Attachment 16 to

GNRO-2012/00039

Entergy Nuclear Grand Gulf Nuclear Station License Renewal Environmental Audit – Hydrology Ford - Grand Gulf Nuclear Site Needs List for Hydrology

Hydrology Information Needs for the
Grand Gulf Nuclear Station (GGNS)
License Renewal Environmental Review

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- **(1)** Specific information for groundwater radial wells, including locations, designs, depths, and yields (and well logs, if available). **(2)** Include information on wells that are currently inactive or installed but not yet operational. **(3)** Also include any studies assessing groundwater drawdown (and related impacts) as a result of the facility's use of Ranney wells.

  Response (1): The radial well locations, design, depths and yields are as follows:

  - Location: Refer to Figure 2.3-7 (Sheet 2 of 2) of the GGNS ER (page 2-55) and the GGNS UFSAR table included in Attachment A.
  - Design: Refer to Figure 3.2-2 of the GGNS ER (page 3-7).
  - Depths and Yields: Refer to Table 2.3-3 of the GGNS ER (page 2-45).

  Response (2): As discussed in Section 2.3.4.3 of the GGNS ER (page 2-44), eight wells were installed for dewatering around GGNS Unit 1. Since there has been no need for plant dewatering activities in previous years, there has been no need to operate these wells. However, these wells are still classified as "active' and are permitted as such through MDEQ's groundwater withdrawal permitting program. It should be noted that only one of the eight wells (DW-6) currently has a pump associated with it.

  As shown in Table 2.3-3 and discussed in Section 2.3.4.3 of the GGNS ER (page 2-44), an additional radial well (Radial Well #6) has been installed. Startup and testing for this new well are currently scheduled to begin March 31, 2012 and be completed by April 24, 2012. The location of this new well is shown in Figure 2.3-7 (Sheet 2 of 2) of the GGNS ER (page 2-55); well design is shown in Figure 3.2-2 of the GGNS ER (page 3-7); and well depth is shown in Table 2.3-3 of the GGNS ER (page 2-45).

  Response (3): The study assessing groundwater drawdown and related impacts associated with the radial wells, which was used as the reference (Enercon 2010f) in Sections 4.7.5.1 and 4.7.5.2 of the GGNS ER (pages 4-19 and 4-20), is included in Attachment B. For historical purposes, groundwater drawdown tests associated with the radial wells are discussed in Sections 2.4.13.2.5 and 2.4.13.2.6 of the GGNS UFSAR and are included in Attachment C.

- **(1)** Permits for all on-site wells, including those that are currently inactive, new wells, domestic wells, and monitoring wells; and all related monitoring reports for the past 5 years.

(2) Please also include information on the Groundwater Protection Initiative and related site characterization and monitoring reports dating back to its inception at the GGNS (in 2007) to the present. **(3)** Also, provide a description of what other measures (permits, best management practices, or monitoring protocols) are in place to protect groundwater quality.

Response (1): Well permits have been included in Attachment D. As specified in footnote "a" to Table 2.3-3 of the GGNS ER (page 2-46), no water use reporting was required by MDEQ in 2006 and 2007. Therefore, only the 2005, 2008, 2009 and 2010 reports have been included in Attachment E. The references listed in Table 2.3.3 of the GGNS ER also represent these 2008 – 2010 reports.

- **Response (2):** Refer to Section 2.3.3 of the GGNS ER (pages 2-34 through 2-40) for information on the Groundwater Protection Initiative (GPI) and related site characterization. In addition, as discussed further below (environmental site assessments or hydrological studies (aquifer tests, etc.) conducted onsite), site characterization activities were also conducted in conjunction with the SERI Combined Operating License Application (COLA) Environmental Report.

  A discussion of the monitoring results associated with the GPI is provided in Section 9.1.3.8 of the GGNS ER. Monitoring results for 2007 – 2010 which were reported in GGNS' Annual Radioactive Effluent Release Reports are included in Attachment F.

  Response (3): As discussed in Section 3.2.8.4 of the GGNS ER (page 3-27), the use and storage of chemicals at GGNS are controlled in accordance with Entergy's fleet chemical control procedure and site-specific spill prevention plans (SPCC and Stormwater Pollution Prevention Plans). In addition, as discussed in Section 3.2.8.1 of the GGNS ER (page 3-23), nonradioactive wastes are managed in accordance with Entergy's waste management procedure which contains preparedness and prevention control measures. The best management practices and prevention measures contained in these procedures and plans are designed to prevent and minimize the potential for a chemical release to the environment and subsequently to groundwater.

- **(1)** Permits for all surface water intakes and discharges, including surface impoundments, and related (i.e., required) monitoring reports submitted to the state for the past 5 years. This should include a complete version of the current NPDES permit (MS0029521) and any accompanying maps showing outfalls, monitoring locations, or other relevant site features. **(2)** Also include any applications for NPDES permit renewal, if one has been submitted.

  Response (1): GGNS does not have a surface water intake; therefore, there is no associated permit. GGNS also does not have any surface impoundments as it relates to the treatment of hazardous waste. A copy of GGNS' NPDES Permit issued September 2, 2011 is included in Attachment G. Monthly DMR's submitted to the state over the previous 5 years (2007 – 2011) are included on a CD in the Attachment H sub-folder.

Response (2): The last GGNS NPDES Permit renewal application that was submitted to MDEQ on December 28, 2007 is included in Attachment I.

- Any permits related to stormwater (if separate from NPDES permit) and storm management plan. If no plan exists, provide a listing of best management practices used by the facility to control stormwater.

  Response: Attachment J includes the following:

  - Baseline Storm Water General NPDES Permit MSR000883 and associated Stormwater Pollution Prevention Plan.
  - Small Construction General Permit MSR15 (inclusive of Stormwater Pollution Prevention Plan).
  - Large Construction General Permit MSR10-5946 and associated Stormwater Pollution Prevention Plan

- From the past 5 years, any release notifications or violation information (e.g., Notice of Violations) associated with surface water discharges, septic or sewage systems, and groundwater or soil contamination (including spills, leaks, and other releases).

  Response (Nonradiological): There have been no spills that triggered the reporting requirements associated with the 40CFR110 (oil spills to navigable waters), 40CFR262 (hazardous waste releases), 40CFR280 (underground storage tank releases) or 40CFR302 (chemical spills) over the previous 5 years (2007 – 2011).

  There have also been no regulatory notices of violations issued to the facility over the previous five years (2007–2011) as it relates to GGNS' environmental program areas.

  Noncompliances associated with the GGNS NPDES Permit over the previous 5 years (2007 – 2011) are shown below. As a note, Table 9.1-3 of the GGNS ER includes noncompliances from 2006 - 2010.

GGNS NPDES Permit Noncompliances, 2007–2011		
NPDES Outfall	**Noncompliance**	**Date**
013 (Sedimentation Basin A)	Unauthorized discharge	March 2007
010 (Sewage Treatment Plant)	pH exceedance	January 2008
NA	Late Discharge Monitoring Report submittal	May 2008
002 (Cooling Tower Blowdown)	Total recoverable zinc exceedance	July 2008
010 (Sewage Treatment Plant)	Free residual chlorine exceedance	August 2008
016 (Energy Services Center)	Missed sample	January 2009
Outfall 007 (Stormwater)	Total dissolved solids exceedance	March 2011
016 (Energy Services Center)	Total residual chlorine exceedance	July 2011

Response (Radiological): Over the previous five years, there has only been one event that has triggered the voluntary notification reporting requirements under NEI 07-07 (Industry Groundwater Protection Initiative). In April 2011, it was determined that unmonitored tritium contaminated water from the Unit 2 Turbine Building east and west sumps was being discharged to the storm drain to Lake Hamilton via Sedimentation Basin B. The condition reports associated with this event are included in Attachment K, and documentation associated with reporting the event is included in Attachment L.

- From the past 5 years, documentation related to any remedial (cleanup) activities at the GGNS.

  Response: There have been no remedial activities conducted at the site over the previous 5 years (2007 – 2011) nor are there any current or ongoing remediation activities.

- Any environmental site assessments or hydrological studies (aquifer tests etc.) conducted onsite since the facility was built.

  Response: The following significant environmental site assessments have been completed since GGNS was constructed:

  - GGNS Early Site Permit Application (ESP) Environmental Report submitted October 21, 2003 and revised October 3, 2005 (included in Attachment R)
  - NRC ESP Environmental Impact Statement (NUREG-1817)
  - SERI COLA Environmental Report submitted February 27, 2008 (included in Attachment R).
  - SERI extended power uprate license amendment request submitted September 8, 2010. Environmental Assessment associated with this amendment is included in Attachment M.
  - GGNS License Renewal Application submitted November 1, 2011

  The following hydrological studies (aquifer tests etc.) have been conducted onsite since the facility was built:

  - Hydro Group. "Annual Report Collector Well Performance, PSW Wells 1, 3, 4, and 5 for System Energy Resources, Inc. (Grand Gulf Nuclear Station) of Port Gibson, Mississippi. February 1989 (included as Attachment 4 to the Enercon evaluation included in Attachment B)
  - Groundwater Associates, Inc. "Evaluation of Means for Supplying Plant Service Water Requirements, Grand Gulf Nuclear Station." June, 1994. (included as Attachment 1 to the Enercon evaluation included in Attachment B)

- SERI COLA Part 2 FSAR Section 2.4 describes the hydrologic setting of GGNS specific to the proposed Unit 3. Section 2.4.12 describes hydrogeological studies conducted at GGNS between 2006 and 2007, including discussion of pump tests completed in the vicinity of Unit 3 and aquifer characteristics. Measured groundwater levels in monitoring wells and groundwater potentiometric surface maps are also provided. Section 2.5.4.1 discusses geologic features at GGNS, and includes a comparison of the Unit 3 COLA evaluation of stratigraphy for Unit 3 with historic assessments for GGNS Unit 1 in 2.5.4.1.1.2. The COLA FSAR Section 2.5.4.6 provides additional discussion of groundwater occurrence specific to Unit 3. The sections referenced above are included in Attachment N.

- The SERI extended power uprate license amendment request and Section 2.3 of the GGNS ER both evaluated the impacts associated with radial well pumping. This evaluation is included in Attachment B.

- Status of the EPU scheduled for 2012

  Response: As discussed in Section 3.2.2.1 of the GGNS ER (page 3-2), after implementation of EPU circulating water makeup is estimated to be 27,860 gpm with 7,170 gpm being returned to the Mississippi River via blowdown; therefore, a maximum of 20,690 gpm of water would be consumed, mainly through evaporation and drift from the natural draft and auxiliary cooling towers. These make-up, blowdown and evaporation/drift values continue to be valid.

- Any studies conducted to evaluate thermal discharge to the Mississippi River and thermal monitoring reports.

  Response: Sections 2.3.3 and 5.3.2.1 of the GGNS Unit 3 COLA Environmental Report discusses bathymetric survey and temperature and velocity measurements conducted in October 2006. Based on a discharge flow at the time of 5,700 gpm with an average river flow of 560,000 cfs, the Unit 1 discharge was barely perceptible. These specific sections from the GGNS COLA are included in Attachment O.

  In addition as discussed in Section 3.2.2.1 of the GGNS ER (Page 3-3), thermal monitoring was conducted during the winter and summer months preceding the submittal year of the permit renewal application as required by the NPDES Permit. Protocols for conducting the thermal monitoring, which are included in Attachment P, were performed in accordance with Attachment III to GGNS Procedure 08-S-09-4 (NPDES Sampling). The thermal monitoring report, which was included in the 2007 NPDES Permit renewal application, is included in Attachment Q. No other thermal-related monitoring as specified in the NPDES Permit has been triggered.

- All references cited in the ER pertaining to hydrology or the facility's water-related systems (cooling, fire protection, plant service, waste etc.)

Response: References listed below are included in Attachment R unless otherwise specified.

- Bechtel. 1986. Bechtel, Radial Wells 1, 3, 5 - Reduction of Multiple Well Test Data (Geotech Calc G-035). Approved July 31, 1986 ·

- Entergy. 2008a. Entergy Nuclear Fleet Procedure EN-CY-109, Sampling and Analysis of Groundwater Monitoring Wells, Revision 2. April 1, 2008

- Entergy. 2011a. Entergy Nuclear Fleet Procedure EN-CY-111, Radiological Ground Water Monitoring Program, Revision 1. February 16, 2011

- GEHNE (GE Hitachi Nuclear Energy). 2010. GE Hitachi Nuclear Energy. Project Task Report Entergy Operations, Inc. Grand Gulf Nuclear Station Extended Power Uprate Task T0605: Main Condenser/Circulating Water/Normal Heat Sink Performance & Discharge Limits, Revision 0. March 2010 – **THIS IS A PROPRIETARY DOCUMENT AND WILL BE PROVIDED UPON REQUEST**

- GGNS (Grand Gulf Nuclear Station Units 1 and 2). 2003. Grand Gulf Nuclear Station, Lesson Plan Number GLP·GPST·P4100, General Plant Systems Training, Standby Service Water (SSW) - P41. May 2, 2003

- GGNS. 2006a. Grand Gulf Nuclear Station Water Use Program (Annual Water Use Survey - 2005) – **ALREADY INCLUDED IN ATTACHMENT E**

- GGNS. 2007a. Correspondence to Lisa May-McKenzie, Mississippi Department of Environmental Quality, Office of Land and Water Resources, from Rusty Shaw, Grand Gulf Nuclear Station, Groundwater Withdrawal Permit Modification, GEXO-2007/00063. September 6, 2007

- GGNS. 2010a. Grand Gulf Nuclear Unit 1 Updated Final Safety Analysis Report. April 5, 2010

- GGNS. 2010b. Grand Gulf Nuclear Station (GGNS), Water Use Program (Annual Water Use Survey - 2008 - 2009) - **ALREADY INCLUDED IN ATTACHMENT E**

- GGNS. 2011a. Grand Gulf Nuclear Station National Pollutant Discharge Elimination System Permit MS0029521 **- ALREADY INCLUDED IN ATTACHMENT G**

- GGNS. 2011i. Grand Gulf Nuclear Station (GGNS), 2010 Water Use Program Survey - **ALREADY INCLUDED IN ATTACHMENT E**

- GGNS. 2011j. Site Procedure 08-S-03-10, Chemistry Sampling Program, Revision 48. January 20, 2011

- MDEQ (Mississippi Department of Environmental Quality). 2007. Correspondence to Rusty Shaw, Entergy Operations, Grand Gulf Nuclear Station, from James Crawford, Mississippi Department of Environmental Quality. Groundwater Withdrawal. October 8, 2007

- MDEQ. 2009a. Mississippi Department of Environmental Quality, Office of Land and Water Resources, Groundwater Planning and Protection Division, Records of Public-Supply Wells in Mississippi. Accessed at http://www.deq.state.ms.us/MDEQ.nsf/page/L&W_WaterUseProgram?OpenDocument

- MDEQ. 2010a. Mississippi Department of Environmental Quality, Office of Land and Water Resources, Water Well Drillers, Radial-Search, Wells. Email correspondence from Tommie Whitten Mississippi Department of Environmental Quality. September 1, 2010

- MDEQ. 2010b. Radial Search Map, Source Water Assessment Resources, Groundwater Planning and Protection Division, Office of Land and Water Resources. Accessed at http://landandwater.deq.ms.gov/swap/RadialSearch/SourceWater.html

- SERI (System Energy Resources, Inc.). 2005a. Grand Gulf Early Site Permit Application. Part 2, Site Safety Analysis Report. October 3, 2005

- SERI 2008a. Grand Gulf Nuclear Station Unit 3 Combined License Application. Part 2. Final Safety Analysis Report. February 2008 - **ALREADY INCLUDED IN ATTACHMENT N**

- SERI. 2008b. Grand Gulf Nuclear Station Unit 3 Combined License Application. Part 3, Environmental Report. February 2008

- USACE (United States Army Corps of Engineers) 1998. 1998 Mississippi River Navigation Charts, Upper Mississippi River Mile 300 to Gulf of Mexico. Map No. 100. Mississippi Valley Division. Accessed at: http://www.mvd.usace.army.mil/Gis/navbook/main.html

- USEPA. 2010. USEPA Envirofacts, Safe Drinking Water Information System, List of Water Systems in SDWIS, Claiborne County. Accessed at http://oaspub.epa.gov/envirosdw_query_v2.get_list?wsys_name=&fac_search=fac_beginning&fac_county=CLAIBORNE&pop_serv=500&pop_serv=3300&pop_serv=10000&pop_serv=100000&pop_serv=100001&sys_status=active&pop_serv=&wsys_id=&fac_state=MS&last_fac_name=&page=1&query_results=&total_rows_found=

- USGS. 2009. Groundwater Atlas of the United States. Arkansas, Louisiana, Mississippi, HA 730-F, by Robert A. Renken. Accessed at: http://pubs.usgs.gov/ha/ha730/ch_f/index.html

- USNRC (United States Nuclear Regulatory Commission). 1981. Final Environmental Statement Related to the Operation of Grand Gulf Nuclear Station, Units 1 and 2 Docket Nos. 50-416 and 50-417, NUREG-0777. September 1981

- USNRC. 2006a. NUREG-1817. Environmental Impact Statement for an Early Site Permit (ESP) at the Grand Gulf ESP Site, Final Report. April 2006

- USNRC. 2006b. NUREG-1840. Safety Evaluation of Early Site Permit Application in the Matter of System Energy Resources, Inc., a Subsidiary of Entergy Corporation, for the Grand Gulf Early Site Permit Site, Final Report. April 2006

Meetings Requested:

Meeting with applicant staff that is familiar with the following areas:

Program Area	Contact
Facility's Cooling Water System	Steve Lee
Stormwater Management System	Charles Shepphard and John Lassetter
Fire Protection System	Randy Sorrels
Plant Service Water System	Steve Lee
Standby Service Water System	Bob Townley, Randy Sorrels and Steve Lee
Evaporation Ponds (if any)	None exist on-site.
Underground Infrastructure (piping and tanks)	Bob Townley
Waste systems (radwaste and nonradwaste; liquids and solids; wet and dry)	Chip Schoonover, Paul Stokes and Charles Shepphard
Sanitary Waste Treatment Facility	Mike Michalski
Requirements and reporting for various monitoring programs (e.g., tritium monitoring)	Rosie Bevily, John Lassetter and Charles Shepphard