From: "Williams, Dana M." <X2DANAWI@southernco.com>
To: "Christian Araguas" <CJA2@nrc.gov>
Date: 12/27/2006 2:00:26 PM
Subject: RAI-Hydrology Letter
cc: "Amy G. Aughtman" <AGAUGHTM@southernco.com>,"James T. Davis" <JTDAVIS@southernco.com>,"Tom C. Moorer" <TCMOORER@southernco.com>

Christian:

Attached is the PDF version of our RAI Hydrology letter. I am putting the original in the mail today via next day FedEx delivery to your Document Control Desk.

Jim told me about your house and I am really sorry to hear that. I hope things are going better for you.

Thank you,

<<AR-06-2865 RAI Resp (Hydrology).pdf>>

Dana Williams
Southern Nuclear Operating Company
Nuclear Development
P 205.992.5934
F 205.992.5296

Hearing Identifier: Vogtle_Non_Public
Email Number: 107

Mail Envelope Properties (46028A22.HQGWDO01.TWGWPO04.200.2000001.1.5C5AE.1)

Subject: RAI-Hydrology Letter
Creation Date: 12/27/2006 2:00:26 PM
From: "Williams, Dana M." <X2DANAWI@southernco.com>

Created By: X2DANAWI@southernco.com

Recipients "Amy G. Aughtman" <AGAUGHTM@southernco.com>,"James T. Davis" <JTDAVIS@southernco.com>,"Tom C. Moorer" <TCMOORER@southernco.com>
"Christian Araguas" <CJA2@nrc.gov>

Post Office	**Route**
TWGWPO04.HQGWDO01	nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	464	12/27/2006 2:00:26 PM
AR-06-2865 RAI Resp (Hydrology).pdf	286527	3/22/2007 1:52:34 PM
Mime.822	403100	3/22/2007 1:52:34 PM

Options
Priority: Standard
Reply Requested: No
Return Notification: None
None

Concealed Subject: No
Security: Standard

J. A. "Buzz" Miller
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SOUTHERN COMPANY
Energy to Serve Your World℠

DEC 27 2006

Docket No.: 52-011

AR-06-2865

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

Southern Nuclear Operating Company
Vogtle Early Site Permit Application
Response to Request for Additional Information on Hydrology

Ladies and Gentlemen:

By letter dated November 27, 2006, the U.S. Nuclear Regulatory Commission (NRC) provided Southern Nuclear Operating Company (SNC) with requests for additional information (RAIs) following the review of the Site Safety Analysis Report (SSAR) portion of the Vogtle Early Site Permit (ESP) Application. The RAIs involved ESP application Part 2 (SSAR), Section 2.4 (Hydrologic Engineering) and Section 17.1 (ESP Quality Assurance). SNC responded to the RAIs involving Quality Assurance in a letter dated December 15, 2006. SNC's response to the Hydrology RAI is provided in the enclosure to this letter, along with two supporting attachments. Attachment 1 contains a description of the electronic files included on the compact disc (CD) in Attachment 2. As discussed with the NRC Vogtle ESP Project Manager, the data provided on the CD are not intended to meet NRC electronic submittal criteria.

The SNC contact for this RAI response letter is J. T. Davis at (205) 992-7692.

Respectfully submitted,

SOUTHERN NUCLEAR OPERATING COMPANY

Joseph A. (Buzz) Miller

Sworn to and subscripted before me this 27 *day of* December, *2006*

Notary Public

JAM/BJS/dmw

Enclosure: Response to November 27, 2006 Request for Additional Information on Vogtle ESP Application Hydrology

cc: Southern Nuclear Operating Company
Mr. J. B. Beasley, Jr., President and CEO (w/o enclosure)
Mr. J. T. Gasser, Executive Vice President, Nuclear Operations (w/o enclosure)
Mr. D. E. Grissette, Vice President, Plant Vogtle (w/o enclosure)
Mr. D. M. Lloyd, Vogtle Deployment Director
Mr. C. R. Pierce, Vogtle Development Licensing Manager
Document Services RTYPE: AR01
File AR.01.01.06

Nuclear Regulatory Commission
Mr. J. E. Dyer, Director of Office of Nuclear Regulation
Mr. W. D. Travers, Region II Administrator
Mr. D. B. Matthews, Director of New Reactors
Ms. S. M. Coffin, AP1000 Manager of New Reactors
Mr. C. J. Araguas, Project Manager of New Reactors
Mr. M. D. Notich, Environmental Project Manager
Mr. G. J. McCoy, Senior Resident Inspector of VEGP

Georgia Power Company
Mr. O. C. Harper, Vice President, Resource Planning and Nuclear Development (w/o enclosure)

Oglethorpe Power Corporation
Mr. M. W. Price, Chief Operating Officer (w/o enclosure)

Municipal Electric Authority of Georgia
Mr. C. B. Manning, Senior Vice President and Chief Operating Officer (w/o enclosure)

Dalton Utilities
Mr. D. Cope, President and Chief Executive Officer (w/o enclosure)

Bechtel Power Corporation
Mr. J. S. Prebula, Project Engineer
Mr. R. W. Prunty, Licensing Engineer

Southern Nuclear Operating Company

AR-06-2865

Enclosure

Response to November 27, 2006

Request for Additional Information

On

Vogtle ESP Application

Hydrology

NOTE: This enclosure contains two attachments which follow the textual RAI response. The attachments are as follows:

Attachment 1, List of Electronic Data Provided

Attachment 2, Compact Disc (CD) RAI # 2.4.1-1 [This CD does not meet NRC electronic submittal criteria.]

SSAR Section 2.4, Hydrologic Engineering

RAI 2.4.1-1

The following response to the NRC's request for additional information (RAI) on Hydrology is discussed below.

RAI Summary: Provide background and modeling data to prepare Section 2.4, "Hydrology."

RAI Detail:

In order for the staff to perform a confirmatory analysis, provide the following background materials and modeling data which were created and used to prepare Section 2.4 of the Vogtle ESP application:

(a) Digital maps including topography, bathymetry, land use, soil, and water use.

(b) Hydrologic features (e.g., location, geometry, and cross section, if applicable) of rivers, canals, dams, reservoirs, etc.

(c) Hydrologic time series data, including stages, flows, groundwater heads, and hydrometeorologic data.

(d) Modeling data (HEC1, HEC-RAS, and NWS DAMBRK, etc.) including input and output data. In addition, identify the codes used, and provide any codes that are not publicly available.

(e) Brief descriptions of the items provided in response to subsections (a) through (d) [above].

Response

Following are brief descriptions of the electronic data being transmitted in response to parts (a) through (d) of RAI 2.4.1-1. The brief descriptions satisfy part (e) of the RAI.

(a) Digital maps including topography, bathymetry, land use, soil, water use etc.

- Watershed map. The "GIS work" folder contains input and output files for Arc Map used to develop the Savannah River Basin and its sub-basins, as delineated by the National Weather Service (NWS) and further subdivided into USGS Hydrologic Unit Code (HUC-12).

- Topographic maps. The "USGS Quadrangles" folder contains the web site used to obtain USGS topographic maps in the format used to compute distances and areas using the ArcGIS program.

- Bathymetry maps. The "Bathymetry" folder contains the web site used to obtain the citations for the bathymetry maps for Thurmond, Russell and Hartwell Reservoirs, which are protected by copyright.

  Note: Land use, soil and water use maps were not utilized.

(b) Hydrologic Features (e.g. location, geometry, and cross section, if applicable) of rivers, canals, dams reservoirs etc.

- Proposed water management changes. The "Proposed Water Management Changes" folder contains files printed from the USACE (2004) website as supporting documentation for the discussion of proposed water management changes.

- Dam data. The "Dam Data" folder contains the web site link to the U.S. Army Corps of Engineers Water Control Manual for the Savannah River. The document, which is maintained online, provides engineering data for the three U.S. Army Corps of Engineers owned and operated dams on the Savannah River (Thurmond, Russell, and Hartwell Dams). It also contains stage and storage information for the Jocassee and Keowee Dams located upstream of Hartwell Dam.

  The "Dam Data" folder also contains copies of cross sections for the three U.S. Army Corps of Engineers owned dams from the U.S. Army Corps of Engineers Water Control Manual. In addition, the folder contains a letter describing the Probable Maximum Flood (PMF) conditions for the Jocassee and Keowee Dams, which is the only information available for these two dams.

- Channel diversion data. The "Channel Diversion Data" folder contains the web site link to the USGS topographic maps used to compare river bank-lines between 1964 and 1989. The folder also contains the composite of USGS quadrangle maps that were used for licensing VEGP Units 1 and 2.

(c) Hydrologic time series including stages, flows, groundwater heads, hydrometeorologic, etc.

- Hydrologic data. The "Hydrology Calculations" folder contains all USGS data files used for the calculation of hydrologic statistics (e.g. PMF, PMP, annual mean flow, annual peak flow, average daily flow etc.).

- Hydrometeorologic data. The "Hydrometerologic Data" folder contains VEGP Units 1 and 2 and NWS air temperature data. The folder also contains the citation used to obtain the Savannah River water temperature data and the web site used to obtain ice jam data for the Savannah River from the U. S. Army Corps of Engineers.

- Stream flow data. The "Stream Flow Data" folder contains daily-mean stream flow data for three USGS-maintained stations (Augusta, Burtons Ferry, Jackson). The two USGS web sites for the Augusta and Burtons Ferry stations are also provided. The USGS web site for the Jackson station is currently unavailable.

  The "Stream Flow Data" folder also contains stream flow gage and water level measurements for the USGS-maintained Waynesboro station. The USGS web site for this station is also provided.

- Bathymetry. The "Bathymetry Near Intake" folder contains the bathymetry data obtained near the location of the proposed intake structure.

- Groundwater Head Data. The "Groundwater Head Data" folder contains the groundwater level elevations measured in the site observation wells. Data for both the Water Table and Tertiary aquifers are included. In the course of validating these data against the original field data, some minor typographic and transcription errors were identified. These errors have been corrected in the electronic data file that is being provided in response to this RAI. Corresponding changes to SSAR Section 2.4.12 will be made in a future revision.

(d) Modeling data (HEC1, HEC-RAS, and NWS DAMBRK, etc.)

- NWS Model input. The "NWS Model" folder contains input files obtained from the NWS. The hydrologic description is presented in SSAR Section 2.4.1.1 and summarized in Table 2.4.1-1.

- Dam break model. The "HEC-RAS files" contain input and output files for the HEC-RAS program Dam Break Model used for the dam break analysis. The model was performed using the dam breach and unsteady flow options in HEC-RAS. The HEC-RAS model also contains Savannah River Cross Section data. The data can be tabulated or plotted in the HEC-RAS computer program.

  Note: The HEC1 and NWS DAMBRK models were not used.

Attachments:

Attachment 1, List of the electronic data being transmitted. Folders are shown in capitals and in bold print.
Attachment 2, Compact Disc (CD) RAI # 2.4.1-1 [This CD does not meet NRC electronic submittal criteria.]

Attachment 1 – List of Electronic Data Provided

(a) DIGITAL MAPS

- GIS Work
  - 24kgrid_metadata_shp.pdf
  - Basin Map no labels.jpg
  - Gage.mxd
  - GageLocationMap.jpg
  - GageLocationMapAnnotated.jpg
  - NWS basins above Vogtle.bmp
  - USGS gage locations labeled.jpg
  - USGS Quad Index Map.jpg
  - VogtleWatershed.bmp
  - Shape Files
    - BasinH12.dbf
    - BasinH12.prj
    - BasinH12.sbn
    - BasinH12.sbx
    - BasinH12.shp
    - BasinH12.shp.xml
    - BasinH12.shx
    - SavanaRiverPoly.dbf
    - SavanaRiverPoly.prj
    - SavanaRiverPoly.sbn
    - SavanaRiverPoly.sbx
    - SavanaRiverPoly.shp
    - SavanaRiverPoly.shp.xml
    - SavanaRiverPoly.shx
    - SC_hu12polygon.dbf
    - SC_hu12polygon.prj
    - SC_hu12polygon.sbn
    - SC_hu12polygon.sbx
    - SC_hu12polygon.shp
    - SC_hu12polygon.shp.xml
    - SC_hu12polygon.shx
  - NWS watershed files
    - basinsoutlines.txt
    - NWScoords Input to CORPCON.txt
    - nwsfi.txt
    - NWSout.txt
    - NWSwatersheds.dgn
    - NWSwatersheds.dwg
    - USGSgagesNatCoords.txt
    - USGSgagesUTM.txt
    - USGSgagesUTM1.txt
- USGS Quadrangles
  - Topo website
- Bathymetry
  - Fishing website

Attachment 1 (Cont'd)

(b) HYDROLOGIC FEATURES

Proposed Water Management Changes

www.sas.usace.army.mil_projects_projects_brunharb.pdf
www.sas.usace.army.mil_projects_projects_clemdam.pdf
www.sas.usace.army.mil_projects_projects_hartrehb.pdf
www.sas.usace.army.mil_projects_projects_lowshbas.pdf
www.sas.usace.army.mil_projects_projects_nsbld.pdf
www.sas.usace.army.mil_projects_projects_oatescrk.pdf
www.sas.usace.army.mil_projects_projects_rbrdam.pdf
www.sas.usace.army.mil_projects_projects_rbrmitigation.pdf
www.sas.usace.army.mil_projects_projects_shwrda96.pdf
www.sas.usace.army.mil_projects_projects_srbcomp.pdf
www.sas.usace.army.mil_projects_projects_thurrehb.pdf

Dam Data

US Army Corps link
LBC&W Letter.pdf
WCMDamSections.pdf

Channel Diversion Data

Topo Website
Composite Top Map_VEGP1971.pdf

(c) HYDROLOGIC TIME SERIES

Hydrology Calculations

PMF

HMR51.djvu
HMR52.djvu

PMP

Complete.djvu

USGS gage data

gage7000.bmp
gage7320.bmp
gage7500.bmp
gage8500.bmp
List of USGS Savannah R gages.txt
Savannah River gages.txt
Savannah River gages2.txt

Annual Mean flow

AugustaGAAvgAnnualQs.pdf
BurtonsFerryAverageAnnualQ.pdf
JacksonAnnuaMean.pdf

Attachment 1 (Cont'd)

- Hydrology Calculations (Cont'd)
  - Annual Peak
    - annpeak.txt
    - AugustaAnnualPeakQs.pdf
    - BurtonsFerryAnnualPeak.pdf
    - CalhounAnnualPeakQs.pdf
    - CalhounFallsAnnualPeakQs.pdf
    - ClyoAnnualPeakQ.pdf
    - JacksonAnnualPeakQ.pdf
    - peak.txt
    - peak7000.txt
    - peak7000Watstore.txt
    - peaktabformatted.txt
    - Qpeak302197000.txt
    - Qpeak302197320.txt
    - Qpeak302197500.txt
    - Qpeak302198500.txt
    - Qpeak7000mdy.txt
    - USGSReport1990.pdf
  - Average Daily
    - avgdaily.txt
    - AugustaGAAnnualAvgDailyQs.pdf
    - AugustadailyQ.bmp
    - BurtonsFerryAverageDaily.pdf
    - CalhounFallsAnnualAvgDailyQs.pdf
    - ClyoGAAnnualAvgDailyQs.pdf
    - JacksonAnnualAvgDailyQs.pdf
  - Daily
    - day.txt
    - CommonPeriod.bmp
    - CommonPeriodAnnotated.bmp
    - DailyQ7000.bmp
    - DayQJackson.txt
    - QdailyAugusta.txt
    - QdailyBurtonsFerry.txt
    - QdailyClyo.txt
    - TotalPeriod&closures.bmp
    - TotalPeriod.bmp
  - Low Flow (SWSTAT Model)
    - low.txt
    - SNOClow.wdm
    - SNOclow.wdu
  - Monthly
    - month.txt
    - AugustaMonthlyAvgQs.pdf
    - BurtonsFerryMonthlyQ.pdf
    - CalhounMonthlyAvgQs.pdf
    - ClyoMonthlyQs.pdf
    - JacksonMonthlyQs.pdf

Attachment 1 (Cont'd)

- Hydrometeorologic Data
  - Ice jam events
  - Air Temperature
    - (NCDC 2003).pdf
    - Vogtle Temperature 1984.xls
    - Vogtle Temperature 1985.xls
    - Vogtle Temperature 1986.xls
    - Vogtle Temperature 1987.xls
    - Vogtle Temperature 1988.xls
    - Vogtle Temperature 1989.xls
    - Vogtle Temperature 1990.xls
    - Vogtle Temperature 1991.xls
    - Vogtle Temperature 1992.xls
    - Vogtle Temperature 1993.xls
    - Vogtle Temperature 1994.xls
    - Vogtle Temperature 1995.xls
    - Vogtle Temperature 1996.xls
    - Vogtle Temperature 1997.xls
    - Vogtle Temperature 1998.xls
    - Vogtle Temperature 1999.xls
    - Vogtle Temperature 2000.xls
    - Vogtle Temperature 2001.xls
    - Vogtle Temperature 2002.xls
  - SR Water Temperature
    - (Dyar and Alhadeff 1997).pdf
- Stream Flow Data
  - Augusta gages
  - Burtons Ferry gages
  - Waynesboro gages
  - Jackson gages
  - USGS mean-daily flow_Augusta 40-03_April21.txt
  - USGS mean-daily flow_Augusta 84-39_April23.txt
  - USGS mean-daily flow_BurtonsFerry 40-03_April20.txt
  - USGS mean-daily flow_Jackson 72-02_April20.txt
  - USGS Near Waynesboro.pdf
- Bathymetry Near Intake
  - Intake Cross Section Points.xls
  - Plant Vogtle River Survey Discharge Cross Sections.pdf
  - Plant Vogtle River Survey Intake Cross Sections.pdf
  - Plant Vogtle River Survey Topo.pdf
- Groundwater Head Data
  - esp_gw_data.xls

Attachment 1 (Cont'd)

(d) MODELING DATA

NWS Model

- basins.txt
- hucs012Plane3.jpg
- hucs012Plane4.jpg
- HUCsInNWSbasin.dbf
- HUCsInNWSbasin.dbf.xml
- HUCsINNWSbasins.jpg
- IncludedHUCs.dbf
- IncludedHUCs.jpg
- NWSRFS documentation.msg
- NWSRFS documentation.txt
- NWSRFS for Savannah River.msg
- Nwsrfs for Savannah Rvr.txt
- NWSsubbasins.dbf
- NWSsubbasins.dbf.xml
- NWSwatersheds.dgn
- NWSwatersheds.dwg
- Savannah River Routing parameters.msg
- Savannah River routing parameters.txt
- Savannah River Unit Hydrographs.msg
- Savannah Rvr Unit Hydrographs.txt
- SP_hucs012.jpg
- srblagk.txt
- srbuhg.txt
- USGS_data.jpg
- Vogtle_FIG_1.2_4_esbwr_V8_9_2.jpg

HEC-RAS Files

- DamBreak.zip

Attachment 2 – Compact Disc (CD) RAI # 2.4.1-1
[This CD does not meet NRC electronic submittal criteria.]