Nuclear Regulatory Commission
Exhibit # - SNC000068-MA-BD01
Docket # - 05200011
Identified: 03/23/2009

Admitted: 03/23/2009 Withdrawn:
Rejected: Stricken:

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	**) Docket No. 52-011-ESP**
Southern Nuclear Operating Company	**) ASLBP No. 07-850-01-ESP-BD01**
(Early Site Permit for Vogtle ESP Site)	**) November 7, 2008**

SOUTHERN NUCLEAR OPERATING COMPANY'S RESPONSE TO THE LICENSING BOARD'S ORDER OF OCTOBER 17, 2008

BACKGROUND

On October 17, 2008, the Atomic Safety and Licensing Board ("Board") issued a Memorandum and Order providing initial questions and potential presentation topics associated with the mandatory hearing on environmental matters.[1] In Appendix A of the Order, the Board set out questions regarding environmental matters. Pursuant to the deadline established in the Order, Southern Nuclear Operating Company ("SNC") hereby responds to the Board's questions.

As an initial matter, SNC submits that the Nuclear Regulatory Commission ("NRC") Staff's FEIS satisfies its obligation under the National Environmental Policy Act ("NEPA") to consider significant environmental impacts that may result from the agency's action. SNC notes that the Board is charged with considering whether, in accordance with subpart A of 10 C.F.R.

[1] October 17, 2008 Memorandum and Order (Providing Initial Questions and Potential Presentation Topics Associated with Mandatory Hearing on Environmental Matters) ("Order"); *see also* September 19, 2008 Memorandum and Order (Regarding Schedule for Mandatory Hearing on Environmental Matters).

part 51, the Early Site Permit ("ESP") should be issued as proposed.[2] In a mandatory hearing, the Board must address three "baseline" NEPA issues:

1. Determine whether the requirements of Section 102(2)(A), (C), and (E) of NEPA and subpart A of 10 CFR part 51 have been complied with in this proceeding;

2. Independently consider the final balance among the conflicting factors contained in the record of the proceeding with a view to determining the appropriate action to be taken; and

3. Determine, after considering reasonable alternatives, whether the ESP should be issued, denied, or appropriately conditioned to protect environmental values.[3]

As the Commission has clarified, "boards should conduct a simple 'sufficiency' review" in addressing these issues.[4]

With respect to determining whether NEPA has been complied with, "[t]he salient question is whether the FEIS took the required 'hard look' at the relevant environmental consequences."[5] This "hard look" requirement is tempered by a "rule of reason."[6] "That standard is not one of perfection; rather it is a question of reasonableness."[7] The Supreme Court has characterized the "rule of reason" as such:

> [A]n EIS is required to furnish only such information as appears to be reasonably necessary under the circumstances for evaluation of the project rather than to be so all-encompassing in scope that the task of preparing it would become either fruitless or well nigh impossible.[8]

---

[2] NRC, Southern Nuclear Operating Company; Notice of Hearing and Opportunity to Petition for Leave to Intervene on an Early Site Permit for the Vogtle ESP Site, 71 Fed. Reg. 60195 (Oct. 12, 2006).

[3] *Id; see also In the Matter of Exelon*, 62 NRC 134 (2005).

[4] *See Exelon Generation Co., LLC* (Early Site Permit for Clinton ESP site), 62 NRC 5, 39 (2005).

[5] *In the Matter of Hydro Resources, Inc.* (P.O. Box 777, Crownpoint, New Mexico 87313), 64 N.R.C. 53 (2006) (internal citations omitted).

[6] *See In the Matter of Louisiana Energy Services, L.P. (Claiborne Enrichment Center)*, 45 N.R.C. 367, 399 (1997).

[7] *Id.*

[8] *New York Natural Resources Def. Council, Inc. v. Kleppe*, 429 U.S. 1307 (1976), *citing Natural Resources Def. Council v. Calloway*, 524 F. 2d 79, 88 (2d Cir. 1975).

The Staff's Final Environmental Impact Statement ("FEIS") demonstrates its "hard look" at the consequences of issuance of an ESP, and clearly supports a determination that the Staff has complied with NEPA and the NRC's regulations implementing NEPA.

As the Board noted in its Order, the NRC Staff, as author of the FEIS is the principal respondent to the bulk of the Board's questions. However, SNC is able to provide information relevant to those questions based on its preparation of the Environmental Report ("ER") (which the Staff has considered in its preparation of the FEIS). In those instances, SNC has provided responses as supplementary information, or to provide background or context for the Staff's response, and not for the purpose of answering for or contradicting the Staff. SNC has supplied this information in order to provide the Board with as complete a record as practicable relative to the Board's questions. SNC's responses are supported by the attached affidavits from the relevant subject matter experts who provided the technical information for each response.[9]

SNC also observes that several of the questions set forth in the Order could be interpreted to address safety, as opposed to environmental issues. In addition, some of the suggested presentation topics in the Order could be read to address safety issues, particularly the topic relating to seismic issues. Given the bifurcated nature of the mandatory hearing as provided in the Board's October 24, 2008 Order revising the schedule for the mandatory hearing,[10] SNC understands that safety issues will be addressed in the safety portion of the mandatory hearing and that only environmental issues are expected to be addressed in the environmental mandatory hearing.

---

[9] *See* attached Affidavits of Tom Moorer, Matt Montz and Dale Fulton.

[10] *See* October 24, 2008 Memorandum and Order (Revised General Schedule).

RESPONSES TO BOARD'S QUESTIONS

Question No.	FEIS Section(s)	FEIS Page(s)	Inquiry:
1	**2.3.1.4**	**2-10**	**The Final Environmental Impact Statement (FEIS) indicates that the period between 1998 and 2002 was an "abnormally dry period in the southeast." How does this compare to the more recent dry period? If the most recent five years is worse, why was the most recent dry period not used as the basis for analysis?**

Response: Average annual rainfall amounts for the most recent five years were greater than those from the 1998 to 2002 time period. National Climactic Data Center (NCDC) rainfall data from Augusta, Georgia from 2003 to 2007 was compared against the 1998 to 2002 Augusta, Georgia data referenced in the FEIS (see Table below). The data used in the FEIS remains bounded.

Year	Annual Rainfall	Five year annual average
1998	47.84"	39.35" (1998 – 2002)
1999	36.74"	
2000	37.85"	
2001	33.55"	
2002	40.78"	
2003	44.58"	41.50" (2003 – 2007)
2004	40.61"	
2005	47.46"	
2006	40.97"	
2007	33.88"	

References: NCDC 1998, NCDC 1999, NCDC 2000, NCDC 2001, NCDC 2002, NCDC 2003, NCDC 2004, NCDC 2005, NCDC 2006, NCDC 2007

2	**2.3.3**	**2-13**	**The FEIS indicates "[m]eteorological data for the period of January 1, 1998, to December 31, 2002, were used to generate atmospheric dispersion factors (X/Q values) to estimate radiological impacts in the areas surrounding the [Vogtle Electric Generating Plant (VEGP)] site." Why was the data limited to this period? What about the last six years?**

Response: As an initial matter, please note that the ESRP in Section 2.7 provides for submittal of 24 months of meteorological data for an ESP. SNC chose to provide a five year data set, which exceeds the ESRP requirement. The data submitted (i.e., 1998 – 2002) was selected because it was the best available five-year data set from the past 10 years (i.e.,1995 -2005). The 2006 data were not complete when the Environmental Report (ER) was filed in August 2006. Also, SNC discovered some anomalies in the 2004 data set provided in the ER, and the 2004 data were corrected in a subsequent ESP revision. Thus, after review of the available data, SNC selected the 1998 – 2002 data as the best set available. It is also important to understand that the environmental analysis for X/Q, as well as many other parameters is based on the 50th percentile data. As such,

the effect of extreme values in the data minimized. As a result, use of meteorological data from other years should produce essentially the same results.			
3	**2.3.3**	**2-13**	**ANSI/ANS-3.11 indicates that meteorological instruments should be located at a distance at least ten times the height of an obstruction. Applicant Southern Nuclear Operating Company (SNC) indicated in its environmental report (ER) that it performed an analysis to verify the acceptability of the meteorological tower being only 3000 feet (ft.) from the 600 ft. high cooling towers. How did the staff confirm the SNC ER analysis?**
Response: First, it is important to understand that the meteorological tower is located approximately 3000 feet from the proposed location for the Units 3 and 4 cooling towers. As such, the data collected from these instruments for ESP and COL needs will not be subject to any obstruction issues from any existing structure. An SNC consultant (ABS) developed a report evaluating the potential for the new cooling towers to affect the measurements taken from the existing meteorological tower. The study used a model to determine the impacts associated with potential interferences introduced by the new cooling towers. The study concluded that there would be little measurable impact on the data generated and the met tower would not need to be relocated after the new cooling towers are constructed. In fact, the predominant wind direction is from the west-northwest and the proposed cooling tower location is essentially due north of the met tower. As such, there would be no interference from the predominant wind direction. In addition, the wind blows from the direction that would produce interference less than 5 percent of the time (confirm from wind rose). The ABS report was provided during the site audit and was discussed with NRC staff. However, it is understood that the NRC staff reached an independent conclusion on this matter, without use of the report.			
4	**2.6.1.1**	**2-20**	**In connection with the Savannah River water temperature data from 1973 to 1996 referenced on this FEIS page, is there any indication that there is an increasing temperature trend?**
Response: Due to the limited quantity of data and the high number of variables which could influence instantaneous water temperature measurements (season, time of day, cloud cover, rainfall, river flow rates, etc.) a trend analysis could not be performed. SNC did plot and review the available data for any observable trends and, apart from one high measurement which SNC believes is an error, no trends, up or down, were noted.			
5	**2.6.1.2, 5.9.2**	**2-28, 5-67**	**The FEIS presents key hydraulic properties for the Water Table, Tertiary, and Cretaceous aquifers. How are these properties used in calculating the liquid effluent pathway radiation doses to the maximally exposed individual (MEI) and nearby populations? How did the staff assure itself the parameters used in the dose calculations had adequate conservatism to account for the uncertainties in the measured data on which they are based?**
Response: Effluent releases to the groundwater are not part of the design for Vogtle Units 3 and 4.			

Therefore, hydraulic properties were not used in developing the doses to the Maximally Exposed Individual (MEI). The dose to the MEI does not take into consideration accidental releases and therefore it is not appropriate to analyze potential groundwater releases in this context.

The liquid effluent pathway used for calculating the liquid effluent dose to the MEI is the discharge to the Savannah River. Drinking water was not evaluated in the FEIS because the current land use census showed no drinking water use of the river within 100 miles downstream of the site. (FEIS 5-64) Once the new units are in operation they will be added to the existing radiological groundwater monitoring program.

6	**2.6.1.2**	**2-29**	**The FEIS indicates that "[b]ased on potentiometric contour maps (Southern 2008a), groundwater movement from the VEGP site power block region appears to be toward Mallard Pond." What are the implications of this movement with respect to radiological monitoring?**

Response: The radiological groundwater monitoring program is currently being developed by SNC, in accordance with Reg Guide 4.21, to support the operation of Units 3&4 and Units 1 and 2. This program will use existing groundwater information to develop the location of monitoring points. This monitoring program will also use the accidental release to groundwater pathways modeled as part of the SER to support the development of the radiological groundwater monitoring program. Since groundwater modeling and potentiometric contour maps indicate the primary groundwater flow direction from the Vogtle Units 3 and 4 power block is towards Mallard Pond, the monitoring program will strategically place monitoring points to detect radiological constituents prior to them reaching the pond.

7	**2.6.3.2**	**2-42**	**The FEIS states that "[t]he evidence indicates the primary pathway for tritium pollution of the Water Table aquifer is through recharge of the aquifer by atmospheric deposition of tritium released from the Savannah River Site." What is the evidence that supports this conclusion?**

Response: Several investigations documenting the presence of tritium in groundwater in eastern Burke County, Georgia have been completed. These investigations are discussed in the ER and include those of Summerour et al. (1994), Summerour et al. (1998), and Georgia Department of Natural Resources (DNR) (2004). Brief descriptions of the data resulting from these investigations and associated conclusions are summarized below.

The main conclusions resulting from the Summerour et al. (1994) study are as follows:

- There is no evidence of a public health threat due to tritium pollution of aquifers in Burke County.
- There is widespread evidence of tritium in the water table (unconfined) aquifer in eastern Burke County, at levels well below the maximum concentration level (MCL) standard for drinking water set by the United States Environmental Protection Agency.
- There is no evidence of regional tritium pollution of the Gordon (confined) aquifer in eastern Burke County.
- Existing data do not fully resolve the issue of the tritium occurrence in water table aquifer.

However, the 1994 investigation shows that some pathways are more likely than others and

suggests specific pathway models for future investigations. The Summerour et al. (1998) document is the follow-up to the Summerour et al. (1994) and concludes the following:

- Tritium concentrations in the unconfined aquifer are declining. This decline in tritium concentration is probably due to a combination of radioactive decay, dilution by untritiated groundwater, and recharge by untritiated (or low tritium) rainwater.
- Very low, but measurable, levels of tritium are present in all of the confined aquifers. Because the water in these aquifers is very old (11,000 to 32,000 years) compared with the half-life of tritium (12.35 years), there should be no tritium present within the confined aquifers. The tritium in these deep aquifers is believed to be due to cross contamination during drilling and well installation or to cross-contamination sampling. There is insufficient evidence to distinguish between these alternatives.
- A seismic reflection survey across the projected location of the Pen Branch fault identified a series of 13 high-angle faults along approximately 4,550 ft of a 7,620-ft seismic line. All 13 faults affect the basement rock and project upwards into the overlying Cretaceous-age sediments. None of these faults appear to have disturbed the Gordon aquitard, which isolates the unconfined aquifer from underlying confined aquifers. The seismic profile also shows other numerous minor fractures or faults within the Cretaceous and Tertiary Coastal Plain sediments. Summerour et al. (1998) indicate that while these minor fractures may cut the lower Midville, upper Midville, lower Dublin, upper Dublin, and Millers Pond aquitards, it is unclear whether the fractures also cut the Gordon aquitard (Lisbon Formation). The effect of the Pen Branch fault zone and other minor faults on groundwater flow patterns and pathways was not resolved in this investigation.
- The preponderance of evidence indicates that the primary pathway for tritium into the Upper Three Runs aquifer is through recharge of the aquifer by tritiated rainfall related to atmospheric tritium releases at the Savannah River Site (SRS). A possible secondary pathway for tritium is suggested by the presence of very low levels of tritium in all confined aquifers in Burke County.

In addition to the Summerour studies the Georgia DNR reported tritium sampling results for the 2000 – 2002 period from monitoring wells and public water-supply wells located at SRS and Vogtle. Georgia DNR concludes that the average tritium concentration in groundwater was less than 1,000 pico-curies per liter (pCi/l), well below the drinking water MCL of 20,000 pCi/l. Georgia DNR also indicates that contamination appears to be concentrated primarily within the SRS downwind footprint, suggesting a possible connection with airborne (or rain-borne) tritium from SRS. Therefore it is likely that tritium is present in the Water Table (unconfined) Aquifer at Vogtle and most likely attributed to atmospheric releases from SRS, as Vogtle is located downwind. The same investigations suggest the possibility of very low, but measurable, levels of tritium in the deeper, confined aquifers underlying the VEGP site. Possible sources of tritium in the confined aquifers of Burke County, Georgia, include cross contamination from well drilling, installation and during sampling.

References

(Georgia Department of Natural Resources 2004) Georgia Department of Natural Resources, Environmental Radiation Surveillance Report, 2000-2002, Environmental Protection Division, March, 2004.

(Summerour et al 1994) Summerour, J. H., Lineback, J. A, Huddlestun, P. F., and Hughes, A. C., An Investigation of Tritium in the Gordon and Other Aquifers in Burke County, Georgia: Georgia Geologic Survey Information Circular 95, 1994.

(Summerour et al 1998) Summerour, J. H., Shapiro, E. A., and Huddlestun, P. F., An

Investigation of Tritium in the Gordon and Other Aquifers in Burke County, Georgia, Phase II: Georgia Geologic Survey Information Circular 102, 1998.			
8	**2.6.3.3, 5.3.3.1**	**2-43, 5-17**	**The FEIS states that thermal monitoring of the VEGP Units 1 and 2 discharge is performed once every five years. Did this monitoring include temperature measurements in the Savannah River thermal plume? If so, were these measurements compared to the thermal plume calculations performed with the CORMIX code to check the accuracy of the calculations?**
Response: The thermal monitoring discussed in the FEIS is a single sample collected at the Cooling Tower Mixing Sump prior to discharge to the Savannah River. The sampling is performed to complete EPA Form 2C for the NPDES permit renewal and does not include temperature measurements in the Savannah River thermal plume.			
9	**2.8.2.6, 2.8.2.7**	**2-109 to -112**	**Please explain why the FEIS impact analysis regarding public services and education does not include South Carolina impacts.**

Response: In general, socioeconomic impacts are caused by two types of initiators: (1) expenditures made and taxes paid within a region on behalf of a proposed project's facilities, and (2) changes to the region's economy and community services caused by project-related in-migrating workforces.

Because South Carolina is not expected to receive significant amounts of the expenditures and taxes made on behalf of the VEGP project facilities, impacts caused by this initiator were not assessed in South Carolina in the ER.

As to the second type of initiator, when deciding which counties to include in a socioeconomic analysis, one generally looks to an existing workforce of a similar type within the same region that would provide insights into where such a workforce might choose to reside. In socioeconomics, it is an acceptable and commonly used practice to predict the residential choices of in-migrating workforces based on the residential distributions of existing workforces of a similar type. Because VEGP has an existing workforce, that workforce was examined, in detail. Table A describes, in detail, the residential distribution of the VEGP operations workforce in 2005. This was the most current information available at the time that this analysis was performed. After reviewing the residential distribution of the 2005 VEGP operations workforce, SNC determined that the majority (79%) of the VEGP operations employees lived in Burke, Richmond, and Columbia Counties; all Georgia Counties. The VEGP workforce was reviewed in 2007 as part of the COLA process, and the size of the workforce and the distribution had not changed significantly.

With the exception of Aiken County, South Carolina, where 37 VEGP operations workers live, fewer than 5 VEGP operations workers live in any South Carolina county. So, with the exception of Aiken County, SNC was able to immediately eliminate all of the South Carolina counties from further analysis. Then, for Aiken County, SNC performed the following analysis.

The 37 VEGP operations employees that live in Aiken County represent 4.29 percent of the 2005 VEGP operations workforce. In Section 4.5.2 of the FEIS, it was determined that there would be a construction-related population increase of 5,500 people (the construction workforce would be the largest workforce associated with the project). Assuming that 4.29 percent of the construction

workforce would reside in Aiken County, 236 construction workers and family members would reside in Aiken County. The following is an excerpt from Table A documenting the above analysis results including the expected population impact on counties in South Carolina.

Table A. Residential Distribution of VEGP Operations Workforce (2005)

County	State	Employees per County	% of Total Employees
Bryan	GA	1	0.12%
Bulloch	GA	10	1.16%
Burke	GA	170	19.72%
Candler	GA	2	0.23%
Columbia	GA	289	33.53%
Emanuel	GA	12	1.39%
Fulton	GA	1	0.12%
Glascock	GA	2	0.23%
Jefferson	GA	13	1.51%
Jenkins	GA	16	1.86%
Johnson	GA	2	0.23%
Lincoln	GA	3	0.35%
Macon	GA	1	0.12%
McDuffie	GA	3	0.35%
Richmond	GA	224	25.99%
Screven	GA	58	6.73%
Spalding	GA	1	0.12%
Toombs	GA	2	0.23%
Washington	GA	1	0.12%
Aiken	SC	37	4.29%
Allendale	SC	1	0.12%
Bamberg	SC	2	0.23%
Barnwell	SC	4	0.46%
Edgefield	SC	1	0.12%
McCormick	SC	4	0.46%
Richland	SC	2	0.23%
TOTAL	--	862	100.00%

According to the USCB, the Aiken County population in 2000 was 142,522 (USCB 2000). A 236-person increase in Aiken County's 2000 population would represent a 0.17 percent increase in that population. Because these workers and their family members would represent such a small increase in Aiken County's population, their impact on any resources would not be noticeable. Therefore, Aiken County was eliminated from further analysis for construction impacts, and because the operations workforce would be smaller than the construction workforce, and represent an even smaller increase in the population of Aiken County, the impacts of the operations workforce on Aiken County also were not analyzed.

Access to VEGP from South Carolina is difficult. The bridges spanning the Savannah River between South Carolina and Georgia that are closest to VEGP, are roughly 25 to 30 driving miles north and 30 to 35 driving miles south of the VEGP site. The closest population centers in South

Carolina counties are roughly 5 to 25 miles beyond the bridges. Burke, Richmond, and Columbia Counties, Georgia offer housing choices and community amenities in sufficient varieties and numbers to accommodate the construction and operations workforces, and VEGP is easier to access from these counties. For these reasons it is more likely that workers would chose to reside in Georgia counties rather than any South Carolina County.

In SNC's environmental report for new units at VEGP, only Burke, Columbia, and Richmond Counties, Georgia were analyzed In the FEIS, the NRC chose to include different mixes of counties, depending on the resource area. While the NRC's approach differed from SNC's approach, neither approach conflicts with the other, and the essential conclusions are the same.

In conclusion, SNC did not consider impacts of the project in South Carolina because the services and housing already in place in the Georgia counties are sufficient to support construction and operations workforces, travel between South Carolina and VEGP is difficult, and the percent change in the existing South Carolina counties' populations would be so small as to be negligible.

<u>Reference</u>

USCB (U. S. Census Bureau). 2000. American Factfinder. Fact Sheet. Aiken County, South Carolina. Available online at http://factfinder.census.gov. Accessed October 21, 2008.

10	**5.3.2.2**	**5-15**	**The FEIS states that the hydraulic heads of the Cretaceous and Tertiary aquifers in the vicinity of the VEGP site are approximately 160 ft. and 120 ft. above mean sea level, respectively. It also states that pumping drawdown in the Cretaceous aquifer would be less than 40 ft., so that an upward gradient is maintained during pumping. What is a conservative estimate of the cumulative pumping drawdown? How confident is the staff of the conclusion that an upward gradient will always be maintained? How would a reversal of this gradient impact the staff's conclusions regarding potential contamination of the Cretaceous aquifer?**

Response: The top of the Cretaceous and Tertiary aquifers at VEGP are at approximately -254 feet msl and 74 feet msl, respectively. The aquifers are separated by a semi-confining unit 146 feet thick. The average static water levels in the Cretaceous and Tertiary aquifers are at approximately 160 feet msl and 120 feet msl, respectively, indicating that over 400 feet of head pressure occurs in the Cretaceous aquifer and approximately 45 feet in the Tertiary.

The maximum drawdown observed in the calculations conducted by SNC is less than 40 feet in the Cretaceous aquifer. This would result in a reduction of the head pressure from approximately 400 feet to 360 feet and the upward gradient will be maintained during normal and extreme operating conditions. None of the drawdown scenarios conducted by NRC staff (in the FEIS) or SNC (in the ER), indicate that a localized reversal in the gradient is possible. Accordingly, SNC believes the drawdown calculations included in the ESP ER are conservative.

SNC took a postulated look at what conditions could cause a localized reversal in the gradient between the Tertiary and Cretaceous aquifers. Although this localized reversal is theoretically possible under hypothesized worst-case conditions, it is extremely unlikely and due to the low permeability of the confining unit, communication between the Tertiary and Cretaceous aquifers

would not occur during the life of the plant. Thus, a regional reversal in the aquifer gradients is not plausible.			
11	**5.3.3.1**	**5-17 to -20**	**Why were the CORMIX analyses described in this section limited to Drought Level 3 river flow rates? What would be the impact of lower flow rates?**
Response: The CORMIX analyses were limited to the Drought Level 3 river flow rate (3800 cfs) because the 3800 cfs flow is conservative and representative of flows during a typical drought year. Additionally, at present, there are no specific flows defined for Drought Level 4. As discussed in the FEIS, since the completion of Thurmond Dam in 1951, the Savannah River upstream of VEPG is a highly regulated river. The three dams upstream of VEGP; Hartwell, Russell and Thurmond, are capable of storing a combined total of 8,600,000 acre-ft of water. Since 1951, the lowest flow ever recorded downstream of the dam at the Jackson stream gage was 3220 cfs on December 9, 1981. (FEIS 2-18) Use of the discharge from Thurmond dam also does not take into account the local inflow contributions to the Savannah River flows from the many creeks and streams between Thurmond and Vogtle, a distance of over 80 miles. Those contributions, even in the current drought, add over 500 cfs to the Savannah River by the time it passes Vogtle. In the 5˚F mixing zone CORMIX analysis, additional conservative assumptions beyond Drought Level 3 flows were used, including the lowest river temperature recorded (which occurred February 1, 1977 and January 31, 1978), the predicted maximum discharge temperature of 91˚F (which is expected in July) and a single discharge point from the combined effluent of all four units (FEIS 5-18). These are each very conservative assumptions. For example, the proposed Unit 3&4 discharge will actually be 400 ft downstream of Unit 1&2 discharge (FEIS 3-9), and SNC calculated that the discharge temperature is expected to exceed 90°F for less than 7 hours per year (Southern 2008a). For the 90˚F isotherm CORMIX analysis, the Staff used the same assumptions discussed above with the exception that the maximum river water temperature was used (FEIS 5-19). NEPA does not require a worst case analysis but rather a “hard look” at the potential impacts. SNC believes that the use of Level 3 Drought flows and the additional conservative assumptions used for the analysis are appropriate and meet NEPA’s ‘hard look’ standard for determining impacts. The use of more severe Drought Level 4 flows, which have never occurred in the 57 years of operation of Thurmond, approach the worst case scenario.			
12	**5.7.3**	**5-57**	**The FEIS references a study by the Institute for Energy and Environmental Research (IEER) that supposedly indicates that only a “small amount” of the radiological contamination in the Savannah River and its organisms can be attributed to the existing VEGP. Where in the IEER report are releases from VEGP addressed? If these releases are not directly addressed, please expand on the rationale for the above conclusion.**
Response: The ASLB panel is correct that the IEER article does not directly state that only small amounts of radioactive contamination in the Savannah River are attributable to VEGP. Tritium accounts for most of the radioactivity released to the Savannah River from the Savannah			

River Site (SRS) and VEGP (see WSRC 2007; SNC 2006, 2007, 2008). In years past the SRS contribution of tritium to the Savannah River was much greater than the contribution of VEGP. For example, between 1988 and 1995, total tritium releases from SRS to the SRS streams which drain to the Savannah River ranged from approximately 9,000 curies to approximately 25,750 curies (WSRC 1996). Historically, SRS has been identified as the largest contributor, by far, of tritium to the Savannah River, even though that description does not appear in the IEER study.

However, since the late 1990s SRS has dramatically reduced releases of tritium to SRS streams. In 2006 SRS released 1,640 curies to the Savannah River (WSRC 2007) and VEGP released 1,975 (SNC 2007). In 2007 SRS released 1,300 curies (WSRC 2008) and VEGP released 447 (SNC 2008).

Beginning in about 2006, the SRS contribution of tritium had declined to less than 1700 curies per year. Tritium values in the Savannah River are much lower than they have been historically.

References

(SNC 2006). Southern Nuclear Operating Company. Vogtle Electric Generating Plant – Units 1 and 2, NRC Docket Nos. 50-424 and 50-425, Facility Operating License Nos. NPF-68 and NPF-81, Annual Radioactive Effluent Release Report for January 1 2005 to December 31 2005.

(SNC 2007). Southern Nuclear Operating Company. Vogtle Electric Generating Plant – Units 1 and 2, NRC Docket Nos. 50-424 and 50-425, Facility Operating License Nos. NPF-68 and NPF-81, Annual Radioactive Effluent Release Report for January 1 2006 to December 31 2006.

(SNC 2008). Southern Nuclear Operating Company. Vogtle Electric Generating Plant – Units 1 and 2, NRC Docket Nos. 50-424 and 50-425, Facility Operating License Nos. NPF-68 and NPF-81, Annual Radioactive Effluent Release Report for January 1 2007 to December 31 2007.

(WSRC 1996). Westinghouse Savannah River Company. Savannah River Site Environmental Report for 1995. WSRC-TR-96-0075. Aiken, SC.

(WSRC 2007). Westinghouse Savannah River Company. Savannah River Site Environmental Report for 2006. Aiken, SC. WSRC-TR-2007-00008. Available at www.srs.gov/general/pubs/ERsum/index.html.

(WSRC 2008). Westinghouse Savannah River Company. Savannah River Site Environmental Report for 2007. WSRC-STI-2008-00057. Aiken, SC. Available at www.srs.gov/general/pubs/ERsum/index.html.

13	**5.9.2.1, G.1.4**	**5-67, G-2**	**In FEIS Appendix G, the staff reports it reviewed the annual radiological effluent release reports for the existing VEGP units. The staff states that the highest liquid pathway releases occurred in 2001. What are the key factors that cause variations in the releases from one year to the next and why were the releases highest in 2001?**

Response: There are several factors that affect radiological liquid effluent releases from year to year. Fuel condition has a major impact. Small defects in fuel cladding will cause an increase in radioactivity of the reactor coolant which would then be reflected in the liquid radiological effluent discharges. Outages (both scheduled and unscheduled) result in more liquid radiological waste generated as the reactor coolant boron concentration is adjusted on shutdown and startup. Some

years, 2 or more outages occur; those are the years with higher liquid radiological effluents. Spent fuel pool water purification (often performed during refueling outages) results in increased liquid radiological effluents. Tritium (tritiated water) is the most abundant radionuclide released to the environment. Where most radioactive material can be removed by filtration and deionization, tritiated water can only be treated by dilution. However, tritium is a low energy beta emitter which has very little impact on radiation dose and therefore is not a significant health hazard. Furthermore, efforts have been in place since 2000 to incorporate better filtration technologies (such as tubular ultrafiltration) in addition to the normal radwaste purification demineralizers. Due to these improvements, fission and activation products in liquid effluents showed a decreasing trend from 2001 to 2004.

14	**5.9.4**	**5-72**	**The FEIS provides the collective occupational dose from the operation of VEGP Units 1 and 2 for the year 2005. It also mentions the need to keep individual doses below the five-rem limit, but provides no data regarding those doses. What were the average and maximum individual worker occupational doses during that year?**

Response: Based on the SNC Year-to-Date 2005 TEDE Distribution Report the average individual worker occupational dose is 0.065 rem. The maximum dose raged from of 1.0 to 2.0 rem in three workers. During 2005, 2,341 workers were subject to the monitoring program and 1,242 workers received no measurable dose. The table below includes the dose distribution for 2005.

Year-to-Date 2005 TEDE Distribution Report
All Monitored Personnel
Criteria Selected

Year 2005

Year-to-Date TEDE rem	No. of Persons	Cum. Percent	TEDE Percent	Total	Cum. Percent	Ave. Percent	Ave. TEDE	Age
No Measurable Exposure	1,242	53.05	53.05	0.000	0.00	0.00	0.000	46
0.001 - 0.100	585	24.99	78.04	25.906	17.15	17.15	0.044	45
0.100 - 0.250	346	14.78	92.82	55.114	36.48	53.62	0.159	45
0.250 - 0.500	129	5.51	98.33	43.065	28.50	82.12	0.334	44
0.500 - 0.750	27	1.15	99.49	16.116	10.67	92.79	0.597	43
0.750 - 1.000	9	0.38	99.87	7.656	5.07	97.86	0.851	42
1.000 - 2.000	3	0.13	100.00	3.239	2.14	100.00	1.080	45
2.000 - 3.000	0	0.00	100.00	0.000	0.00	100.00	0.000	0
3.000 - 4.000	0	0.00	100.00	0.000	0.00	100.00	0.000	0
4.000 - 5.000	0	0.00	100.00	0.000	0.00	100.00	0.000	0
5.000 - 6.000	0	0.00	100.00	0.000	0.00	100.00	0.000	0
6.000 - 7.000	0	0.00	100.00	0.000	0.00	100.00	0.000	0
7.000 - 8.000	0	0.00	100.00	0.000	0.00	100.00	0.000	0
8.000 - 9.000	0	0.00	100.00	0.000	0.00	100.00	0.000	0
9.000 - 10.000	0	0.00	100.00	0.000	0.00	100.00	0.000	0
> 10.000	0	0.00	100.00	0.000	0.00	100.00	0.000	0

Total Number of Monitored Personnel: 2,341 Persons
Total Exposure: 151.096 rem
Average Exposure: 0.065 rem / Person

The bases for maintaining less than 5 rem are a requirement stated in 10 CFR 20.1201, Occupational Dose Limits.

15	**6.1**	**6-1 to -14**	**Is it necessary to analyze the greenhouse gas impacts of facility construction and operation, including those relating to the nuclear fuel cycle?**

Response: No. There is no statutory or regulatory requirement calling for an analysis of "greenhouse gas" impacts of facility construction and operation, including those relating to the nuclear fuel cycle. Any requirement to analyze these impacts would fall under the auspices of NEPA. The NRC implements NEPA through the regulations found in 10 C.F.R. Part 51, which do not require analysis of greenhouse gas impacts. Nor does NRC regulatory guidance that implements NEPA, as set forth in the NRC Environmental Standard Review Plan ("ESRP"), call for such an analysis. *See* Standard Review Plans for Environmental Reviews for Nuclear Power Plants, NUREG-1555 (Oct. 1999).

Rather, Section 5.8.1 of the ESRP explains that an Environmental Report ("ER") should include a discussion of gaseous emissions, but does not specifically identify greenhouse gases. In fact, a Licensing Board recently stated that "[w]ith respect to gaseous emissions, the ESRP only seeks an assessment of the direct physical impact of construction-related activities and plant operation on the local community." *Tennessee Valley Authority* (Bellefonte Nuclear Power Plant Units 3 and 4), LBP-08-16, 68 NRC __, slip op. at 65 n.15 (Sept. 12, 2008). Such an assessment considers odors, vehicle exhaust, dust, and other non-radiological emissions *within the context of applicable air quality standards for gaseous pollutants* (based on consultation with Federal, State, regional, and local agencies). The ER that is part of the Vogtle ESP application contains this information. For example, ER Section 3.6.3 (Other Effluents) discusses gaseous emissions and ER Table 3.6-2 provides annual emissions from diesel generators and the auxiliary boiler.

Additionally, "greenhouse gases" are discussed in the ER and the Final Environmental Impact Statement ("FEIS") in the context of other requirements. For example, Table S-3 in 10 C.F.R. § 51.51 summarizes and codifies the NRC's assessment and determinations for evaluating the environmental effects of the uranium fuel cycle, including gaseous emissions and electricity consumed in the fuel cycle. A Licensing Board recently explained that "Table S-3 was developed by the Commission to address, on a generic basis, the need to consider the environmental effects of the uranium fuel cycle." *Duke Energy Carolinas, LLC* (Combined License Application for William States Lee III Nuclear Station, Units 1 and 2), LBP-08-17, 68 NRC __, slip op. at 13 (Sept. 22, 2008). This table is used in ER Section 5.7 (Uranium Fuel Cycle Impacts) and FEIS Section 6.1 (Fuel Cycle Impacts and Solid Waste Management).

Similarly, ER Section 10.4.1.3 discusses the considerable air quality benefits from nuclear generation, stating: "Unlike electricity generated from coal and natural gas, nuclear energy does not result in any emissions of air pollutants associated with global warming and climate change (e.g., nitrogen oxides, sulfur dioxide, carbon dioxide) or methyl mercury." FEIS Section 11.6.2.2 provides a similar statement. Other sections of the ER and FEIS also discuss gaseous emissions.

A similar question regarding evaluation of greenhouse gas emissions was raised in the *Bellefonte*,

Duke, and *Harris* combined license ("COL") proceedings by petitioners seeking to intervene. The petitioners submitted contentions arguing that the ERs for these COL applications should have included a discussion of greenhouse gases and the "carbon footprint" of the new plants. The Licensing Boards in all of these proceedings rejected the contentions for a number of reasons, including that the petitioners ignored the existing discussion of greenhouse gases in the ERs and any challenges to Table S-3 must be made through a petition for rulemaking. *Bellefonte*, LBP-08-16, slip op. at 63-66; *Lee*, LBP-08-17, slip op. at 12-14; *Progress Energy Carolinas, Inc.* (Shearon Harris Nuclear Power Plant, Units 2 and 3), LBP-08-21, 68 NRC __, slip op. at 27-30 (Oct. 30, 2008).

Citing the generic and novel issues raised by these contentions, both the *Bellefonte* and *Duke* COL Licensing Boards referred their rulings to the Commission for its consideration, pursuant to 10 C.F.R. § 2.323(f). *Bellefonte*, LBP-08-16, slip op. at 66; *Lee*, LBP-08-17, slip op. at 14. To date, the Commission has taken no action on the referred rulings. Additionally, the *Harris* Licensing Board also stated that even if an admissible contention had been proffered, a petitioner would still face a significant hurdle because "unless in a particular instance there is in fact a viable alternative which has an extremely low carbon footprint, the footprint of the nuclear fuel cycle is immaterial to the decision the Agency must make." *Harris*, LBP-08-21, slip op. at 29.

Nuclear generation provides a tremendous annual offset in the production of greenhouse gases from power generation. This offset is discussed as a nuclear benefit in the Alternatives section of Chapter 9.

16	**7.2**	**7-3**	**Does the FEIS conclusion regarding the small impact to air quality assume simultaneous construction and/or operation of all the facilities discussed in section 7.2?**

Response: Based on the language in Section 7.2 it does not appear that the simultaneous emissions of construction and/or operations of VEGP, Plant Wilson, SRS, and MOX Facility are evaluated. However the FEIS evaluates the Air pollution impacts of each contributor in accordance with NEPA requirements. VEGP, Plant Wilson, and SRS hold current air permits issued by state permitting authorities. The area is currently in attainment for all pollutants. The VEGP air permit will be modified to include emissions associated with Units 3 and 4. No special regulations or limits are expected as a part of the air permits for the construction and operation of the facilities. The cumulative effects of air emissions from sources in the VEGP area will be considered during the permitting process and will have to remain below regulatory levels.

17	**7.3.1.1**	**7-4**	**Given the FEIS indicates that "[c]omparable levels for Drought Level 4 are not shown in Table 7-1 because the river discharge is not specified in the Drought Plan but is variable based on inflow conditions," what are the implications of Table 7-1 for lower river discharge rates? Presumably the plants will continue to operate during Drought Level 4. Subsequent analyses evaluated two Drought Level 4 flows. Why are they not included in this table?**

Response: As a supplement to the Staff's response, SNC notes that lower river discharge (flow) rates would result in proportionally greater increases in the percentage of the river withdrawn by the combined Unit 1&2 and Unit 3&4 intake structures. The lowest observed river flow event since

1951 is 3220 cfs. At present, there are no specific flows defined for Drought Level 4. The Staff's consideration of whether a flow event as low as 2000 cfs would affect the conclusions in the FEIS seems very conservative for use in the NEPA analysis.			
18	**7.3.1.1**	**7-5**	**Same comment for Table 7-2 as Table 7-1. Should it also consider cumulative utilization from other plants and the Savannah River Site (SRS)? Also, what is the basis for acceptability of a given flow percentage?**
Response: Similar to Question 17 answer, lower river discharge rates would result in proportionally greater increases in the percentage of the river withdrawn and consumptively used by the combined Unit 1&2 and Unit 3&4. The FEIS text is incorrect in listing the Urquhart Station and D-Area Powerhouse withdrawals of 127.5 cfs and 68.4 cfs, respectively, as consumptive uses. Urquhart station and D-Area Powerhouse both utilize once-through cooling which returns approximately 98% of the water withdrawals back to the Savannah River. The Clean Water Act, Section 316(b) Phase I rule for cooling water intake structures provides a basis of acceptability for allowable river flow withdrawal percentages. Pursuant to 40 CFR 125.84, "For cooling water intake structures located in a freshwater river or stream, the total design intake flow must be no greater than five (5) percent of the source water annual mean flow." As discussed in the Table 5-1, the Unit 3&4 intake structure will normally withdraw approximately 0.9 of the annual mean flow (FEIS 5-8). As discussed in Table 7-1, the combined Unit 1&2 and Unit 3&4 normal withdrawals from the Savannah River will be approximately 2 percent of the annual mean flow (FEIS 7-4).			
19	**7.3.1.1**	**7-5**	**The basis for the statements and conclusions in FEIS section 7.3.1.1 that the impacts would be small and mitigation is not warranted does not appear to reflect the cumulative effects of all river users or any Drought Level 4 conditions, only the VEGP site under Drought Level 3 conditions. Explain why the conclusions would be unchanged if the D-Area Powerhouse and Urquhart station, as well as other present and future water users, are included in the analysis assuming the 2000 cubic feet per second (cfs) Drought Level 4 assumption used elsewhere in this section.**
Response: As was discussed in the response to Question 18, the FEIS text is incorrect in listing 'consumptive uses' at Urquhart Station as 127.5 cfs and D-Area Powerhouse as 68.4 cfs Urquhart station and D-Area Powerhouse both utilize once-through cooling which returns approximately 98% of the 127.5 cfs and 68.4 cfs, respectively, water withdrawals back to the Savannah River. Additionally, and as discussed in response to Question 11, SNC believes that the Staff's use of numerous conservative assumptions in it's analysis of impacts is appropriate to meet the 'hard look' requirement of NEPA.			
20	**7.3.1.1**	**7-6**	**This section indicates that "the percentage of stream flow reduction in the Savannah River due to the operation of VEGP Units 1 through 4 would be 4.3 percent at 3000 cfs and 6.5 percent at 2000**

			cfs." Why does this surface water consumption analysis not include the other nearby water users such as the D-Area Powerhouse consumptive use (1.94 cubic meters per second (m3/s [68.4 cfs]) and the Urquhart Station consumptive use (3.61 m3/s [127.5 cfs])? At 2000 cfs river flow, the total consumptive use from these sources (129 cfs + 68.4 cfs + 127.5 cfs = 324.9 cfs) apparently would be 16 percent of the stream flow. Is this acceptable? What determines the limits? What is the basis for the 2000 cfs assumption?
Response: Please see responses to questions 11 and 18. Withdrawals from the Urquhart and D-Area Powerhouse supply once-through cooling systems and should not be defined as consumptive uses.			
21	**7.3.2.1**	**7-12**	**Please explain the basis for the statement that the impacts under river flow rates below the Drought Level 3 value would not be significantly different from the impacts analyzed under the Drought Level 3 condition. Section 5.3.3.1 does not appear to identify any analyses at the lower flow rates.**
Response: This information was not included in the FEIS but has been subsequently added by the September 3, 2008 ERRATA document published by the staff.			
22	**7.5.2**	**7-23**	**The FEIS indicates that "[i]n addition to the above analysis, the staff also considered the cumulative impacts to aquatic biota in the Savannah River associated with the normal withdrawal rates for all four units at the VEGP site at two river flow rates below the Drought Level 3 values. Even assuming river flows of 3000 cfs and 2000 cfs, rather than the Drought Level 3 case of 3800 cfs river flow, the percentage of water withdrawn from the Savannah River due to the operation of VEGP Units 1 through 4 would be 5.8 percent at 3000 cfs and 8.7 percent at 2000 cfs." This analysis does not include the other major water users. Please explain why the conclusions would be unchanged if these other water users (present and future) were included?**
Response: As discussed in the response to question 11, the NRC Staff's use of the 3800 cfs flows for their analysis of impacts is appropriate and conservative. As noted in the FEIS, due to the relatively small and localized impacts of Urquhart Station and D-Area Powerhouse in addition to their distance from VEGP, the cumulative impacts from these facilities would be undetectable at the VEGP site (FEIS 7-23).			
23	**9.2**	**9-3**	**The FEIS states that "[f]or analysis of energy alternatives, [SNC] assumed a bounding electrical output target value of 2234 megawatts electric (MW[e]) (Southern 2008). The staff also used this**

			level of output in its analysis of energy alternatives." Does this mean that the analysis is applicable to any plant size smaller than the proposed two new VEGP units? For example, explain whether the analysis would still be applicable if only one of the two reactors were built.
Response: The value of 2234 MWe expressed in the FEIS (and ER) is not an assumed value, but rather the designated electrical output in MWe of two Westinghouse AP1000 reactors (2 at 1117 MWE = 2234 MWe). Vogtle used a technology specific ESP that presents actual values, in lieu of a bounding Plant Parameter Envelope (PPE) approach. The 2234 MWE value is bounding only in that it represents the maximum normal MWE output of two AP1000 units. In the event, for some reason, as decision was made to pursue only one unit, SNC believes that the FEIS would be substantially impacted such that it could not be used without further review and possible revision to bound a one unit option. Areas where changes would occur include the socioeconomic analysis and alternatives sections. While the FEIS analysis would still be of value, it could not be used as a surrogate FEIS. Many of the values in the two unit FEIS would change. NEPA is focused on identifying and disclosing the potential impacts from the proposed action. While the information contained in the two unit EIS provides a basis for the additional analysis, it would require major to work to adapt the process.			
24	**9.2.4**	**9-23**	**The combination of alternatives discussion assumes 60 MW of wind energy. What was the basis for this choice? What are the factors regarding wind energy generation that limit the plant size? Is there a wind energy limit for this site that precludes considering it as base load capacity?**
Response: Sub-question 1 Response: Different combinations of generating alternatives were considered for this project. Among these considerations, wind power, although not a feasible alternative for base load power, can be used in combination with other base load generation. Potential wind energy is relatively limited in the Southeast Region. The total potential wind energy in the Southeast is approximately 171 MWe **(AWEA 2002).** Consider that this amount includes the entire southeast (Mississippi, Alabama, Georgia, South Carolina, and Florida). Also, consider that almost all of this potential is concentrated in the exposed ridge crests and mountain summits in the southern Appalachian Mountains located in north Georgia and extreme northwest South Carolina. In addition, there is also a possibility for capturing offshore wind power from the coast of Georgia, which could amount to 10 MWe **(Southern 2007)** although economically challenging at this point. These two sources, if used in full, could account for 181 MWe. Although this amount is potentially available in the southeast, it would be inappropriate to apply this entire amount to this project; therefore, a 60 MWe assumption for this analysis is reasonable, accounting for approximately 1/3 of the total potential. Sub-question 2 Response: Potential for wind energy is driven by the availability of supporting wind schemes and land. As mentioned above, the available wind energy potential for the southeast is limited to 181 MWe. This is due to the relatively limited areas that have supporting wind schemes in the Southeast which include the mountainous and off shore areas. Furthermore, the site is not located in either of these areas. Therefore, all potential wind energy for this project would come from offsite. With the regions limited potential for wind energy, it is not reasonable to include the entire regions potential for the site, therefore the 60 MWe assumptions by the staff are reasonable. Sub-question 3 Response: As stated above, the site is not located in an area of potential wind energy. Any wind energy potential would be obtained off site either from the			

offshore region, the mountainous region or a combination of both. The wind energy limit would theoretically be the total potential for the southeast region of 181 MWe. Alternatively, assuming there was energy potential on this site, the limiting factor would be land space. The current site is 3169 +/- acres. Estimates based on existing installations indicate that a utility-scale wind farm would require about 50 – 60 acres per MWe. Using this factor and the assumptions above, the maximum potential wind energy generation for this site would be ~63.4 MWe. This analysis supports the 60 MWe assumed by the staff and discussed above in "Sub-question 1 Response" as reasonable. It also provides wind energy limit for the site. Note that the Commission has previously ruled that neither solar nor wind can provide baseload power.

25	**9.3**	**9-25 to -27**	**While once-through cooling seemingly is not suitable for this site, other options, such as cooling ponds, might be reasonable alternatives. Why were such alternatives not evaluated?**

Response: As a supplement to the staff's analysis, SNC notes that these alternatives were evaluated by SNC in the Environmental Report (ER) for Vogtle 3 and 4. In accordance with ESRP Section 5.3.3.1, SNC considered the following cooling technologies as options for cooling Vogtle Units 3 and 4 and evaluated their feasibility in ER Chapter 9.

- Once-through cooling
- Mechanical draft wet cooling towers
- Natural draft wet cooling towers
- Wet/Dry cooling towers
- Dry cooling towers
- Cooling ponds
- Spray canals

In Section 9.4.1.1, SNC discusses the cooling pond alternative and states that this alternative was considered for Vogtle 1 and 2. The option was rejected because the approximately 8000 acre cooling reservoir required would have been located in an area where seepage loss from the reservoir was a problem, and there was some uncertainty regarding the applicability of water quality standards to the impoundment. The existing Vogtle site is 3169 acres. Vogtle 1 and 2 occupy approximately 800 of those acres. The 8000 acre pond would require substantially more land than was available on the Vogtle site. This issue, coupled with the seepage and water quality standard applicability concern was sufficient to preclude further consideration of the cooling pond option.

The spray pond alternative is also discussed in the same ER section. This alternative is very similar to the cooling pond alternative in that it involves the creation of a new surface water body. Spray modules improve the evaporation from the pond and reduce the required pond volume. However, this is offset by the electrical and mechanical operating and maintenance costs. This alternative was also judged as unsuitable for Vogtle 3 and 4.

The other alternatives noted above are discussed in the balance of Section 9.4.1.1 and in Section 9.4.1.2.

26	**9.4.2**	**9-28 to -29**	**What was the basis for the staff's conclusion that SNC's methodology for selecting alternative sites was reasonable? Did the staff confirm there were no feasible sites in Mississippi that needed to be evaluated? What was the rationale for accepting the SNC approach of excluding non-nuclear sites**

			from further evaluation, despite the possibility such sites might have been judged more favorably regarding such relevant criteria as water availability during a drought?

Response: The SNC site selection process is described below. The SNC selection process did consider sites in Mississippi and determined that there were no existing generating sites or Greenfield sites owned or controlled by Southern Company that met the selection screening criteria. Mississippi Power Company, a Southern Company susidiary, serves a small territory along the coast of eastern Mississippi. They have three small generating plants, but no plants of the same size or larger than the AP1000. As such, these plants were screened out and did not make the list of 13 plants subjected to the final selection process. As discussed in the information below, SNC included nine coal plants in the list of 13 facilities considered as alternate sites. As stated in the summary below, water availability was a key factor in determining the 13 sites subjected to the final screening process. Although not explicitly stated below, water availability for each site was determined and compared as part of the selection process. While some sites clearly were limited by water availability in terms of potential for expansion, no site was identified with water resource availability significantly larger than the others. The three nuclear sites, and the Greenfield sites were all developed as four unit sites. Thus, water availability for four units was confirmed for these sites, as well as adequate land to support expansion. These factors coupled with the advantages discussed for co-location of nuclear units led to the selection of the Vogtle site and the three alternative sites. The availability of water was actually one of the factors that led to the selection of the Vogtle site for the Early Site Permit (ESP).

Background

Chapter 9 of the Environmental Report (ER) submitted in support of the Vogtle early Site permit (ESP) application provides a discussion of alternatives to the proposed action described in the application. Specifically, Chapter 9 requires presentation of the bases for the applicant's choice of the proposed site and the use of nuclear power technology over the available alternate sites and energy technologies. Chapter 9 presents a discussion of the range of practical alternatives and the considerations and rationale that led to the final site and technology selection. Two classes of alternatives are discussed: those that can meet the power demand without the creation of new generating capacity and those that require the addition of new generating capacity. The following paragraphs briefly describe the process used by Southern Nuclear to identify potential sites and screen them to develop the final candidate site list.

The Southern Nuclear Process

Regulatory Guide 4.2 in Section 9.2-1 provides guidance for the selection of candidate sites in the region of interest available to the applicant to provide a reasonable number of realistic siting options. The applicant must first identify potential sites within the region of interest to support a preliminary assessment to establish a list of candidate sites. The candidate sites are sites that that are suitable for evaluation and have the potential to be licensable and capable of being developed. Regulatory Guide 4.7 "General Site Suitability Criteria for Nuclear Power Stations" provides guidance on selection of potential sites. The applicant is directed to place primary reliance on existing, published materials and reconnaissance level information during the section of potential and candidate sites.

Chapter 9 in the Vogtle ESP ER describes the alternatives to construction and operation of new nuclear units with closed cycle cooling at the existing Vogtle Electric generating Plant (a two unit Westinghouse PWR with closed cycle cooling located on a 3169 acre site in Burke County Georgia). The ER addresses the alternative site selection process in section 9.3, beginning on page

9.3-1. NEPA mandates that reasonable alternatives to the action be evaluated. Consistent with this requirement, the SNC site selection process focused on those alternative sites that are considered to be reasonable with respect to being licensable and capable of being developed. SNC notes that the traditional way of conducting alternate site reviews has changed, since existing nuclear sites capable of supporting additional units can now be included in the candidate site list. These sites provide many years of construction and operational experience relative to the impacts of nuclear power plants on the environment. These sites are licensed by NRC and the impacts of their construction and operation are well documented. In NUREG 1555 Section 9.3(iii) (b), NRC recognizes "that there will be special cases in which the proposed site was not selected on the basis of a systematic site selection process. Examples include plants proposed to be constructed on the site of an existing nuclear power plant previously found acceptable on the basis of a NEPA review and/or demonstrated to be environmentally satisfactory on a basis of operating experience , and sites assigned or allocated to an applicant by a State government from a list of State-approved power plant sites. For such cases, the reviewer should analyze the applicant's site selection process only as it applies to candidate sites other than the proposed site, and the site-comparison process may be restricted to a site-by-site comparison of these candidates with the proposed site. As a corollary, all nuclear plant sites within the identified relevant service area having an operating nuclear power plant or a construction permit issued by NRC should be compared with the applicants proposed site."

SNC relied on this special case noted in NUREG -1555 and took advantage of the existing nuclear facilities within the relevant service area that have been previously reviewed by NRC and found to be suitable for construction and operation of a nuclear power plant. The prior review process for these plants also included an alternate site analysis. The candidate screening process used by SNC included two basic steps. SNC identified all sites in the relevant service area with existing units relatively the same size or larger than the proposed AP-1000 units, available land area consistent with proposed site, and available cooling water. The potential site list was developed from plants meeting these criteria and included large pulverized coal plants and nuclear plants in Georgia and Alabama. The review included:

Alabama	Georgia
Plant Barry (coal)	Plant Bowen (coal)
Plant Gaston (coal)	Plant Branch (coal)
Plant Gorgas (coal)	Plant Hammond (coal)
Plant Greene County (coal)	Plant Scherer (coal
Plant Miller (coal)	Plant Hatch (nuclear)
Plant Farley (nuclear)	Plant Vogtle (nuclear)
Plant Barton (nuclear greenfield)	

NUREG -1555 provides that the region of interest includes the state where the candidate site is located, so that alternative sites may be considered for review. Southern Company has generating facilities in four states; Alabama, Georgia, Mississippi, and Florida. There were no facilities in Florida or Mississippi that met the requirements for the potential site list, so the region of interest was narrowed to Alabama and Georgia. During the initial review of potential sites, SNC determined that the advantages of co-locating the new facility with an existing nuclear power facility outweighed the advantages of any other siting alternative.

- Co-located nuclear sites offer distinct advantages in existing infrastructure and support facilities.
- The environmental impacts of an existing nuclear facility are known and the impacts of a co-located new facility should be comparable to those of the operating nuclear plant.

- Site physical criteria: e.g., geologic/seismic suitability and emergency planning have been characterized at existing sites and these factors are very important in determining site suitability.
- Transmission is available and the existing sites have nearby markets.
- Existing nuclear sites have local support and the availability of experienced personnel.

Other advantages of co-locating with an existing nuclear facility include:

- The total number of required generating sites is reduced
- Construction of new transmission corridors would be minimized due to potential for use of existing corridors
- No to minimal additional land acquisition is normally necessary
- The site has already been through the NEPA alternatives analysis process
- Site development costs and environmental impact of any preconstruction activities are reduced
- Construction, installation, and operation and maintenance costs are reduced because of existing site infrastructure.

Based on the above information, the coal sites were eliminated in favor of available existing nuclear sites suitable for co-location of additional units.

Two nuclear facilities owned by the Tennessee Valley Authority, Browns Ferry and Watts Bar are located in North Alabama outside of the relevant service area. Also, the Savannah River Site (SRS) is located directly across the Savannah River from the Vogtle site in South Carolina. It is also outside the relevant service area. These facilities are operated by government agencies and present a number of problems as alternate sites. SNC considered these facilities but concluded that existing facilities in the region of interest where SNC could obtain access and control were preferred over other sites. The two TVA facilities and SRS were eliminated as potential sites.

Within the region of interest, SNC considered the three existing Southern Company nuclear sites with currently licensed, operating plants as candidate sites. In addition, SNC included an undeveloped (greenfield) site in central Alabama that was evaluated as a four unit nuclear site in the 1970s. The evaluation included development of a Preliminary Safety Analysis Report (PSAR) and most of the environmental work. The candidate site facilities selected by SNC are:

- Joseph M. Farley Nuclear Plant
- Edwin I. Hatch Nuclear Plant
- Vogtle Electric Generating Plant
- Barton Site (greenfield)

The review of the candidate sites begins in Section 9.3.3 located on page 9.3-3.

27	**9.5.1.2, 9.5.2.2, 9.5.3.2**	**9-33, 9-50, 9-70**	**The water use and quality evaluations for all sites were based upon the 7Q10 flow. Why was the maximum expected drought condition not evaluated for each of these sites and then compared to the VEGP site?**

Response: 7Q10 values (the lowest 7-day average flow that occurs on average once every 10 years) are a common design flow statistic used by many states and the EPA to define low flows for the purposes of setting permit limits. It is also a standard metric calculated by the United States Geological Survey (USGS) at stream gage stations throughout the country. In terms of the

alternatives analysis, all the site were compared using 7Q10 values to keep the impacts relative to the same standard. As mentioned in the FEIS, the 7Q10 for the Savannah River (3823 cfs) was nearly identical to the 3800 cfs Drought Level 3 flows. Therefore, use of 7Q10 values is appropriate when evaluating that no 'obviously superior' site exists. Use of the 7Q10 meets the "hard look" standard utilized under by NEPA.

28	**10.0**	**10-1**	**The last paragraph of this section indicates the staff performed its own independent review of the alternative sites analysis in applicant SNC's ER. Please describe the manner in which the staff performed this independent review.**

Response: This question is directed to the NRC and SNC will not provide a response.

29	**11.6.2.1**	**11-16**	**Please explain the basis upon which the staff has concluded that the estimated construction capital costs for Units 3 and 4 ($7.1 to $7.8 billion) are valid given the seemingly higher cost estimates for other AP1000 facilities, such as the proposed new Turkey Point facilities recently referenced by the Licensing Board in the Bellefonte combined operating license proceeding, LBP-08-16, 68 NRC _, _ (slip op. at 67) (Sept. 12, 2008)?**

Response: Cost estimates to construct a nuclear power plant vary significantly, depending on the site, the assumed capital cost escalation rates, the assumed cost of capital, and what is included or excluded from the referenced cost numbers. In the comparison of numbers from plant to plant, it is important to understand such factors as whether the cost of capital is included, whether commodity escalation factors are considered, and whether the cost of transmission lines is included. The referenced Bellefonte proceeding cites October 2007 testimony before the Florida Public Service Commission by Florida Power and Light Company (FPL) indicating that the cost of a new AP1000 unit (including escalation during construction) at the location of its existing two-unit Turkey Point site to be between $5492 and $8041 per kW. The estimated cost of Plant Vogtle Units 3 and 4 fall within the range of the $5492 to $8041 used in the FPL testimony.

In the Vogtle 3 and 4 circumstances, Georgia Power Company signed an Engineering, Procurement, and Construction Contract with Westinghouse and Shaw on April 8, 2008 to construct two AP1000 units at the Vogtle site, contingent on PSC certification. That contract allows Southern Nuclear to provide more precise estimates of the cost of Vogtle. The reference for the numbers provided in the FEIS of $7.1 to $7.8 billion is an SNC Letter dated June 26, 2008 (Ref: ML081790598). This letter provides an **overnight capital** cost of $3200 to $3500 per kilowatt. SNC's range falls within the range of $3108 to $4540/kw for overnight capitals estimated by FPL. It is important to understand what an overnight capital cost number is. It is the cost of the plant as if it could be constructed basically overnight – such factors as the cost of capital and the increased cost of money over time are not included. This Southern Nuclear reference also lists the total cost as approximately $14 billion. This $14 billion is based on certain assumptions about the cost of capital and does not include certain provisions which could reduce the cost such as Construction Work In Progress (CWIP) in rate base accounting treatment which is being discussed with the Georgia Public Service Commission at this time. This $14 billion total cost dollars is similar to the assumptions applied by Florida Power and Light and the cost range is also similar.

The recently referenced material by the Licensing Board in the Bellefonte combined operating

license proceeding dealing with the Turkey Point proceedings originates from the Direct Testimony of Steven D. Scroggs, Florida Power and Light Company before the Public Service Commission on October 16, 2007, Exhibit SDS-8. In that Exhibit, Mr. Scroggs notes the difference between overnight costs and project total costs. There are three estimates for project costs. In one example, Mr. Scroggs notes that the estimated total overnight costs for Turkey Point to be $3,596/kW while the total Project costs are estimated at $6,372.			
30			**Are there any ESP license conditions that the staff will impose to address environmental matters associated with the VEGP site and, if so, what are they?**
Response: This question is directed to the NRC and SNC will not provide a response.			

Respectfully submitted,

(Original signed by M. Stanford Blanton)

_____

M. Stanford Blanton, Esq.
C. Grady Moore, III, Esq.
BALCH & BINGHAM LLP
1710 Sixth Avenue North
Birmingham, AL 35203-2015
Telephone: (205) 251-8100
Facsimile: (205) 226-8798

COUNSEL FOR SOUTHERN NUCLEAR OPERATING COMPANY

Kathryn M. Sutton, Esq.
MORGAN, LEWIS & BOCKIUS LLP
1111 Pennsylvania Avenue, NW
Washington, DC 20004
Telephone: (202) 739-5738
Facsimile: (202) 739-3001

CO-COUNSEL FOR SOUTHERN NUCLEAR OPERATING COMPANY

Dated this 7th day of November, 2008.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	**) Docket No. 52-011-ESP**
Southern Nuclear Operating Company	**) ASLBP No. 07-850-01-ESP-BD01**
(Early Site Permit for Vogtle ESP Site)	**) November 7, 2008**

CERTIFICATE OF SERVICE

I hereby certify that copies of SOUTHERN NUCLEAR OPERATING COMPANY'S RESPONSE TO THE LICENSING BOARD OF OCTOBER 17, 2008 in the above captioned proceeding have been served by electronic mail as shown below, this 7th day of November, 2008, and/or by e-submittal.

Administrative Judge G. Paul Bollwerk, III, Chair Atomic Safety and Licensing Board Mail Stop T-3F23 U.S. Nuclear Regulatory Commission Washington, D.C. 20555-0001 (Email: gpb@nrc.gov)	Administrative Judge Dr. Nicholas G. Trikouros Atomic Safety and Licensing Board Mail Stop T-3F23 U.S. Nuclear Regulatory Commission Washington, D.C. 20555-0001 (E-mail: ngt@nrc.gov)
Administrative Judge Dr. James Jackson Atomic Safety and Licensing Board Mail Stop T-3F23 U.S. Nuclear Regulatory Commission Washington, D.C. 20555-0001 (E-mail: jackson538@comcast.net)	Office of the Secretary ATTN: Docketing and Service U.S. Nuclear Regulatory Commission Washington, D.C. 20555-0001 (E-mail: HEARINGDOCKET@nrc.gov)
Emily Krauss Law Clerk Atomic Safety and Licensing Board Mail Stop T-3F23 U.S. Nuclear Regulatory Commission (E-mail: eik1@nrc.gov)	Office of Commission Appellate Adjudication U.S. Nuclear Regulatory Commission Washington, D.C. 20555-0001 (E-mail: ocaamail@nrc.gov)

Ann P. Hodgdon, Esq. Patrick A. Moulding, Esq. Kathryn L. Winsberg, Esq. Office of the General Counsel U.S. Nuclear Regulatory Commission (E-mail: aph@nrc.gov, pam@nrc.gov, klw@nrc.gov)	Mary Maclean D. Asbill, Esq. Lawrence D. Sanders, Esq. Turner Environmental Law Clinic Emory University School of Law (E-mail: masbill@law.emory.edu lsanders@law.emory.edu)
Diane Curran, Esq. Harmon, Curran, Spielberg & Eisenberg, LLP 1726 M Street, NW Suite 600 Washington, D.C. 20036 (E-mail: dcurran@harmoncurran.com)	* And upon any other persons designated on the official service list compiled by the Nuclear Regulatory Commission in this proceeding.

(Original signed by M. Stanford Blanton)

_____

M. Stanford Blanton
Counsel for Southern Nuclear Operating Company

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	) **Docket No. 52-011-ESP**
Southern Nuclear Operating Company	) **ASLBP No. 07-850-01-ESP-BD01**
(Early Site Permit for Vogtle ESP Site)	) **November 7, 2008**

AFFIDAVIT OF THOMAS C. MOORER CONCERNING SOUTHERN NUCLEAR OPERATING COMPANY'S RESPONSE TO THE LICENSING BOARD ORDER OF OCTOBER 17, 2008

I, Thomas C. Moorer, do hereby state as follows:

1. I am employed as the Project Manager, Environmental Affairs, for Southern Nuclear Operating Company.

2. I am responsible for the responses to the Board's questions 1-27.

3. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.

Thomas C. Moorer

Thomas C. Moorer

Gloria H. Bain
05/06/09

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	) **Docket No. 52-011-ESP**
Southern Nuclear Operating Company	) **ASLBP No. 07-850-01-ESP-BD01**
(Early Site Permit for Vogtle ESP Site)	) **November 7, 2008**

AFFIDAVIT OF CHARLES R. PIERCE CONCERNING SOUTHERN NUCLEAR OPERATING COMPANY'S RESPONSE TO THE LICENSING BOARD ORDER OF OCTOBER 17, 2008

I, Charles R. Pierce, do hereby state as follows:

1. I am employed as a Licensing Manager, Vogtle Deployment, for Southern Nuclear Operating Company.

2. I am responsible for the response to the Board's question 29.

3. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.

Charles R Pierce

Charles R. Pierce

Gloria H. Bui
05/06/09

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	) **Docket No. 52-011-ESP**
Southern Nuclear Operating Company	) **ASLBP No. 07-850-01-ESP-BD01**
(Early Site Permit for Vogtle ESP Site)	) **November 7, 2008**

AFFIDAVIT OF MATTHEW THOMAS MONTZ CONCERNING SOUTHERN NUCLEAR OPERATING COMPANY'S RESPONSE TO THE LICENSING BOARD ORDER OF OCTOBER 17, 2008

I, Matthew Thomas Montz, do hereby state as follows:

1. I am employed as an Environmental Specialist, Environmental Affairs, for Southern Nuclear Operating Company.

2. I am responsible for the responses to the Board's questions 1, 4, 8, 11, 17-22, 26-27.

3. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.

Matthew Thomas Montz

Gloria D. Brin
05/06/09

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	) **Docket No. 52-011-ESP**
Southern Nuclear Operating Company	) **ASLBP No. 07-850-01-ESP-BD01**
(Early Site Permit for Vogtle ESP Site)	) **November 7, 2008**

AFFIDAVIT OF DALE LANE FULTON CONCERNING SOUTHERN NUCLEAR OPERATING COMPANY'S RESPONSE TO THE LICENSING BOARD ORDER OF OCTOBER 17, 2008

I, Dale Lane Fulton, do hereby state as follows:

1. I am employed as an Environmental Specialist, Environmental Affairs, for Southern Nuclear Operating Company.

2. I am responsible for the responses to the Board's questions 5-7, 10, 16.

3. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding. I declare under penalty of perjury that those statements, and my statements in this affidavit, are true and correct to the best of my knowledge, information, and belief.

Dale Lane Fulton

Dale Lane Fulton

Gloria H. Bric
05/09/08