedures are used to implement the guidance in IE Bulletin 80-10 (DCD Reference 11.4-19). The permanent and mobile/portable non-radioactive systems, which are connected to radioactive or potentially radioactive portions of SWMS, are protected from contamination with an arrangement of double check valves in each line. The configuration of each line is also equipped with a tell-tale connection, which permits periodic checks to confirm the integrity of the line and its check valve arrangement. Plant procedures describe sampling of non-radioactive systems that could potentially become contaminated by cross-connection with systems that contain radioactive material. In accordance with the guidance in RG 1.109, exposure pathways that may arise due to unique conditions are considered for incorporation into the plant-specific ODCM if they are likely to contribute significantly to the total dose.

STD COL 11.4-3-A Waste classification and process controls are described in the Process Control Program (PCP). NEI 07-10, "Generic FSAR Template Guidance for Process Control Program (PCP) Description," which is under review by the NRC, is incorporated by reference. (Reference 11.4-201) The milestone for development and implementation of the PCP is addressed in Section 13.4.

11.4.6 COL INFORMATION

11.4-1-A Process System Regulatory Guide Compliance

STD COL 11.4-1-A This COL item is addressed in Section 11.4.2.3.

11.4-2-A Compliance with IE Bulletin 80-10

STD COL 11.4-2-A This COL item is addressed in Section 11.4.2.3.

11.4-3-A Process Control Program

STD COL 11.4-3-A This COL item is addressed in Section 11.4.2.3.

11.4-4-A Temporary Storage Facility

~~STD~~GGNS COL 11.4- This COL item is addressed in Section 11.4.1.

11.4-5-A Compliance with Part 20.1406

STD COL 11.4-5-A This COL item is addressed in Section 11.4.1.

11.4.7 REFERENCES

11.4-201 NEI 07-10, Generic FSAR Template Guidance for Process Control Program (PCP) Description.

ATTACHMENT 4

G3NO-2008-00010

RESPONSE TO NRC RAI LETTER NO. 08

RAI QUESTION NO. 11-05 BRANCH TECHNICAL POSITION-1

RAI QUESTION NO. 11-05 BRANCH TECHNICAL POSITION-1

NRC RAI 11-05 BRANCH TECHNICAL POSITION-1

FSAR Section 11.5.4.6, on process and effluent monitoring and sampling, presents information in Table 11.5-201 on sampling for several Grand Gulf Unit 3 plant systems, including the plant service water system (item 2), storm drains and cooling tower blowdown (item 11), and sanitary waste water (item 14). Footnotes to the table appear internally inconsistent in describing sampling provisions and where the supporting information may be found in the DCD and/or FSAR.

The apparent inconsistencies are:

a) Plant Service Water System (PSWS, line item 2) - For this system, footnotes No. 6 and 8 of Table 11.5-201 are provided in clarifying sampling provisions and how this sampling stream would be treated through the liquid waste management system (LWMS). However, a review of MFN 06-417 (Supp. 4) indicates that in response to DCD RAI 9.2-8 S02, footnote 8 is being replaced with footnote 4, but Table 11.5-201 does not reflect that change. Accordingly, update FSAR Table 11.5-201, line item 2 for the PSWS, to include the proper footnote citations. This information would ensure that such provisions are clearly identified in the FSAR and not likely to be omitted during the development of the sampling and analysis program for the plant specific Offsite Dose Calculation Manual in confirming compliance with liquid effluent concentration limits of Table 2 in Appendix B to Part 20 and numerical objectives of Appendix I to Part 50.

b) Storm Drains and Cooling Tower Blowdown (line item 11) – For these systems, footnote No. 4 of Table 11.5-201 does not refer to specific sampling provisions for these two systems, such as sampling points or installation of automatic composite samplers. FSAR Sections 11.5, 9.2, and 10.4 do not appear to make such provisions for either system. Accordingly, confirm whether this observation is correct and update FSAR Sections 11.5, 9.2, and 10.4 by providing specific references to DCD or FSAR sections where this information is presented, and, if not, supplement the appropriate FSAR sections with additional design details. This information would ensure that such provisions are clearly identified in the FSAR and not likely to be omitted during the development of the sampling and analysis program for the plant specific Offsite Dose Calculation Manual in confirming compliance with liquid effluent concentration limits of Table 2 in Appendix B to Part 20 and numerical objectives of Appendix I to Part 50.

c) Sanitary Waste Water System (line item 14) – For this system, footnote No. 4 of Table 11.5-201 does not refer to specific sampling provision for this system. Accordingly, add a new footnote to the system's line item 14 (Col. 3 in Table 11.5-201) indicating that grab samples can be obtained from the sewage treatment plant for the purpose of detecting the presence of radioactivity. This information would ensure that such provisions are clearly identified in the FSAR and not likely to be omitted during the development of the sampling and analysis program for the plant specific Offsite Dose Calculation Manual in confirming compliance with liquid effluent concentration limits of Table 2 in Appendix B to Part 20 and numerical objectives of Appendix I to Part 50.

Entergy Response

Entergy has reviewed the basis for the sampling provisions shown in FSAR Table 11.5-201 for (1) Plant Service Water System, (2) the Storm Drains and Cooling Tower Blowdown, and (3) the Sanitary Waste Water System. The following discussions address each of these systems and provide the bases for the sampling requirements for the effluent stream for each system. The discussions also address related changes to FSAR Table 11.5-201.

I. Plant Service Water System

Sampling Provisions for the Plant Service Water System

Entergy has reviewed the basis for sampling provisions for the Plant Service Water System (PSWS) cooling tower blowdown (effluent). Grab sampling provisions are included in the design of the PSWS (i.e., the cooling tower basin provides that capability) and a footnote with a cross-reference to FSAR Section 9.2.1.2 will be added to FSAR Table 11.5-201 for line item 2 to identify that the basin provide effluent grab sampling capability. FSAR Section 9.2.1.2 will be revised to address grab sampling provisions.

However, grab sampling capability for PSWS effluent is not provided for use in developing the sampling and analysis program for radioactive effluents in the offsite dose calculation manual (ODCM) as indicated in the RAI. An ODCM provides the procedural details for controls on expected radioactive effluents and for environmental monitoring. The PSWS for an ESBWR is designed to remain a nonradioactive system that does not have the potential to generate radioactive effluent as the result of a single pressure boundary failure. Therefore, it is inappropriate to apply radioactive effluent monitoring or sampling requirements to PSWS cooling tower effluent (blowdown).

Rather, the capability to obtain and analyze grab samples from the PSWS basin complies with the required action in NRC Inspection and Enforcement (IE) Bulletin No. 80-10, *Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release* of *Radioactivity to Environment,* which was reinforced in NRC Information Notice (IN) No. 91-40, *Contamination of Nonradioactive System and Resulting Possibility for Unmonitored, Uncontrolled Release to the Environment.* IE Bulletin 80-10 requested licensees with an operating license to establish a routine sampling/analysis or monitoring program for systems that are considered as nonradioactive (or described as nonradioactive in the FSAR), but that could possibly become radioactive through interfaces with radioactive systems.

To meet the action required in IE Bulletin 80-10, the appropriate sections of the FSAR will be revised to reflect a routine sampling and analysis program for the PSWS cooling tower basin in order to identify any contaminating events which could lead to unmonitored, uncontrolled liquid radioactive releases to the environment. In the unlikely event that PSWS would become contaminated, periodic grab samples obtained from the PSWS cooling tower basin would provide the defense in depth protection needed for detection of such contamination.

However, there is only a very small likelihood of PSWS becoming contaminated. The systems cooled by PSWS are the Reactor Component Cooling Water System (RCCWS) and the Turbine Component Cooling Water System (TCCWS). Both of these systems are also nonradioactive systems.

Of these two systems, only the RCCWS provides a buffer between PSWS and systems containing radioactive liquids. However, leakage from a radioactive system into RCCWS is also highly unlikely. If it were to occur due to a pressure boundary failure in a heat exchanger, leakage of a radioactive liquid into RCCWS would be readily detected. The RCCWS has radiation monitors to detect an increase in radioactivity. There are continuous radiation monitors in each cooling water train that would detect intersystem inleakage of radioactive liquid into the respective RCCWS loop. The continuous radiation monitors alarm on a high radiation signal, and if such an alarm occurs, the applicable RCCWS train would be isolated. See DCD Tier 2, Revision 5, Section 9.2.2.5, Section 11.5.3.2.6, and Table 11.5-4.

In addition, inleakage into RCCWS would cause water to be added to the head tank in the RCCWS. The high water level in the head tank is alarmed/annunciated in the main control room (see DCD Tier 2, Revision 5, Section 9.2.2.5). The alarm would indicate a malfunction, such as inleakage from one of the RCCWS cooling loads or a leaking makeup water valve, and would initiate actions to identify the source of inleakage.

These two methods of inleakage detection into the RCCWS mean that in addition to a failure of the pressure boundary between a radioactive system and RCCWS allowing intersystem inleakage, failures of both methods of leakage detection would have to occur before the RCCWS would have the potential for undetected inleakage of a radioactive liquid into PSWS.

Also, an additional failure would have to occur before PSWS would become contaminated. As described in DCD Tier 2, Revision 5, Section 9.2.2.2, the PSWS cools the RCCWS heat loads using plate-type heat exchangers. Leakage through holes or cracks in the plates is not considered credible based on industry experience with plate-type heat exchangers. However, this unlikely type of heat exchanger pressure boundary failure would have to occur for intersystem inleakage from RCCWS into PSWS. Intersystem inleakage does not occur from gasket failures for this type of heat exchanger.

The RCCWS heat exchangers are designed such that any gasket leakage from either RCCWS or PSWS drains to the Equipment and Floor Drain System. This design results in leakage passed a gasket from either system flows to a radioactive drain system for collection and treatment, and not into the other system, which precludes intersystem inleakage due to a gasket failure.

To summarize, the following failures would have to occur for PSWS to become contaminated with a radioactive liquid:

- Failure of a pressure boundary between a system with a radioactive liquid and the RCCWS

- Failure of the radiation monitor alarms in RCCWS to alert operators to increasing radioactivity levels in the RCCWS
- Failure of the RCCWS head tank level instrumentation to alert operators to an increasing water inventory in the RCCWS
- Failure of a plate-type heat exchanger allowing contaminated RCCWS liquid to flow into PSWS

Given that this combination of events is unlikely, the PSWS is appropriately classified as a nonradioactive system that is not a potential radioactive effluent pathway and is not subject to radioactive effluent monitoring or sampling requirements. However, for added assurance, PSWS cooling tower effluent (blowdown) will be subject to periodic grab sample and analysis requirements consistent with the action required by IE Bulletin 80-10. FSAR Table 11.5-201 line item 2 and the associated footnotes will be revised to more clearly reflect this approach for PSWS.

In revising line item 2 in FSAR Table 11.5-201, the changes will show that continuous sampling is not performed for PSWS cooling tower basin blowdown (effluent). This approach complies with the requirements of Table 2 of SRP Section 11.5 because continuous sampling is not applicable for the PSWS of an ESBWR. The Table 2 requirement for continuous sampling applies to existing BWRs for those modes of operation when a service water system is used to cool a heat exchanger with a radioactive liquid directly across the heat exchanger's pressure boundary. This occurs during shutdown for removal of decay heat via a service water system for existing BWRs.

As described above, for an ESBWR, there are no systems containing a radioactive liquid cooled directly by PSWS flow; RCCWS provides a buffer between such radioactive systems and PSWS. Because of this fundamental design improvement, an ESBWR has no need to implement continuous sampling for PSWS effluent while for existing BWRs, when service water systems are used for decay heat removal, continuous effluent sampling is performed. Also consistent with current practice, when existing BWRs are in normal operation and a component cooling water system provides a buffer for a service water system, continuous sampling is not required; sampling is performed periodically to meet IE Bulletin 80-10.

Plant Service Water System Line Item 2 Expanded to Include Cooling Tower Blowdown from Line Item 11

In addition to the changes described above, FSAR Table 11.5-201 line item 2 and the associated footnotes will be expanded to address sampling provisions for the Circulating Water System (CIRC) cooling tower blowdown (effluent). Line item 2 is the appropriate location in Table 11.5-201 to address CIRC effluent sampling provisions based on Table 2 of SRP Section 11.5, row No.3, "Service Water System and/or Circulating Water System." Accordingly, "cooling tower blowdown" identified in line item 11 of FSAR Table 11.5-201 is being deleted; CIRC is now addressed in line item 2.

Like PSWS, grab sampling provisions are included in the design of the CIRC (i.e., the cooling tower basin provides that capability). A footnote with a cross-reference to FSAR

Section 10.4.5.2.3 will be added to FSAR Table 11.5-201 for CIRC in line item 2 to identify that the basin provides effluent grab sampling capability. FSAR Section 10.4.5.2.3 will be revised to address grab sampling provisions.

However, grab sampling capability for CIRC is not provided for use in developing the sampling and analysis program for radioactive effluents in the ODCM as indicated in the RAI. The CIRC for an ESBWR is designed to remain a nonradioactive system that does not generate radioactive effluent. Therefore, it is inappropriate to apply radioactive effluent monitoring or sampling requirements to CIRC cooling tower effluent (blowdown).

Again, the capability to obtain and analyze grab samples from the CIRC basin complies with IE Bulletin 80-10. Appropriate sections of the FSAR will be revised to reflect a routine sampling and analysis program for the CIRC cooling tower basin in order to identify any contaminating events that could lead to unmonitored, uncontrolled liquid radioactive releases to the environment. In the unlikely event that CIRC would become contaminated, periodic grab samples obtained from the CIRC cooling tower basin would provide the defense-in-depth protection needed to detect such contamination.

However, there is only a very small likelihood of CIRC becoming contaminated. The main condenser, cooled by CIRC, operates at a vacuum. The continuous evacuation of the inside of the main condenser results in a lower pressure in the condenser shell than in the CIRC system. Leakage from the condenser into the tubes and CIRC does not occur. Rather, leakage of circulating water into the condenser shell is the recognized concern and is monitored by the online instrumentation as described in DCD Tier 2, Revision 5, Section 10.4.1.5.4. Condensate conductivity and selected impurities are monitored at the discharge of the condensate pumps. High condensate conductivity or impurity content, which indicates a condenser tube leak, is individually alarmed in the main control room. Condenser tube leaks are located with tracer gases or other appropriate means and repaired as needed to support plant chemistry control.

Given that contamination of CIRC water flow is unlikely, CIRC is appropriately classified as a nonradioactive system that is not a potential radioactive effluent pathway and is not subject to radioactive effluent monitoring or sampling requirements. However, for added assurance, CIRC cooling tower effluent (blowdown) will be subject to periodic grab sample and analysis requirements consistent with the action required by IE Bulletin 80-10. CIRC will be added to FSAR Table 11.5-201 line item 2 and the associated footnotes will be revised to more clearly reflect this approach for CIRC cooling tower blowdown.

COLA FSAR Revisions

Based on the response provided above for PSWS and CIRC cooling tower effluent sampling provisions, the following revisions will be made to COLA FSAR Table 11.5-201 related to line item 2:

- In the column for "Process Systems as listed in NUREG-0800, SRP 11.5 Table 2 (Draft Rev. 4)," add "... and/or Circulating Water System."

- In the column for "ESBWR System(s) that Perform the Equivalent SRP 11.5 Function," add "... and Circulating Water System." This system was moved from the row with line item 11 to be consistent with Table 2 of SRP Section 11.5.

- In the column for "In Effluent - Grab" sampling provisions, add a new footnote 9. This footnote will provide the cross-reference to the applicable FSAR sections by stating: "Grab samples can be obtained from a cooling tower basin. See Section 9.2.1.2 for the PSWS cooling tower basin and Section 10.4.5.2.3 for the Circulating Water System cooling tower basin."

- In the column for "In Effluent - Continuous" sampling provisions, delete (S&A) and Notes 6 & 8. Add a short dash. These changes indicate that continuous sampling is not performed for this effluent stream. Therefore, the RAI's request to replace footnote 8 with footnote 4 would be inappropriate.

- At the end of Table 11.5-201, add a new footnote 9 as described above.

In addition, FSAR Sections 9.2.1.2 and 10.4.5.2.3 will be revised to address grab sampling provisions.

II. Storm Drains and Cooling Tower Blowdown

Entergy has reviewed the basis for sampling provisions for the storm drains and cooling tower blowdown. As described above, the Circulating Water System (CIRC) and its cooling tower blowdown (effluent) will be moved to line item 2 in FSAR Table 11.5-201 for consistency with Table 2 in SRP Section 11.5.

For the liquid effluent in the storm drains in the storm drainage system, the sampling provisions identified in line item 11 in Table 11.5-201 will be clarified by adding a new footnote with a cross-reference to DCD Section 9.2.6.2. This DCD section describes the design details for grab sampling provisions for the only storm drainage system liquid effluent with the potential to be contaminated. As described in FSAR Section 2.4.13, the Unit 3 condensate storage tank (CST) is the only above-grade tank that contains radioactivity outside of containment. A basin surrounding the tank is designed to prevent uncontrolled runoff in the event of a tank failure; the enclosed space is sized to contain the total tank capacity. Tank overflow is also collected in this space. A sump is provided inside the retention area with provisions for sampling collected liquids prior to routing them to the Liquid Waste Management System or the storm drainage system, as per sampling and release requirements. These design features preclude uncontrolled releases to the environment. No capability for continuous sampling is required because the basin contents are treated as a batch.

Therefore, grab sampling capability for the storm drainage system (specifically for the CST basin sump) is not provided for use in developing the sampling and analysis program for radioactive effluents in the ODCM as indicated in the RAI. An ODCM provides the procedural details for controls on expected radioactive effluents and for environmental monitoring. The CST basin is designed to remain a nonradioactive system that does not generate radioactive effluent. Sampling and analysis for each batch ensures liquids sent to the storm drainage system are not radioactive. Therefore, it is inappropriate to apply radioactive effluent monitoring or sampling requirements to storm drainage system effluents.

Rather, the capability to obtain and analyze grab samples from the CST basin sump complies with IE Bulletin 80-10. To meet the action required in IE Bulletin 80-10, appropriate sections of the FSAR will be revised to reflect a per batch sampling and analysis program for the CST basin sump in order to identify any contaminating events which could lead to unmonitored, uncontrolled liquid radioactive releases to the environment. In the unlikely event that the CST would fail or overfill and the basin liquid would become contaminated, the grab sample obtained from the sump would detect such contamination before the effluent would be routed to the storm drainage system.

COLA FSAR Revisions

Based on the response provided above for the storm drains and cooling tower blowdown sampling provisions, the following revisions will be made to COLA FSAR Table 11.5-201 related to line item 11:

- In the column for "ESBWR System(s) that Perform the Equivalent SRP 11.5 Function," delete "...and Cooling Tower Blowdown." The Circulating Water System and the associated sampling provisions for cooling tower blowdown will be moved to the row with line item 2 and is addressed above.
- In the column for "In Effluent - Grab" sampling provisions, delete the parenthesis from (S&A, H3) and delete Note 6. These changes indicate that grab sampling is performed for this effluent stream, rather than downstream. Also, delete Note 4. This change indicates that sampling for the CST basin sump is not in support of the sampling and analysis program for radioactive effluents in the ODCM, but rather for meeting the action required in IE Bulletin 80-10.
- In the same column, add a new footnote 10. This footnote will provide the crossreference to the FSAR section (i.e., a DCD section incorporated by reference) by stating: "Grab samples can be obtained from the Condensate Storage Tank (CST) basin sump. See DCD Section 9.2.6.2."
- In the column for "In Effluent - Continuous" sampling provisions, delete (S&A) and Notes 3 & 6. Add a short dash. These changes indicate that continuous sampling is not performed for this effluent stream. If the effluent from the CST basin would be routed to the Liquid Waste Management System, then downstream sampling is also performed on a batch basis per line item 1.
- At the end of Table 11.5-201, add a new footnote 10 as described above.

III. Sanitary Waste Water System

Entergy has reviewed the basis for sampling provisions for the effluent from the Sanitary Waste Water System [to be re-titled as Sanitary Waste Discharge System (SWDS)]. Grab sampling provisions are included in the design of the SWDS [i.e., effluent from the SWDS provides that capability]. A footnote with a cross-reference to FSAR Section

9.2.4.2 will be added to FSAR Table 11.5-201 for line item 14 to identify that the sewage-treatment plant (STP) provides grab sampling capability. FSAR Section 9.2.4.2 will be revised to address grab sampling provisions.

However, grab sampling capability for SWDS is not provided for use in developing the sampling and analysis program for radioactive effluents in the ODCM as indicated in the RAI. An ODCM provides the procedural details for controls on expected radioactive effluents and for environmental monitoring. The SWDS for an ESBWR is designed to remain a nonradioactive system that does not have the potential to generate radioactive effluent. The SWDS is not designed to handle radioactive fluids. It is neither connected to, nor does it interface with, any system that may contain radioactive fluids. Therefore, it is inappropriate to apply radioactive effluent monitoring or sampling requirements to SWDS effluents.

Rather, the capability to obtain and analyze grab samples from the STP in the SWDS complies with IE Bulletin 80-10. Sanitary waste systems are specifically identified in IE Bulletin 80-10 as a type of system for which special consideration should be given. Appropriate sections of the FSAR will be revised to reflect a routine sampling and analysis program for the SWDS effluent in order to identify any contaminating events which could lead to unmonitored, uncontrolled liquid radioactive releases to the environment. In the unlikely event that the SWDS would become contaminated, periodic grab samples obtained from the SWDS effluent would provide the defense in depth protection needed for detection of such contamination. In the event radioactivity is detected above predetermined limits, controls are in place to prevent unmonitored, uncontrolled radioactive releases to the environment.

Accordingly, FSAR Section 9.2.4 and Figure 9.2-202 will be revised to address grab sampling provisions.

COLA FSAR Revisions

Based on the response provided above for the SWDS sampling provisions, the following revisions will be made to COLA FSAR Table 11.5-201 related to line item 14:

- In the column for "ESBWR System(s) that Perform the Equivalent SRP 11.5 Function," change "Sanitary Waste Water" to "Sanitary Waste Discharge System" to be consistent with the system title in FSAR Section 9.2.4.
- In the column for "In Effluent - Grab" sampling provisions, delete the parenthesis from (S&A, H3) and delete Note 6. These changes indicate that grab sampling is performed for the SWDS effluent stream, rather than downstream.
- In the same column, delete Note 3. This note would indicate that the SWDS liquid effluent could be sampled downstream after treatment as liquid radwaste in the Liquid Waste Management System.
- In the same column, delete Note 4. This change indicates that sampling for the SWDS is not in support of the sampling and analysis program for radioactive effluents in the ODCM, but rather for meeting the action required in IE Bulletin 80-10.

- In the same column, add a new footnote 11. This footnote will provide the crossreference to the FSAR section by stating: "Grab samples can be obtained from the sewage treatment plant. See Section 9.2.4.2."

- In the column for "In Effluent - Continuous" sampling provisions, delete (S&A) and Note 4. Add a short dash. These changes indicate that continuous sampling is not performed for this effluent stream and is not in support of the sampling and analysis program for radioactive effluents in the ODCM.

- At the end of Table 11.5-201, add new footnote 11 as described above.

In addition, FSAR Section 9.2.4.2 and Figure 9.2-202 will be revised to address grab sampling provisions.

IV. Related Changes to FSAR Table 11.5-201

While the FSAR changes described above in sections I through III show the sampling provisions to meet the required action in NRC I&E Bulletin 80-10, there are other changes to FSAR Table 11.5-201 needed to clarify the sampling provisions that support development of the plant-specific ODCM.

COLA FSAR Revisions

The following revisions will be made to COLA FSAR Table 11.5-201 related to line item 1:

- In the column for "ESBWR System(s) that Perform the Equivalent SRP 11.5 Function," add "Detergent Drain Subsystem" to be consistent with DCD Revision 5 Section 11.2.2.2.4 and Figure 11.2-1.

- In the column for "In Effluent - Grab" sampling provisions, add Note 4 which will be revised to the following: "Monitoring of effluents from the Equipment, Floor, and Detergent Drain Subsystems is included in the Offsite Dose Calculation Manual."

- At the end of Table 11.5-201, revise footnote 4 as described above.

Proposed COLA Revision

FSAR Sections 9.2.1.2, 9.2.4.2, 9.2.4.3 and 10.4.5.2.3, and Figure 9.2-202 will be revised as indicated in the attached draft markup to address grab sampling provisions.

FSAR Table 11.5-201 will be revised as indicated in the attached draft markup and described in the response above.

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.

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.

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.

Detailed System Description

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 to preclude long-term corrosion and fouling of the PSWS based on site water quality analysis.

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

GGNS CDI

Unit 3 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.

Delete the last paragraph.

Operation

Add the following ~~text~~ to the end of the second paragraph of this section.

GGNS SUP 9.2.1-1

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).

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.

9.2.4 POTABLE AND SANITARY WATER SYSTEMS

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

Replace the information in this section with the following ~~information~~.

9.2.4.1 DESIGN BASES

GGNS CDI

Safety Design Basis

The Potable Water System (PWS) and Sanitary Waste Discharge System (SWDS) do not perform any safety-related function. Therefore the PWS and SWDS have no safety design bases.

Power Generation Design Basis

The PWS and SWDS are designed to provide potable water supplies and sewage treatment necessary for normal plant operation and shutdown periods. The PWS is designed to supply 12.6 liters per second (200 gallons per minute) of potable water during peak demand periods.

The PWS is designed to produce and maintain the quality of water required by the authorities having jurisdiction.

The SWDS is designed to produce an effluent quality required by federal, state, and local regulations and permits.

9.2.4.2 SYSTEM DESCRIPTION

Potable Water System

The PWS consists of pumps, water heaters, and interconnecting piping and valves as shown on Figure 9.2-201. PWS component characteristics are shown in Table 9.2-203. Treated water from the GGNS site water tower is supplied to the potable water storage tank. In addition to non-radiological areas, potable water is provided to areas where inadvertent backflow into the system could result in radiological contamination of the potable water. For those branches with outlets in areas where the potential for radiological contamination exists, backflow prevention is provided through the installation of air gaps.

Sanitary Waste Discharge System

The SWDS consists of a prefabricated, aerobic, digestion-type sewage-treatment plant (STP), capable of treating between 100,000 and 160,000 gallons per day of sanitary sewage. The plant includes a comminutor and clarifier in addition to the aeration chamber. The effluent is discharged to Stream A. For meeting the action required by NRC Inspection and Enforcement Bulletin No. 80-10, routine sampling and analysis will be performed for the SWDS by obtaining grab samples from the SWDS effluent. The samples provide the means to identify events which could contaminate the environment. The quality of effluent meets, as a minimum, the standards established by federal, state, and local regulations and permits. The ~~sewage treatment plant~~STP is shared with Unit 1. A simplified diagram of the SWDS is shown in Figure 9.2-202.

9.2.4.3 SAFETY EVALUATION

Potable Water System

The PWS has no safety-related function and is not connected to any safety-related structure, system or component. The PWS meets GDC 60 for features provided to control the release of liquid effluents containing radioactive material. Failure of the system will not compromise any safety-related equipment or component and will not prevent safe shutdown of the plant. The PWS does not handle radioactive fluids. It is not connected to any system that may contain radioactive fluids. Any possibility of back flow which could introduce radioactive fluids into the PWS is precluded by the installation of air gaps.

Sanitary Waste Discharge System

The SWDS has no safety-related function and is not connected to any safety-related structure, system or component. The SWDS System meets GDC 60 for features provided to control the release of liquid effluents containing radioactive material. Failure of the system will not compromise any safety-related equipment or component and will not prevent safe shutdown of the plant.

The SWDS does not handle radioactive fluids. It is neither connected to, nor does it interface with any system that may contain radioactive fluids. This system does not have any potential for radioactive contamination. ~~SWDS effluent is monitored as described in Table 11.5-201.~~As a precautionary measure, the effluent of the SWDS is sampled periodically for potential radiological contamination (refer to Figure 9.2-202). In the event radioactivity is detected above predetermined limits, controls are in place to prevent unmonitored, uncontrolled radioactive releases to the environment.

9.2.4.4 INSPECTION AND TESTING

Ongoing monitoring of the availability of the PWS and SWDS is maintained through regular use of the systems during plant operation.

9.2.4.5 INSTRUMENTATION APPLICATION

The PWS and SWDS are furnished with instrumentation that will permit local and/or remote monitoring and control of each respective process. This instrumentation

NOTES

1. DETAILED INFORMATION PROVIDED BY THE VENDOR.
2. ALL COMPONENT NUMBERS START WITH U44.
3. SAMPLES FOR RADIOACTIVITY CAN BE OBTAINED FROM THE EFFLUENT OF THE SWDS.

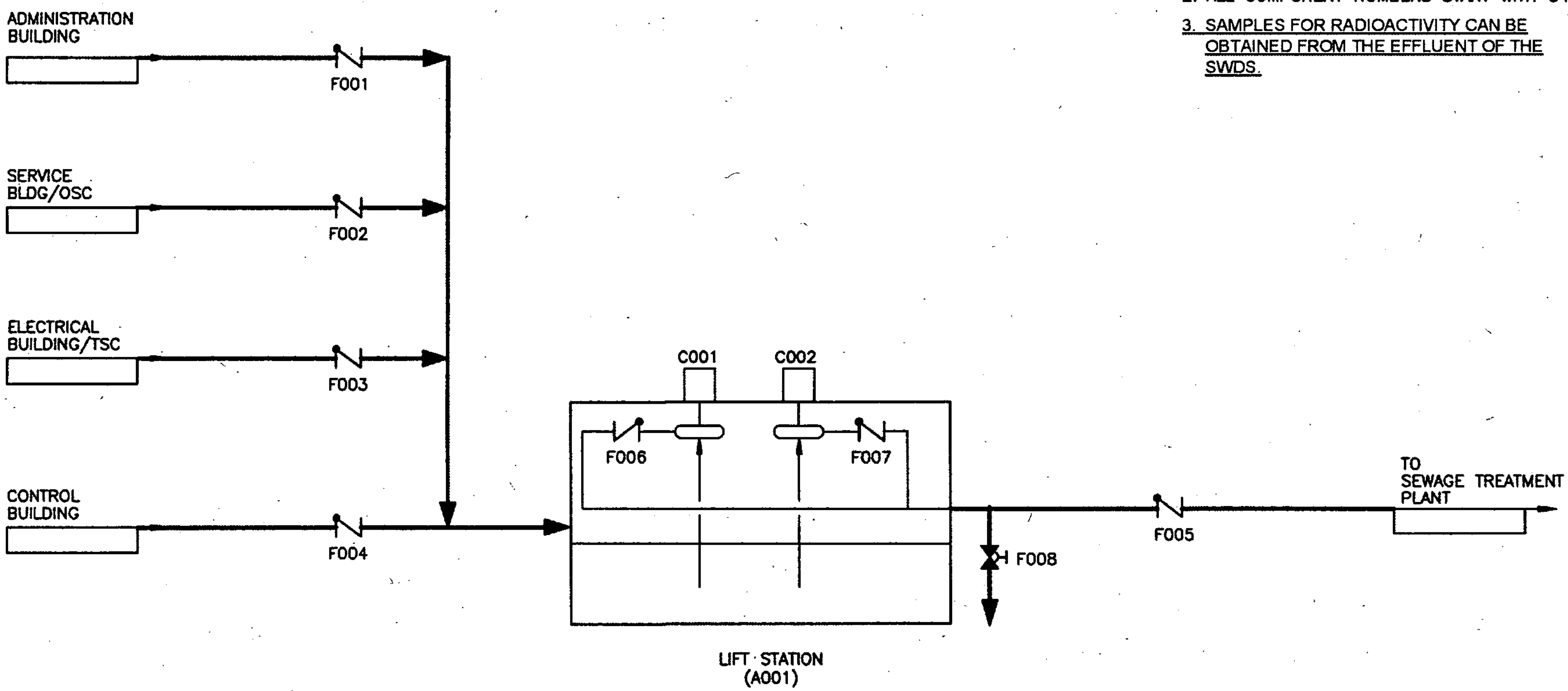

Figure 9.2-202. Sanitary Waste Discharge System Simplified Diagram

vary with seasons. Algaecide is applied, as necessary, to control algae formation in the cooling towers.

The following chemicals are used, as specified by plant chemistry to control circulating water chemistry:

- Biocide - 10 to 15 percent sodium hypochlorite with the aid of a surfactant, if required
- Algaecide - 10 to 15 percent sodium hypochlorite with the aid of a surfactant, if required
- pH Adjuster - 90 percent sulfuric acid
- Corrosion Inhibitor - 50 to 60 percent zinc chloride
- Scale Inhibitor - 55 percent organic phosphate with the aid of a dispersant, if required

Chemicals selected are compatible with selected materials or components used in the CIRC.

10.4.5.2.3 System Operation

Add the following at the end of this section.

GGNS CDI The four circulating water pumps take suction from the circulating water pump pit and circulate the water through the main condenser. Circulating water returns through the condenser discharge to the cooling towers. During normal operation, the NDCTs and MDCTs distribute circulating water through nozzles in the cooling tower distribution headers. The water then falls through fill material to the basin beneath the tower and, in the process, rejects heat to the atmosphere. Provisions are made during cold weather to stop circulating water flow through the MDCT and reduce overall flow through the system. Circulating water flow may also be returned directly to the NDCT basin.

The Station Water System (SWS) supplies makeup water to the NDCT basin to replace water losses due to evaporation, wind drift, and blowdown. Blowdown from the CIRC is taken from the discharge weir of the NDCT and is discharged to the plant outfall.

A condenser tube cleaning subsystem cleans the circulating water side of the main condenser tubes.

Leakage of condensate from the main condenser into the CIRC via a condenser tube leak is not likely during power operation, since the CIRC normally operates at a greater pressure than the shell (condensate) side of the condenser. For meeting the action required by NRC Inspection and Enforcement Bulletin No. 80-10, routine sampling and analysis will be performed for the CIRC by obtaining grab samples from the CIRC cooling tower basin. The samples provide the means to identify any events which could lead to unmonitored, uncontrolled radioactive releases to the environment.

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.

10.4.5.6 Flood Protection

Add the following to the end of this section.

GGNS CDI Failure of a pipe or other component in the CIRC, including the NDCT cooling tower basin, in the yard would not have an adverse impact on the intended design functions of safety-related SSCs.

A failure of the NDCT basin would bound other failures of yard piping and components in the CIRC. The cooling towers are located on a plateau on a grade of approximately elevation 156 ft above mean sea level (msl), and the power block is on a grade of 133.5 ft msl, with the elevation of the power block buildings floor grade at 134 ft msl, six inches above grade (Section 2.4.1.1; Figure 2.4.1-201, Sh. 1). The power block area is separated from the cooling tower area by a retaining wall that runs the length of the western edge of the area, and continues east on the north side to a point approximately equal to the location of the eastern edge of

STD COL 11.5-3-A

TABLE 11.5-201 (SHEET 1 OF 4)
PROVISIONS FOR SAMPLING LIQUID STREAMS

No.	Process Systems as listed in NUREG-0800, SRP 11.5 Table 2 (Draft Rev. 4)	ESBWR System (s) that Perform the Equivalent SRP 11.5 Function (Note 1)	In Process	In Effluent	
			Grab Notes 2 & 7	Grab Notes 2 & 7	Continuous Notes 2 & 7
1.	Liquid Radwaste (Batch) Effluent System Note 3	Equipment (Low Conductivity) Drain Subsystem Floor (High Conductivity) Drain Subsystem Detergent Drain Subsystem	S&A	S&A, H3 Note 4	-
2.	Service Water System and/or Circulating Water System	Plant Service Water System and Circulating Water System	-	S&A, H3 Note 9	~~(S&A)~~ ~~Notes 6 & 8~~ -
3.	Component Cooling Water System	Reactor Component Cooling Water System	S&A	S&A H3	(S&A) Notes 6 & 8
4.	Spent Fuel Pool Treatment System	Spent Fuel Pool Treatment System	S&A	S&A H3	(S&A) Notes 6 & 8
5.	Equipment & Floor Drain Collection and Treatment Systems	LCW Drain Subsystem HCW Drain Subsystem Detergent Drain Subsystem Chemical Waste Drain Subsystem Reactor Component Cooling Water System (RCCWS) Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
6.	Phase Separator Decant & Holding Basin Systems	Equipment (Low Conductivity) Drain Subsystem Floor (High) Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8

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TABLE 11.5-201 (SHEET 2 OF 4) PROVISIONS FOR SAMPLING LIQUID STREAMS

No.	Process Systems as listed in NUREG-0800, SRP 11.5 Table 2 (Draft Rev. 4)	ESBWR System (s) that Perform the Equivalent SRP 11.5 Function (Note 1)	In Process	In Effluent	
			Grab Notes 2 & 7	Grab Notes 2 & 7	Continuous Notes 2 & 7
7.	Chemical & Regeneration Solution Waste Systems	Chemical Waste Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
8.	Laboratory & Sample System Waste Systems	Chemical Waste Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
9.	Laundry & Decontamination Waste Systems	Detergent Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
10.	Resin Slurry, Solidification & Baling Drain Systems	Equipment (Low Conductivity) Drain Subsystem, Floor (High) Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
11.	Storm & Underdrain Water System	Storm Drains~~ and Cooling Tower Blowdown~~	-	~~(~~S&A, H3~~)~~ Notes 3~~, 4, & 6~~& 10	~~(S&A)~~ ~~Notes 3& 6~~ -
12.	Tanks and Sumps Inside Reactor Building	Equipment (Low Conductivity) Drain Subsystem Floor (High) Drain Subsystem Chemical Waste Drain Subsystem Detergent Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
13.	Ultrasonic Resin Cleanup Waste Systems	Note 5	-	Note 5	Note 5
14.	Non-Contaminated Waste Water System	Sanitary Waste ~~Water~~Discharge System	-	~~(~~S&A, H3~~)~~ ~~Notes~~Note ~~3, 4 & 6~~11	~~(S&A)~~ ~~Note 4~~ -

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TABLE 11.5-201 (SHEET 3 OF 4)
PROVISIONS FOR SAMPLING LIQUID STREAMS

No.	Process Systems as listed in NUREG-0800, SRP 11.5 Table 2 (Draft Rev. 4)	ESBWR System (s) that Perform the Equivalent SRP 11.5 Function (Note 1)	In Process	In Effluent	
			Grab Notes 2 & 7	Grab Notes 2 & 7	Continuous Notes 2 & 7
15.	Liquid Radioactive Waste Processing Systems (Includes Reverse Osmosis Systems)	Liquid Radioactive Waste Processing Systems (Includes Reverse Osmosis Systems)	S&A	(S&A, H3)	(S&A) Notes 6 & 8

Notes for Table 11.5-201:

1. Table 11.5-5 addresses sampling provisions for BWRs as identified in Table 2 of SRP 11.5. For process systems identified for BWRs in Table 2, but not shown in Table 11.5-5, those systems are not applicable to ESBWR. In some cases, there are multiple subsystems that are used to perform the overall equivalent SRP function and are listed as such in the column.

2. S&A = Sampling & Analysis of radionuclides, to include gross radioactivity, identification and concentration of principal radionuclides and concentration of alpha emitters; R = Gross radioactivity (beta radiation, or total beta plus gamma); H3 = Tritium

3. Liquid Radwaste is processed on a batch-wise basis. The Liquid Waste Management System sample tanks can be sampled for analysis of the batch. See DCD Section 11.2.2.2 for more information on Liquid Radwaste Management.

4. Monitoring of effluents from ~~storm drains, the cooling tower blow down, and sanitation wastes are included in the plant specific ODCM~~the Equipment, Floor, and Detergent Drain Subsystems is included in the Offsite Dose Calculation Manual.

5. The ESBWR does not include ultrasonic resin cleanup waste system at this time. Should one be installed, the Liquid Waste Management System would provide sampling and monitoring provisions.

6. The use of parenthesis indicates that these provisions are required only for the systems not monitored, sampled, or analyzed (as indicated) prior to release by downstream provisions.

7. The sensitivity of detection, also defined here as the Lower Limit of Detection (LLD), for each indicated measured variable, is based on the applicable radionuclide (or collection of radionuclides as applicable) as given in ANSI/IEEE N42.18.

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**TABLE 11.5-201 (SHEET 4 OF 4)
PROVISIONS FOR SAMPLING LIQUID STREAMS**

No.	Process Systems as listed in NUREG-0800, SRP 11.5 Table 2 (Draft Rev. 4)	ESBWR System (s) that Perform the Equivalent SRP 11.5 Function (Note 1)	In Process	In Effluent	
			Grab Notes 2 & 7	Grab Notes 2 & 7	Continuous Notes 2 & 7

Notes for Table 11.5-201 (continued):

8. Processed through radwaste Liquid Waste Management System (LWMS) prior to discharge. Therefore, this process system is monitored, sampled, or analyzed prior to release by downstream provisions. See Note 6 above. Depending on Utility's discretion, additional sampling lines may be installed. Continuous Effluent sampling is not required per Standard Review Plan 11.5 Draft Rev. 4, April 1996, Table 2 for this system function.

9. Grab samples can be obtained from a cooling tower basin. See Section 9.2.1.2 for the PSWS cooling tower basin and Section 10.4.5.2.3 for the Circulating Water System cooling tower basin.

10. Grab samples can be obtained from the Condensate Storage Tank (CST) basin sump. See DCD Section 9.2.6.2.

11. Grab samples can be obtained from the sewage treatment plant. See Section 9.2.4.2.

ATTACHMENT 5

G3NO-2008-00010

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	
FSAR Table 1.6-201 will be revised as indicated in the draft markup contained in Attachment 1 to remove the NEI 07-11 entry on Sheet 2 of the table.	✓		Future COLA submittal.
FSAR Sections 11.2.1 and 11.2.7 will be revised as indicated in the draft markup contained in Attachment 1.	✓		Future COLA submittal.
FSAR Section 12.2.2.4 will be revised to include the population dose results as indicated in the draft markup contained in Attachment 1.	✓		Future COLA submittal.
FSAR Sections 11.3.1 and 11.3.9 will be revised as indicated in the draft markup contained in Attachment 2.	✓		Future COLA submittal.
FSAR Section 11.4.1 will be revised as indicated in the draft markup contained in Attachment 3	✓		Future COLA submittal.
FSAR Sections 9.2.1.2, 9.2.4.2, 9.2.4.3 and 10.4.5.2.3, and Figure 9.2-202 will be revised as indicated in the draft markup contained in Attachment 4 to address grab sampling provisions.	✓		Future COLA submittal.
FSAR Table 11.5-201 will be revised as indicated in the draft markup contained in Attachment 4.	✓		Future COLA submittal.