UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before the Licensing Board:

G. Paul Bollwerk, III, Chairman
Nicholas G. Trikouros
Dr. James F. Jackson

In the Matter of	Docket No. 52-011-ESP
SOUTHERN NUCLEAR OPERATING CO.	ASLBP No. 07-850-01-ESP-BD01
(Early Site Permit for Vogtle ESP Site)	July 24, 2009

MEMORANDUM AND ORDER
(Providing Proposed Questions for Docketing)

Pursuant to 10 C.F.R. § 2.1207(a)(3)(iii), this issuance and the accompanying attachments, which are the proposed questions submitted to the Licensing Board by applicant Southern Nuclear Operating Co. (SNC), the NRC staff, and Joint Intervenors[1] in connection with

[1] Joint Intervenors include the Center for a Sustainable Coast, Savannah Riverkeeper, Southern Alliance for Clean Energy, Atlanta Women's Action for New Directions, and Blue Ridge Environmental Defense League.

the contested evidentiary hearing conducted on March 16-19, 2009, should be placed by the Office of the Secretary into the public docket of this proceeding.

It is so ORDERED.

FOR THE ATOMIC SAFETY
AND LICENSING BOARD[2]

/RA/

G. Paul Bollwerk, III
CHAIRMAN

Rockville, Maryland

July 24, 2009

[2] Copies of this memorandum and order were sent this date by the agency's E-Filing system to counsel for (1) applicant SNC; (2) Joint Intervenors; and (3) the staff.

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February 2, 2009

Hon. G. Paul Bollwerk, III
Atomic Safety and Licensing Board
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: Southern Nuclear Operating Co., Inc. (ESP for Plant Vogtle)
Docket No. 52-011-ESP - ASLBP No. 07-850-01-ESP-BD01

Dear Judge Bollwerk:

In accordance with the order of the Atomic Safety and Licensing Board dated December 15, 2008, Southern Nuclear Operating Company's proposed cross-examination questions, directed to Joint Intervenors' direct testimony in the Vogtle 3 and 4 Early Site Permit Contested Hearing, are attached to this letter.

Please do not hesitate to contact me if you have any questions

Sincerely,

/s/ M. Stanford Blanton

M. Stanford Blanton

MSB:dc
Attachments

Confidential Pending Release by the Licensing Board
Pursuant to 10 C.F.R. § 2.1207 (a)(3)(iii)

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)	)	**February 2, 2009**

SOUTHERN NUCLEAR OPERATING COMPANY'S QUESTIONS FOR THE BOARD ON JOINT INTERVENORS' REVISED PRE-FILED DIRECT TESTIMONY OF BARRY W. SULKIN RELATED TO ENVIRONMENTAL CONTENTION 1.2

Pursuant to the Atomic Safety and Licensing Board's ("ASLB" or "Board") Orders of October 24, 2008 and December 15, 2008,[1] and in accordance with 10 C.F.R. § 2.1207(a)(3), Southern Nuclear Operating Company ("SNC") hereby submits proposed questions for the Board to consider propounding to Mr. Barry W. Sulkin at the Hearing regarding Environmental Contention 1.2 ("EC 1.2"). These questions are based on Mr. Sulkin's testimony originally filed on January 9, 2009, related to EC 1.2 and revised on February 2, 2009.[2]

Following the guidelines for submittals of requests for cross-examination by the parties, this submittal provides a description of the issues, the objective of the line of questioning and the proposed line of questions that will lead to the objective of the questioning. *See* 10 C.F.R. § 2.1204(b)(i) – (iii).

[1] Memorandum and Order (Revised General Schedule) ("October 24 Order") and Memorandum and Order (Contested Evidentiary Hearing Administrative Matters) ("December 15 Order").

[2] References to Question and Answer numbers are to the Revised Pre-filed Direct Testimony of Barry W. Sulkin in Support of EC 1.2, filed by Joint Intervenors on February 2, 2009. To the extent these questions also address issues raised by Mr. Sulkin's revised parallel testimony submitted in support of EC 1.3, these cross-examination questions are proposed in regard to that testimony as well.

I. Description of the Issues

A. Mr. Sulkin's Background, Experience and Preparation

B. Staff's Method of Estimating Impacts

C. Mr. Sulkin's Use of the "Surrogate Method"

II. Objectives

A. Mr. Sulkin's Background, Experience and Preparation

1. Establish Mr. Sulkin's lack of experience preparing NEPA documents.

2. Explore Mr. Sulkin's knowledge of the Savannah River in the vicinity of the Vogtle Site.

B. Staff's Method of Estimating Impacts

1. Establish that the only basis for Mr. Sulkin's conclusion that the FEIS is inadequate is his belief that the "surrogate method" is flawed.

2. Explore Mr. Sulkin's criticism of the 5% threshold.

3. Probe Mr. Sulkin's accusations that the Staff can manipulate its method for assessing impacts.

C. Mr. Sulkin's Use of the "Surrogate Method"

1. Explore Mr. Sulkin's proposed method for assessing impacts.

2. Understand Mr. Sulkin's artificial withdrawal rate calculations.

3. Examine how Mr. Sulkin's conclusions do not consider the coincidence of the biological community of concern with potential low river flows.

III. Proposed Line of Questions

A. Mr. Sulkin's Background, Experience and Preparation

1. Establish Mr. Sulkin's lack of experience preparing NEPA documents.

    a. In giving your opinion in this matter, you have not identified in A.6 that you relied on any personal experience related to the preparation of or assistance in the preparation of NEPA documents, have you?

b. Are you familiar with the NRC's three significance levels for assessing impacts?

c. You testify in A.11 that you have "come to three conclusions" based on your analysis of the FEIS and supporting documents. Are these conclusions based on assessing impacts for purposes of the NEPA scale?

3. Explore Mr. Sulkin's knowledge of the Savannah River in the vicinity of the Vogtle Site.

a. You have not identified in A.6 of your testimony that your opinion is based on any personal observation of the Savannah River in the vicinity of Plant Vogtle, have you?

b. Your testimony is not based on any personal observation of the current intake canal operations at Plant Vogtle or of the proposed intake site, is it?

B. Staff's Method of Estimating Impacts

1. Establish that the only basis for Mr. Sulkin's conclusion that the FEIS is inadequate is his belief that the "surrogate method" is flawed.

a. Doesn't your criticism of the FEIS in A.9 and A.10 involve only the Staff's use of withdrawal rate as a percentage of total flow as an indicator of potential impacts?

b. Isn't it true that this "surrogate method," as you call it, is not the only approach taken in the FEIS for identifying impacts and discharge?

i. On page 5-30 of the FEIS, doesn't it state that a number of factors influence the degree to which impingement and entrainment affect the aquatic biota?

ii. And doesn't the Staff go on at pp. 5-30 – 5-31 to discuss consideration of SNC's use of a closed-cycle wet cooling tower system, the intake design through-screen velocity, and SNC's use of design and construction technologies for minimizing impingement mortality and entrainment, including that the intake canal would be built so that the river flow is almost perpendicular to the intake canal flow and the installation of a weir wall?

iii. In assessing impacts, doesn't the Staff also consider the 1985 Final Environmental Statement for Units 1 and 2 as indicated at p. 5-31? And analysis of an assessment

performed for the Department of Energy to estimate entrainment rates for the Savannah River Site, as indicated at p. 5-31?

iv. Doesn't the FEIS indicate that the Staff also considered a site visit, and the non-reporting of any "Unusual or Important Environmental Events" for purposes of Units 1 and 2 Environmental Protection Plan at 5-33?

c. Isn't it true that the tables attached to your testimony and marked JTI000021 are exactly this: expressing the withdrawal rate as a percentage of flow, just like the so-called surrogate method you criticize?

2. Explore Mr. Sulkin's criticism of the 5% threshold.

a. You testify at A.12 that there is no justification for setting the threshold of significance at 5%. Isn't it true that this threshold is set in the EPA's § 316(b) rule?

b. You testify in A.13 that EPA has determined in its 316(b) rule that withdrawals greater than 5% are inappropriate. Isn't it true that EPA's determination is based on average annual flows, rather than the unlikely, temporary low flows with which you later try to compare this percentage?

c. Isn't it true that EPA equates withdrawals of less than 5% with a finding of best available cooling technology?

d. Doesn't it logically follow that the impacts from withdrawals less than 5% would be less significant than those from withdrawals that exceed 5%?

3. Probe Mr. Sulkin's accusations that the Staff can manipulate its method for assessing impacts.

a. You testify at A.14 that the FEIS "purports to analyze flows below Drought Level 3, at 3,000 cfs and 2,000 cfs, but . . . these results are not included in the Tables. Isn't this analysis included in the text at pp. 5-20 (*see* Errata), 5-38 and 7-6?

b. Your testimony indicates that the FEIS "obfuscates" the potential impacts by presenting some results in charts and other in text. Are you aware of any NEPA requirement that an agency present all of its information in a table format?

c. In fact, you were able to locate all of the data you state is obscured by reviewing the FEIS, weren't you?

C. Mr. Sulkin's Use of the "Surrogate Method"

1. Explore Mr. Sulkin's proposed method for assessing impacts.

   a. You used the same method the Staff used to calculate impacts, for example, in your Tables attached as JTI000021, correct?

   b. To arrive at different withdrawal percentages than the Staff, you assumed hypothetical lower flows and maximum withdrawal, correct?

   c. And these calculations using lower flows and maximum withdrawal yielded withdrawal rates greater than 5%, correct?

   d. The Staff didn't represent its rates as being calculated at these lower rates and at maximum withdrawal levels, did it?

   e. Didn't you simply "manipulate" the method used by the Staff to calculate impacts greater than 5% and then apply the same significance threshold you criticize as having no basis?

   f. You have not independently obtained "site-specific information to justify setting the threshold" at some percentage other than 5%, have you?

2. Understand Mr. Sulkin's artificial withdrawal rate calculations.

   a. Your testimony at A.15 and A.16 states that your assumed Drought Level 4 flow is "the hypothetical unimpaired minimum flow if there were no dams or reservoirs" and that Drought Level 4 means there is no conservation storage remaining in upstream reservoirs? What is the basis of your assumption that there would be no conservation storage remaining in upstream reservoirs?

   b. You testify in A.15 that you assumed that the flow at Drought Level 4 is 957 cfs. Isn't it true that the lowest flow observed at Plant Vogtle during the most recent drought is 3 to 4 times higher than this?

   c. The area of the Savannah River in the vicinity of Plant Vogtle has experienced record drought over the past several years, has it not?

   d. Aren't the lowest recorded flows at Plant Vogtle during this record drought significantly higher than 957 cfs, as shown in SNC000016?

   f. Didn't you previously testify in your declaration submitted in support of Joint Intervenors' Response to SNC's Motion for

Summary Disposition of EC 1.2, labeled Exhibit, JTI000031, at p.9, that a reasonable Drought Level 4 flow estimate would be equivalent to 3600 cfs?

g. What is the basis for your reference in A.18 to recent flows of 3100 cfs in the area of Plant Vogtle?

i. Have you reviewed the U.S Geological Survey records submitted as SNC 000016? Isn't the lowest flow those records indicate well in excess of 3100 cfs?

j. Is it your testimony that the Staff should have used an assumed river flow that is a small fraction of the lowest flow ever recorded on the Savannah River at Plant Vogtle in order to take a hard look at aquatic impacts?

3. Examine how Mr. Sulkin's conclusions do not consider the coincidence of the biological community of concern with potential low river flows.

a. Isn't it true that the biological community of concern for entrainment into the intake or mixing zone of the thermal discharge – ichthyoplankton – occurs in the spring and early summer?

b. Isn't it also true that river flows are generally at seasonal highs during these times?

c. Based on your own surrogate calculations, withdrawals begin to exceed the 5% threshold at 2,000 cfs at the maximum withdrawal rate. Daily flows of 2,000 cfs have never been recorded in the downstream vicinity of Plant Vogtle, have they?

d. Even if those low flows were ever to occur, it would be more likely that they would occur during the dry season, rather than the wet season, isn't that correct?

e. Isn't it unlikely that ichthyoplankton would be present and impacted at such flows?

Respectfully submitted,

(Original signed by M. Stanford Blanton)

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CO-COUNSEL FOR SOUTHERN NUCLEAR OPERATING COMPANY

Dated this 2nd day of February, 2009.

Confidential Pending Release by the Licensing Board
Pursuant to 10 C.F.R. § 2.1207(a)(3)(iii)

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)	)	**February 2, 2009**

SOUTHERN NUCLEAR OPERATING COMPANY'S QUESTIONS FOR THE BOARD ON JOINT INTERVENORS' PRE-FILED DIRECT TESTIMONY OF SHAWN P. YOUNG RELATED TO ENVIRONMENTAL CONTENTION 1.2

Pursuant to the Atomic Safety and Licensing Board's ("ASLB" or "Board") Orders of October 24, 2008 and December 15, 2008,[1] and in accordance with 10 C.F.R. § 2.1207(a)(3), Southern Nuclear Operating Company ("SNC") hereby submits proposed questions for the Board to consider propounding to Dr. Shawn Young at the Hearing regarding Environmental Contention 1.2 ("EC 1.2"). These questions are based on Dr. Young's testimony originally filed on January 9, 2009, specifically questions 1-28, and refiled on February 2, 2009, which address EC 1.2.[2]

Following the guidelines for submittals of requests for cross-examination by the parties, this submittal provides a description of the issues, the objective of the line of questioning and the proposed line of questions that will lead to the objective of the questioning. *See* 10 C.F.R. § 2.1204(b)(i) – (iii).

[1] Memorandum and Order (Revised General Schedule) ("October 24 Order") and Memorandum and Order (Contested Evidentiary Hearing Administrative Matters) ("December 15 Order").

[2] References to Question and Answer numbers are to the Revised Pre-filed Direct Testimony of Shawn P. Young on EC 1.2, filed by Joint Intervenors on January 9, 2009.

I. Description of the Issues

A. Dr. Young's Experience and Preparation

B. Dr. Young's Understanding of NEPA Analyses

C. Scope of EC 1.2

D. Impacts from Impingement/Entrainment and Thermal Discharge

II. Objectives

A. Dr. Young's Experience and Preparation

1. Explore Dr. Young's lack of experience relative to preparation of NEPA documents.

2. Ascertain Dr. Young's familiarity with the VEGP site.

B. Dr. Young's Understanding of NEPA Analyses

1. Explore Dr. Young's understanding of what information NEPA and the NRC's guidelines for preparation of EISs require the Staff to include in order to assess impacts.

C. Scope of EC 1.2

1. Clarify Dr. Young's understanding of "in the vicinity."

D. Impacts from Impingement/Entrainment and Thermal Discharge

1. Determine whether Dr. Young believes SNC's 2008 impingement and entrainment studies answer his call to adequately assess the composition, distribution and vulnerability to entrainment of the ichthyoplankton in the vicinity of the VEGP site.

2. Explore Dr. Young's criticism of the Staff's assumption of uniform drift distribution.

3. Probe Dr. Young's knowledge of current and historical Savannah River flows.

4. Explore Dr. Young's assertion that the FEIS should have considered other flows.

5. Explore Dr. Young's bases for his assertion that the FEIS lacks analysis of impacts under elevated temperatures.

III. Proposed Line of Questions

A. Dr. Young's Experience and Preparation

1. Explore Dr. Young's lack of experience relative to preparation of NEPA documents.

    a. In giving your opinion in this matter, you have not identified that you relied on any personal experience related to the preparation of or assistance in the preparation of NEPA documents, have you?

2. Ascertain Dr. Young's familiarity with the VEGP site.

    a. In A.8 of your testimony you do not include in your actions taken in preparation for your testimony a visit to the VEGP site. Have you actually visited the VEGP site? Have you inspected the existing intake canal or the proposed intake site?

    b. So it is correct that none of your opinions regarding impacts of VEGP 3 and 4 on the Savannah River are based on personal observations of the river in the vicinity of the intake canal?

B. Dr. Young's Understanding of NEPA Analyses

1. Explore Dr. Young's understanding of what information NEPA and the NRC's guidelines for preparation of EISs require the Staff to include in order to assess impacts.

    a. Are you familiar with the NRC's three significance levels for assessing impacts?

    b. Isn't it true that on the NRC's scale for assessing impacts, impacts are determined to be SMALL if environmental effects would not noticeably alter any important attribute of the resource?

c. And, according to NUREG – 1437, impacts are determined to be MODERATE only if environmental effects are sufficient to alter noticeably important attributes of the resource, isn't that correct?

d. When an analysis indicates a SMALL impact, then determining "how small" the impact is would not be necessary for purposes of NRC's scale, would it?

C. Scope of EC 1.2

1. Clarify Dr. Young's understanding of "in the vicinity."

a. Isn't it true that EC 1.2 is limited to the impacts to aquatic species "in the vicinity" of VEGP?

b. You testify in A.13 that the FEIS does not provide sufficient data to substantiate conclusions regarding the impacts of entrainment on the fish species located in the Middle, Lower and estuarine Savannah River in the vicinity of the VEGP site. Can you provide mile points for the beginning and end of each "area" – Middle, Lower and estuarine Savannah River?

c. Isn't it true that the estuarine Savannah River is approximately 120 miles from the VEGP site?

d. Is it your testimony that impacts to the Lower or estuarine Savannah River are in the vicinity of VEGP?

D. Impacts from Impingement/Entrainment and Thermal Discharge

1. Determine whether Dr. Young believes SNC's 2008 impingement and entrainment studies answer his call to adequately assess the composition, distribution and vulnerability to entrainment of the ichthyoplankton in the vicinity of the VEGP site.

a. Have you reviewed the field studies and quantitative analysis of river ichthyoplankton, entrainment and impingement conducted by SNC in 2008 and submitted as part of this proceeding?

b. You are not aware of any similar field studies in the vicinity of the proposed intake structure that have come to conclusions different than those in the SNC study, are you?

2. Explore Dr. Young's criticism of the Staff's assumption of uniform drift distribution.

    a. Although you criticize the uniform drift assumption, you have no evidence that the drift community is somehow concentrated at the proposed Units 3 and 4 intake, do you?

    b. You testify in A.15 that not all of the larval fish that inhabit the Savannah River near VEGP are capable of avoiding the predicted water intake velocities by applying the threshold velocity of 1 ft/sec. Will you read the entire quotation from the FEIS (NRC000001) on this matter on page 5-30 paragraph 4? It doesn't actually say what you have tried to imply it says, does it?

    c. Isn't it a fact that the actual velocity through the screens of the intake is designed to be less than 6 inches/second? Isn't the velocity less than this a few feet away from the intake?

    d. Wouldn't you agree that a velocity of 6 inches/second at the mouth of the intake is unlikely to have any significant impingement impact more than a few feet away?

    e. Isn't it a fact that the FEIS, for example at p5-33, does not rely on <u>any</u> larval fish mobility to reach its conclusion that impacts will be SMALL?

3. Probe Dr. Young's knowledge of current and historical Savannah River flows.

    a. The FEIS, e.g. at 7-24, considers Savannah River flows at 3000 and even 2000 cfs. Your testimony does not acknowledge this analysis, does it?

    b. You are aware that Savannah River Flows at Plant Vogtle have never been recorded as low as 2000 cfs aren't you?

4. Explore Dr. Young's assertion that the FEIS should have considered other flows.

    a. You claim that variability in the Savannah River flow caused by VEGP's intake exceeds that due to natural causes. Isn't it actually true that withdrawals will be generally consistent and not induce variability?

b. The references you cite in A.20 deal with biological impacts from major changes in river flows due to river engineering projects, such as reservoir operations, don't they? The chart on the last page of SNC000016 shows present variations in Savannah River flows. In no way will the proposed intake for Vogtle Units 3 & 4 cause changes in Savannah River flows similar to those shown in SNC000016, will it?

c. Although your testimony expresses conclusions about entrainment and impingement impacts at extremely low flows, isn't it true that the ichthyoplankton in the Savannah River near the VEGP site peak during seasonal high flow, not low flows?

5. Explore Dr. Young's bases for his assertion that the FEIS lacks analysis of impacts under elevated temperatures.

a. Isn't it true that duration of exposure to the thermal plume is a factor that should be considered in analyzing the lethality of the plume to fish?

b. Isn't it true that your conclusions related to the temperatures you cite as being lethal to fish passing through the thermal plume ignore the required duration of exposure?

c. Aren't these species-specific temperatures misleading without corresponding required durations of exposure?

d. Have you reviewed the thermal measurements provided by SNC in Exhibit SNC000011? Isn't it true that those measurements indicate that the temperature of the river in September, upstream of the Unit 1 and 2 Discharge point, is 27.5 degrees Celsius, or 82 degrees Fahrenheit?

e. Isn't it also true that the temperature of the river below the discharge point was basically the same as the upstream temperature?

Respectfully submitted,

(Original signed by M. Stanford Blanton)

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Dated this 2nd day of February, 2009.

Confidential Pending Release by the Licensing Board
Pursuant to 10 C.F.R. § 2.1207 (a)(3)(iii)

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)	)	**February 2, 2009**

SOUTHERN NUCLEAR OPERATING COMPANY'S QUESTIONS FOR THE BOARD ON JOINT INTERVENORS' REVISED PRE-FILED DIRECT TESTIMONY OF WILLIAM POWERS TO ENVIRONMENTAL CONTENTION 1.3

Pursuant to the Atomic Safety and Licensing Board's ("ASLB" or "Board") Orders of October 24, 2008 and December 15, 2008,[1] and in accordance with 10 C.F.R. § 2.1207(a)(3), Southern Nuclear Operating Company ("SNC") hereby submits proposed questions for the Board to consider propounding to Mr. William Powers at the Hearing regarding Environmental Contention 1.3 ("EC 1.3"). These questions are based on Mr. Powers' testimony originally filed on January 9, 2009, related to EC 1.3 and revised on February 2, 2009.[2]

Following the guidelines for submittals of requests for cross-examination by the parties, this submittal provides a description of the issues, the objective of the line of questioning and the proposed line of questions that will lead to the objective of the questioning. *See* 10 C.F.R. § 2.1204(b)(i) – (iii).

[1] Memorandum and Order (Revised General Schedule) ("October 24 Order") and Memorandum and Order (Contested Evidentiary Hearing Administrative Matters) ("December 15 Order").

[2] References to Question and Answer numbers are to the Revised Pre-filed Direct Testimony of Barry W. Sulkin in Support of EC 1.3, filed by Joint Intervenors on February 2, 2009.

SNC's Proposed Cross Examination Questions for Mr. William Powers
Regarding EC 1.3 Revised Pre-filed Direct Testimony

I. Description of Issues

A. AP1000 Standard Design

B. Comparison of Existing Dry Cooling Applications

C. Effect of Dry Cooling on an AP1000 unit at Vogtle

D. Impact of Climate on Dry Cooling

II. Objectives

A. AP1000 Standard Design

1. Determine Mr. Powers' understanding of the "standard design" for the AP1000.

2. Determine the basis for Mr. Powers' testimony that the use of an ACC would not require substantial modifications to the standard design for the AP1000.

3. Understand the basis of Mr. Powers' assertion that a single stage, high backpressure turbine and the multi-stage AP1000 turbine are interchangeable.

B. Comparison of Existing Dry Cooling Applications

1. Understand the basis for Mr. Powers' comparison of an AP1000 unit to the smaller, high backpressure units referenced in his testimony.

2. Understand Mr. Powers' testimony with regard to the Heller System (JTI000038).

C. Effect of Dry Cooling on an AP1000 at Vogtle

1. Understand the basis for Mr. Powers' testimony regarding the financial, economic, and performance impacts of an ACC at Vogtle.

2. Examine Mr. Power's calculations and analysis with regard to the size an ACC that could be utilized at Vogtle, the parasitic load of such an ACC, and the resulting loss of capacity.

D. Impact of Climate on the Efficiency of Dry Cooling

1. Understand Mr. Powers' testimony with regard to the impact of the climate at the Vogtle site on the efficiency of a dry cooling system.

III. Proposed Cross-Examination Questions

A. AP1000 Standard Design

1. Determine Mr. Powers' understanding of the "standard design" for the AP1000.

   a. In A9 of your direct testimony, you state that you have reviewed the ESP application, the FEIS and Exhibit JTI000034 in preparation for such testimony. None of these documents contain detailed design information, such as site diagrams, equipment layouts or single line drawings for the AP1000 or do they?

   b. Please explain your understanding of the standard AP1000 design configuration.

   c. Are you aware of the Westinghouse AP1000 Design Control Document (DCD)? Would you agree that this would be a reasonable standard for interpreting what constitutes the standard design for an AP1000 nuclear plant?

   d. In A23 of your direct testimony, you state that "a standard design serves as a point of departure for customizing the design for a specific site with specific site constraints."

      i. Explain the basis for your position. Is there a difference between a standard design and a custom design? If so what is the difference?

      ii. What evidence do you present to support this position?

      iii. Does the DCD, or any other NRC rule or guidance, support this position?

   e. Please read the first two sentences of Section 10.2.2.1 of the DCD (Exhibit SNC000028). Would you agree that this section is very specific in its designation of a particular model turbine, namely a "TC6F 52-inch last-stage blade unit," as part of the standard AP1000 design? Does the DCD mention any other type of turbine?

   f. Have you reviewed Chapter 10.2 of the AP1000 Design Control Document? What does that chapter describe?

g. Isn't it true that Chapter 10.2.2.1 of the AP1000 DCD specifies the turbine to be used with the AP1000 as a 1800-rpm tandem compound, six-flow, reheat unit with 52 inch last-stage blades (TC6F)?

h. Isn't it also true that Chapter 10.2.2.1 of the Design Control Document states that the turbine generator foundation is a spring-mounted support system and consists of a concrete deck mounted on springs and supported on a structure that forms an integral part of the turbine?

i. Isn't it also true that the DCD states at Chapter 10.2.2.1 that the integrated design of the turbine foundation reduces the bracing and the number of columns required in the turbine building?

j. Isn't it true that certain safety analyses, such as the safety analysis of the risk of turbine generated missiles, is based on the turbine design in Chapter 10.2 of the DCD and that analysis might have to be redone if the turbine design were changed?

k. Please read Sections 10.1 (first paragraph), 10.4 and 10.4.1 of the DCD (Exhibit SNC000027). Would you agree that a steam surface condenser is considered part of the standard design for an AP1000 plant? Does the DCD mention any alternative for the steam surface condenser?

l. You would agree, wouldn't you, that all things being equal a dry cooling system produces higher turbine back pressure than a wet cooling system?

m. Isn't it also true that turbines such as those specified in the AP1000 DCD generate greater electrical output at lower backpressures than at higher back pressures?

n. Isn't it also true that a dry cooling system for a given turbine is more likely to cause the turbine to reach its high back pressure trip point than a wet cooling system would?

2. Determine the basis for Mr. Powers' testimony that the use of an ACC would not require substantial modifications to the standard design for the AP1000.

a. In A9 of your direct testimony, you state that you have reviewed the ESP application, the FEIS and Exhibit JTI000034 in preparation for such testimony. None of these documents contain detailed design information, such as site diagrams, equipment layouts, or single line drawings for the turbine building or do they?

b. In A21 of your direct testimony, you state that removal of the surface condensers will create the room necessary to install ACC steam ducts. Please direct the Board to the design information for the AP1000 that supports this testimony.

c. Assuming the Vogtle turbine building is designed in accordance with chapter 10.2 of the AP1000 DCD, what changes would need to be made to the turbine foundation design to accommodate the installation of ACC steam ducts in the AP1000 turbine building?

d. Given the statement in Chapter 10.2 of the DCD regarding the relationship between the turbine foundation design and the design of the remainder of the turbine building, have you analyzed the impact of a change to the turbine foundation on the rest of the building design?

e. In A22 of your direct testimony, you appear to agree that 20-foot diameter openings in the turbine building wall will be necessary to allow the steam ducts to be interconnected to the ACC but state that the installation of these openings does not rise to the level of reworking the entire turbine building. You also state that "No other significant physical modifications will be required in or to the turbine building."

   i. What is the basis for your opinion?

   ii. How did you determine that no further modifications will be necessary?

   iii. Did you review any diagrams or line drawings?

   iv. Did you consult with Westinghouse?

   v. What evidence do you submit to support this statement?

f. In A23 of your direct testimony, you state that "a standard design serves as a point of departure for customizing the design for a specific site with specific site constraints." Is it your opinion that the turbine building is a site specific structure? Isn't true that the turbine building is part of the approved standard design?

g. In A23 of your direct testimony, you also state that "The engineering teams at Westinghouse Nuclear and Toshiba who developed the standard AP1000 design have no knowledge of site constraints specific to Plant Vogtle or any other site-specific design issues. Moving boiler feedwater pumps to a slightly different location and providing openings in building walls to

accommodate ACC steam ducts is a minor design engineering adjustment that does not present an engineering challenge."

i. What is the basis for this statement?

ii. Have you discussed this with the Westinghouse and Toshiba engineering teams?

iii. Please direct the Board to the any AP1000 design information, diagrams or line drawings that support your opinion?

3. Understand the basis of Mr. Powers' assertion that a single stage, high backpressure turbine and the multi-stage AP1000 turbine are interchangeable.

a. Throughout your testimony you assert that a single-stage, high backpressure turbine can be substituted for the AP1000 multi-stage turbine in order to accommodate a dry cooling system (A28). Is it your contention that a smaller, single-stage turbine and the large multi-stage turbine currently specified for the AP1000 unit are interchangeable? Please direct the Board to the data, calculations, models or figures you have relied upon to support this statement.

b. What is the difference between a single stage, dual flow turbine and a more complex, multi-stage, multi-flow turbine?

c. Please identify a commercial nuclear power plant that uses a single stage, high backpressure turbine.

d. Are you aware of any electric generating unit with steam flows similar to an AP1000 (i.e., over 8,300,000 lbs/hr total, or around 2,750,000 lbs/hr per duct) that utilizes a single-stage, high backpressure turbine?

B. Comparison of Existing Dry Cooling Applications

1. Understand the basis for Mr. Powers' comparison of an AP1000 unit to the smaller, high backpressure units referenced in his testimony.

a. In A18 and A26 of your direct testimony, you state that dry cooling is common at power plants in the United States and you refer to the Midlothian Energy plant in Dallas, Texas as a 1650 MW plant. Isn't it true that the Midlothian plant is in fact six separate units of 275 MW each? Please direct the Board to any studies, data, research or other evidence that establishes that these 275 MW units are a legitimate basis for comparison with two 1,117 MW units planned for Plant Vogtle.

b. Also in A18 and A26 of your direct testimony, you state that dry cooling is used at a 330 MW coal-fired plant in Wyoming. Is it your testimony that a 330 MW coal-fired facility in Wyoming is comparable to two 1,117 MW units planned for Plant Vogtle in Augusta, Georgia?

c. In A18 and A26 of your direct testimony, you state that dry cooling is used at the Matimba plant, a 4000 MW facility in South Africa. Isn't it true that the Matimba plant is in fact six smaller units of 665 MW each?

d. Please refer to Exhibit SNC000031, which describes the cooling system of the Palo Verde Nuclear Plant in Arizona. Is it your testimony that a cooling system that uses treated wastewater is equivalent to a dry cooling system? If not, what is the basis of your testimony at paragraph 9 of JTI000035?

e. Please identify any commercial nuclear power plant that utilizes dry cooling? If so, what is the capacity of this unit?

f. Please identify for the Board any electric generating unit that is 1,100 MW or greater and utilizes dry cooling?

2. Understand Mr. Powers' testimony with regard to the Heller System (JTI000038).

a. With regard to Exhibit JTI000038, how would you describe the Heller System?

b. In megawatts, what is single largest electric generating unit that utilizes the Heller System?

c. Does this unit use a single-stage or multi-stage turbine?

d. Has the Heller System been installed for use with a nuclear unit? If so, where is it located and what is its capacity?

e. JTI000038 does not identify a Heller System in use in connection with a turbine with a capacity of 1,100 MW or greater does it?

f. How is the Heller System different than the dry cooling systems installed on the units you reference in your testimony (e.g., Midlothian, Matimba, and Wyodak)?

g. How large is the Heller cooling tower?

h. How many Heller cooling towers would be required for each AP1000 unit at Vogtle? Isn't it true that this number of Heller

towers would require substantially more land area than the wet cooling tower in the AP1000 standard design?

C. Effect of Dry Cooling on an AP1000 at Vogtle

1. Understand the basis for Mr. Powers' testimony regarding the financial, economic, and performance impacts of an ACC at Vogtle.

   a. In A16 of your direct testimony, you state that "It is not necessary to maintain the same backpressure with dry cooling at peak conditions that would be achieved with wet cooling." Isn't it true that lower backpressures at peak temperatures would result in greater unit output and more reliable operation for an AP1000 unit located on the Vogtle site?

   b. Regarding A17 of your direct testimony, what is the basis for your assertion that implementing a 35ºF ACC on an AP1000 unit located on the Vogtle site would only result in "an average efficiency penalty" of approximately 1.5 percent?

   c. How did you calculate this 1.5 percent figure? What data, models or figures do you submit that verify such a claim?

   d. Does this 1.5 percent figure capture the additional consumptive power demand that an ACC would generate as compared to a wet cooling system?

   e. In A30 of your direct testimony, you state that "An ACC design system would be simpler than the standard AP1000 design. It is generally considered desirable in the power plant design engineering world to simplify complex systems whenever possible. Simplification generally makes the system more reliable."

      i. How many fans, motors, and gear drives would be required for ACC sized to operate in conjunction with an AP1000 unit on the Vogtle site? How does this compare to a closed cycle wet system such as that proposed by SNC?

      ii. Isn't it true that fans will wear out over time, motors have to be maintained, and gear drives have to have the oil changed on a routine basis?

      iii. Isn't it true that, from a long-term maintenance perspective, it is most advantageous to have fewer moving parts in a system?

   f. Would you please read the following excerpt from pg. 5 of Exhibit SNC000034 (paper by Mr. Burns and Mr. Micheletti):

> Both direct and indirect dry cooling systems. . .are larger and mechanically more complex than corresponding wet cooling systems. . . . [D]ry and hybrid cooling systems will have more fans, meaning more electrical motors, gearboxes and drive shafts. As such, labor requirements for a large ACC can be substantial. At one site with a 60-cell ACC. . . the maintenance staff was increased by two people for such activities as cleaning fan blades and heat exchanger tube fins, monitoring lube-oil systems, and leak-checking the vacuum system."
>
> Do you agree with Mr. Burns and Mr. Micheletti that dry cooling systems have more moving parts and require more maintenance than wet cooling systems? If not, what is the basis for your position?

g. In A16 and A31 of your direct testimony, you state that high backpressure turbines are simpler and less expensive than standard backpressure turbines. Isn't it true that a an 1,117 MW high backpressure turbine would have to be designed specifically for Plant Vogtle and that the cost of the development of such a first of a kind turbine would exceed the simple "scaling up" of a smaller turbine?

2. Examine Mr. Power's calculations and analysis with regard to the size an ACC that could be utilized at Vogtle, the parasitic load of such an ACC, and the resulting loss of capacity.

   a. In A32 of your direct testimony, you state that "SNC performed a flawed evaluation resulting in an ACC design oversized by at least 100 cooling modules. SNC selected a 20° F ITD ACC for the case study because it presumed that it is necessary to maintain the same backpressure with dry cooling at peak hot summer day site conditions as would be achieved with wet cooling."

      i. Do you contend that dry cooling should be evaluated on the basis of higher backpressure than wet cooling under similar conditions?

      ii. Isn't an "apples-to-apples" comparison necessary to balance the cost, size, and performance of an ACC verses the wet cooling system in the AP1000 Standard Design?

   b. In A33 of your direct testimony, you state that "a 230 module ACC with 30 MW parasitic fan load would result in the same annual energy penalty for the dry cooling option" as the 334 module ACC assumed in SNC's evaluation.

i. What calculations, models, or analysis do you submit to support this position?

ii. If SNC were to incorporate the smaller ACC design, isn't it true that plant output as compared to operation with the wet system currently specified as part of the AP1000 standard design would decrease because of higher backpressure?

iii. Isn't it correct, as you acknowledge in you declaration at Exhibit JTI000035 (paragraphs 14, 15, and 21), that the cost of installing such as system at Plant Vogtle would be an additional $200 million over the price of the wet cooling system?

D. Impact of Climate on the Efficiency of Dry Cooling

1. Understand Mr. Powers' testimony with regard to the impact of the climate at the Vogtle site on the efficiency of a dry cooling system.

a. In A26 of your direct testimony, you state that "a dry cooling system can be effective despite the impact of climate in the vicinity of VEGP". In support of this you reference dry cooling systems at plants in Texas, Wyoming, and South Africa. Please direct the Board to the data and analyses that supports your opinion.

b. In A27 and A35 of your direct testimony, you state that during most of the year, the ambient temperature at Vogtle is less than 70° F and that peak summertime design conditions generally occur less than 200 hours a year. At 70° F, you state that there would be relatively little differential in the MW output of wet and dry systems.

i. What data, analysis, or other materials did you rely upon in making these findings?

ii. How much of the year is "most of the year"?

iii. Isn't it true, according to Exhibit SNC000037, that the temperature in Augusta, Georgia exceeds 70° F over 36 percent of the hours in each year (3,215 of 8,760 total hours)?

iv. Isn't it true that the proposed Vogtle units are baseload units that are intended to run 24 hours a day, 365 days per year, except during scheduled refueling outages?

v. What would be the effect on those days when the temperature exceeds 70° F? 80° F? 90° F? 100° F?

vi. Isn't it true that higher ambient temperatures result in higher backpressure?

vii. Isn't it also true that higher backpressure reduces the output of the unit?

viii. Based on this, isn't it true that the unit would suffer the highest output degradation on the days when it is needed the most and when energy prices are the highest?

c. In A28 of your direct testimony, you state that the MW differential between a dry and a wet cooling system would be between 15-20 MW at peak conditions.

i. What are your assumptions regarding peak conditions?

ii. Please explain how you calculated these figures or what analysis that you have done to determine the 15-20 MW differential between the performance of a wet-cooled and an air-cooled system at peak conditions.

iii. Is this 15-20 MW gross or net? Per unit?

d. In A28 of your direct testimony, you also state that a high backpressure turbine can be substituted for standard backpressure turbines in the AP1000 design to assure maximum output from a dry cooled plant at higher ambient temperatures.

i. What do you mean by "higher ambient temperatures"?

ii. Is it your opinion that, in the context of an AP1000 unit, a single-stage, high backpressure turbine would operate as reliably and efficiently as a multi-stage, standard backpressure turbine during peak conditions?

iii. Please identify a commercially available 1,110 plus MW turbine that operates most efficiently at backpressures in excess of 5" HgA, provide the cost of the turbine and the impact the installation of the turbine would have on the AP1000 turbine building.

Respectfully submitted,

(Original signed by M. Stanford Blanton)

_____

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Dated this 2nd day of February, 2009.

Confidential Pending Release by the Licensing Board
Pursuant to 10 C.F.R. § 2.1207 (a)(3)(iii)

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)	)	**February 2, 2009**

SOUTHERN NUCLEAR OPERATING COMPANY'S
QUESTIONS FOR THE BOARD ON JOINT INTERVENORS'
PRE-FILED DIRECT TESTIMONY OF DONALD F. HAYES RELATED TO
ENVIRONMENTAL CONTENTION 6.0

Pursuant to the Atomic Safety and Licensing Board's ("ASLB" or "Board") Orders of October 24, 2008 and December 15, 2008,[1] and in accordance with 10 C.F.R. § 2.1207(a)(3), Southern Nuclear Operating Company ("SNC") hereby submits proposed questions for the Board to consider propounding to Mr. Donald Hayes at the Hearing regarding Environmental Contention 6.0 ("EC 6.0"). These questions are based on Mr. Hayes' testimony originally filed on January 9, 2009, and revised on February 2, 2009, related to EC 6.0.[2]

Following the guidelines for submittals of requests for cross-examination by the parties, this submittal provides a description of the issues, the objective of the line of questioning and the proposed line of questions that will lead to the objective of the questioning. *See* 10 C.F.R. § 2.1204(b)(i) – (iii).

[1] Memorandum and Order (Revised General Schedule) ("October 24 Order") and Memorandum and Order (Contested Evidentiary Hearing Administrative Matters) ("December 15 Order").

[2] References to Question and Answer numbers are to the Revised Pre-filed Direct Testimony of Donald F. Hayes In Support of EC 6.0, filed by Joint Intervenors on February 2, 2009.

I. Description of the Issues

A. Mr. Hayes' Background, Experience and Preparation

B. Mr. Hayes' Conclusions Regarding Dredging Impacts

C. Mr. Hayes' Conclusions Regarding Sediment Placement

II. Objectives

A. Mr. Hayes' Background, Experience and Preparation

1. Establish Mr. Hayes' lack of experience preparing NEPA documents.

2. Explore Mr. Hayes' knowledge of the NRC's NEPA process and impacts scale.

3. Demonstrate that Mr. Hayes' opinions are not based on any actual site assessment.

B. Mr. Hayes' Conclusions Regarding Dredging Impacts

1. Establish that Mr. Hayes' conclusions are based on the incorrect assumption that dredging is required.

2. Understand Mr. Hayes' conclusions are based on incomplete and unavailable information.

C. Mr. Hayes' Conclusions Regarding Sediment Placement

1. Establish that Mr. Hayes provides no additional analysis regarding sediment placement than what was presented by the Staff.

III. Proposed Line of Questions

A. Mr. Hayes' Background, Experience and Preparation

1. Establish Mr. Hayes' lack of experience preparing NEPA documents.

   a. In your professional background, you have not listed any experience related to the preparation of or assistance in the preparation of NEPA documents, have you?

2. Explore Mr. Hayes' knowledge of the NRC's NEPA process and impacts scale.

   a. Are you familiar with the NRC's three significance levels established for assessing impacts?

b. Isn't it true that on the NRC's scale for assessing impacts, impacts are determined to be SMALL if environmental effects would not noticeably alter any important attribute of the resource?

c. And, according to NUREG – 1555, Supplement 1, impacts are determined to be MODERATE only if environmental effects are sufficient to alter noticeably important attributes of the resource, isn't that correct?

d. When an analysis indicates a SMALL impact, then determining "how small" the impact is would not be necessary for purposes of NRC's scale, would it?

3. Demonstrate that Mr. Hayes' opinions are not based on any actual site assessment.

a. You have not identified in A.8 of your testimony that your opinion is based on any personal observation of the Savannah River in the vicinity of Plant Vogtle, have you?

b. Your testimony is not based on any personal observation of the intake canal operations at Plant Vogtle or the proposed intake site, is it?

B. Mr. Hayes' Conclusions Regarding Dredging Impacts

1. Establish that Mr. Hayes' conclusions are based on the incorrect assumption that dredging is required.

a. Isn't it true that you have simply assumed that dredging activities are required in order for SNC to construct Vogtle Units 3&4?

b. Are you aware that SNC can construct Vogtle Units 3&4 without barging any components to the site?

c. Therefore, dredging is not required, is it?

2. Understand Mr. Hayes' conclusions are based on incomplete and unavailable information.

a. You haven't conducted any survey of the Savannah River in order to determine the extent of any dredging that may be required in order to deliver components by barge to the Vogtle site, have you?

b. Isn't it true that there is no present Corps of Engineers plan to dredge the Savannah River?

c. Aren't your conclusions about the size and duration of any dredging project at A.14 and the impacts to the Savannah River ecosystem at A.12 based on the assumption that every foot of the Savannah River Federal navigation channel from the Vogtle site to the Savannah harbor will be dredged?

d. Can you explain your calculations that lead you to conclude that 2 million cubic yards of material would need to be removed from the navigation channel?

e. In your testimony at A.15, you explain that reducing the amount of dredging from your estimate of 2 million cubic yards would likewise reduce the impacts. Wouldn't you agree that only dredging 40,000 cubic yards, or 2% of your estimate, would represent a proportionately significant decrease in potential impacts?

C. Mr. Hayes' Conclusions Regarding Sediment Placement

1. Establish that Mr. Hayes provides no additional analysis regarding sediment placement than what was presented by the Staff.

a. You state in A.20 that you "did not find any information or discussion in the FEIS on the issue of sediment placement." You testify at A.21 that sediment management will be necessary. Doesn't the discussion in the FEIS at 7-20 recognize that dredging would require the disposal of dredged materials?

b. What evidence do you have that the construction of multiple confined disposal facilities ("CDFs") would be necessary?

c. You indicate in A.21 that CDFs would be necessary "unless those facilities already exist and have adequate capacity." What is your evidence that these CDFs don't exist and, if they do, that they don't have adequate capacity?

d. Use of existing CDFs would not necessarily have aquatic impacts in the vicinity of the VEGP, would it?

e. You cite a research paper regarding the Chlor-alkali Plant (JTI000040) as evidence of hazardous materials in the navigation channel of the Savannah River. However, wasn't that study concerned only with the immediate vicinity of the Chlor-alkali plant?

i. Doesn't that paper conclude that the differences in mercury concentrations in Savannah River sediments at stations

upstream and downstream of the Chlor-alkali plant's canal discharge were not statistically significant?

ii. Given that conclusion, is it your testimony that this study nonetheless provides reliable evidence that "may suggest that hazardous materials are a concern" for sediments in the Savannah River between Vogtle and RM 36 where some dredging may occur, as you testified in A.23?

Respectfully submitted,

(Original signed by M. Stanford Blanton)

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Dated this 2nd day of February, 2009.

February 2, 2009

G. Paul Bollwerk, III, Chair
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dr. James F. Jackson
Administrative Judge
Atomic Safety and Licensing Board
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Nicholas G. Trikouros
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

In the Matter of
SOUTHERN NUCLEAR OPERATING CO.
(Early Site Permit for Vogtle ESP Site)
Docket No. 52-011-ESP

Dear Administrative Judges:

In accordance with the Licensing Board's Memorandum and Order (Revised General Schedule) (Nov. 13, 2008) (unpublished), please find enclosed the "NRC Staff Proposed Questions Regarding Direct Testimony" (February 2, 2009).

Pursuant to 10 C.F.R. § 2.1207(a)(3)(i), the enclosed questions are being submitted only to the Board at this time. The Staff understands that, consistent with § 2.1207(a)(3), the questions will

be confidential until propounded by the Board or until issuance of an initial decision, at which time they will be forwarded to the Secretary of the Commission for inclusion in the official record of this proceeding.

Respectfully submitted,

/signed (electronically) by/

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Dated at Rockville, Maryland
This 2nd day of February, 2009

Enclosure: NRC Staff Proposed Questions Regarding Direct Testimony

February 2, 2009

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
SOUTHERN NUCLEAR OPERATING CO.	)	Docket No. 52-011-ESP
	)	
(Early Site Permit for Vogtle ESP Site)	)	

NRC STAFF PROPOSED QUESTIONS REGARDING DIRECT TESTIMONY

Pursuant to 10 C.F.R. § 2.1207(a)(3) and the Atomic and Safety Licensing Board's ("Board") Memorandum and Order (Revised General Schedule) (Nov. 13, 2008) (unpublished), the staff of the U.S. Nuclear Regulatory Commission ("Staff") hereby submits proposed questions for the Board to pose to the witnesses.

Contention EC 1.2 Proposed Cross Examination Questions

The following questions address the testimony of the Joint Intervenors' witnesses with respect to evaluating the environmental impacts that are at issue in Contention EC 1.2.

Questions for Shawn P. Young

I. Experience and Qualifications

In his direct testimony,[1] Dr. Young gives testimony concerning the impacts of entrainment and impingement on aquatic resources. To determine Dr. Young's qualifications for criticizing aspects of the Staff analysis in these areas, the Staff requests that the Board ask the

[1] Pre-Filed Direct Testimony of Shawn P. Young (Jan. 9, 2009) (hereinafter "Young Direct Testimony").

following questions relating to Dr. Young's experience with impingement and entrainment analysis.

1. Please describe your experience in evaluating the impacts of impingement and entrainment of aquatic species, particularly at power facilities.

   1a. Does your experience include experience with facilities that use either once-through cooling systems or closed-cycle cooling systems?

2. Have you conducted sampling or studies assessing the impact of impingement or entrainment at facilities that withdraw large quantities of water?

II. Impact Assessments

A. Sources and Data

In his direct testimony, Dr. Young challenges the sufficiency of the studies and quantitative analysis used in the FEIS. The Staff requests that the Board ask the following questions regarding the basis for Dr. Young's criticisms.

3. Are you familiar with the studies of the Savannah River that were conducted by the Academy of Natural Sciences of Philadelphia (ANSP)? Exhibits NRC-2 to NRC-4.

   3a. Do you agree that these studies provide applicable data that are relevant to the historic impacts on the aquatic biota of the Savannah River between RM 123 and RM 160?

4. The Staff testimony describes the ANSP studies as only one of several sources of data used for characterizing the aquatic biota in the vicinity of the Vogtle site. *See* "NRC Staff Testimony of Dr. Michael T. Masnik, Anne R. Kuntzleman, Rebekah H. Krieg, Jill S. Caverly, and Lance W. Vail Concerning Environmental Contention EC 1.2." (Jan. 9, 2009) (hereinafter "Staff EC 1.2 Direct Testimony") at A9, A15. The Staff testimony also states that the ANSP studies were used to

provide an understanding of the river ecology and the current species present in the vicinity of the VEGP site. *Id.* Based on your direct testimony (Young Direct Testimony at A13), is it your position that the ANSP studies offer no insight into characterizing the environment and aquatic species located in the vicinity of the Vogtle site?

4a. If no, what is your objection to the Staff's consideration of the ANSP studies as one of several sources of information on the aquatic environment?

5. The Staff testimony quotes a statement from the ANSP 2003 report in which the ANSP characterizes its sampling program as being "one of the most comprehensive ecological datasets available for any of the world's rivers." Exhibit NRC-3 at v. Do you disagree? If so, what is the basis for that disagreement?

B. Impingement and Entrainment Impacts

In direct testimony, the Staff explained a number of factors it considered in support of its conclusions regarding the impacts on aquatic species due to impingement and entrainment. The following questions would be posed to identify whether Dr. Young disagrees with these bases for the Staff conclusions and, if so, the basis for that disagreement.

a. Closed-Cycle Cooling

6. Do you agree that the amount of water withdrawn from a source waterbody by a facility is relevant to determining the associated environmental impacts to aquatic species, particularly with respect to impingement and entrainment?

7. Do you agree that, other things being equal, the use of a closed-cycle wet cooling system like that used at the existing Vogtle units and proposed for the

new units involves significantly reduced water withdrawals when compared to a once-through system?

8. Do you agree that use of closed-cycle wet cooling compared to a once-through system for the same facility at the same location therefore would correspond to significantly reduced levels of impingement and entrainment of aquatic biota?

b. Uniform Distribution and Hydraulic Zone of Influence

9. You assert that "[w]hen the drift community is not uniformly distributed, entrainment will not correspond directly with the percent of flow withdrawn. Impacts due to entrainment may be greater during periods when the drift community is highly concentrated." Young Direct Testimony at A17. During what periods are you asserting the drift community would be "highly concentrated"?

9a. Wouldn't those periods be during times of year when flows are naturally higher in the river?

10. Are you familiar with the applicant's study concerning the hydraulic zone of influence of existing Units 1 & 2? (See Young Direct Testimony at A23.)

11. The Staff states in its direct testimony that the hydraulic zone of influence was determined to be about 0.14 acres and to extend about one-sixth of the way across the river in the site vicinity. Staff EC 1.2 Direct Testimony at A34; Exhibit NRC-31. The Staff then states that "the vast majority of ichthyoplankton drifting down the river would be unaffected by the water withdrawal of the intake structure for Units 3 and 4, since they are designed similar to Units 1 and 2." Staff EC 1.2 Direct Testimony at A34. Do you disagree? If so, what is the basis for that disagreement?

12. Is it your position that the Staff instead should have based its conclusions on an assumption that vulnerable biota are more likely to be concentrated in the

location within the water column and the river where they would be most susceptible to entrainment?

13. If so, given the location of the Vogtle intake structure (even considering a range of flow conditions in the Savannah River), isn't what you are advocating a worst-case assumption?

c. Sampling Program and Data for Units 1 and 2

14. Are you familiar with the interim results of Southern's impingement and entrainment sampling program at Units 1 and 2? Exhibit NRC-30.

14a. With respect to impingement, don't these results support the Staff's analysis that impingement is minimal at Units 1 and 2 and that impacts would be small at the proposed units as well?

14b. Do you have any basis for believing that large numbers of fish have been impinged during operations at Units 1 and 2?

14c. If not, doesn't that also support the Staff's conclusion that impingement impacts would be small at the proposed units as well?

15. With respect to entrainment, don't the results of the sampling program indicate that larval densities are lower in samples taken in the intake canal than in samples taken from the Savannah River?

15a. If so, doesn't that support the Staff testimony (e.g., Staff EC 1.2 Direct Testimony at A26, A29) concerning estimated entrainment impacts and the role of the intake structure design in reducing entrainment?

d. National Marine Fisheries Service Letter Re: Biological Assessment

16. Are you familiar with the letter from the National Marine Fisheries Service ("NMFS") to the NRC dated August 11, 2008, marked as Exhibit SNC-22?

16a. If so, do you agree with the NMFS's analysis and its conclusion that "this proposed action is not likely to adversely affect shortnose sturgeon"? Exhibit SNC-22 at 4.

16b. Doesn't the NMFS's finding support the Staff analysis and conclusion in the FEIS concerning impacts of the proposed new units on the shortnose sturgeon?

C. Flow Considerations

In his testimony, Dr. Young challenges the river flows used in the Staff analysis and asserts that low flows or Drought Level 4 flows are "reasonably likely to occur." Young Direct Testimony at A21. The following question would be posed to identify his basis for these assertions.

17. You state that the FEIS "lacks sufficient analysis of entrainment and impingement during low flows, even though low flows are reasonably likely to occur. The FEIS should, at the very least, include analysis of flows ranging from normal to Drought Level 4." Young Direct Testimony at A21. What do you mean here by "Drought Level 4" flows? Furthermore, what is your basis for asserting that "Drought Level 4 flows" are reasonably likely to occur?

D. Thermal Impacts

In his testimony, Dr. Young argues that the FEIS "does not provide sufficient data and analysis of thermal stress and mortality for the fish species" located in the Savannah River. Young Direct Testimony at A27. Because the Staff has stated that the anticipated thermal plume would be small in comparison to the width of the Savannah River at the VEGP site, the following questions would be posed to determine what his basis is for these assertions.

18. Related to the questions in part II.B.a above, do you agree that use of closed-cycle wet cooling compared to a once-through system for the same facility

at the same location would also correspond to significantly reduced thermal discharge and correspondingly reduced thermal impacts to aquatic biota?

19. The Staff testimony states that the size of the thermal plume from the proposed effluent discharge under "conservative river conditions" would be small in comparison to the width of the Savannah River at the VEGP site. Staff EC 1.2 Direct Testimony at A53 to A54. The Staff stated that plume length and width were 97 ft and 15 ft, respectively, and that the width of the river at the point of discharge is approximately 312 feet. *Id.* at A59. The Staff also stated that even under very-low-flow conditions of 2000 cfs, the resulting thermal plume would be approximately twice the areal extent of the plume evaluated at 3800 cfs. *Id.* at A58. Given the extent of the plume compared to the size of the river, what is your basis for asserting that a significant proportion of early life history stages of species would be affected by the plume?

    19a. Even if those organisms that do pass through the plume experience mortality, what is your basis for asserting that such mortality would adversely affect the fishery at a population level?

20. You state that the FEIS "fails to consider all possible river conditions and rather, focuses on conservative river conditions." Young Direct Testimony at A27. What do you mean here by "conservative river conditions," and why are you asserting that assuming "conservative" river conditions would not provide an adequate basis for assessing thermal impacts?

    20a. Are you claiming that assuming non-conservative conditions would result in a different impact conclusion (e.g., greater adverse impacts) than that reached in the Staff analysis?

    20b. If so, what is your basis for that assertion?

Questions for Barry W. Sulkin

In his direct testimony,[2] Mr. Sulkin challenges the conclusions in the FEIS with respect to the significance of water withdrawals and the river flows analyzed. The Staff requests that the Board ask the following questions regarding the basis for Mr. Sulkin's testimony.

1. Your direct testimony states: "I do not know if is reasonable for the Staff to assume a uniform drift community. I do not know if it is reasonable for the Staff to assume that the level of impact is proportional to the rate of withdrawal across all possible river flows. I do not know if it is reasonable for the Staff to assume that impacts from withdrawing less than 5% would be small or insignificant." Sulkin Direct Testimony at A12. In its testimony, the Staff has described its rationale for assuming uniform distribution of the drift community and stated that the percentage of river flow withdrawn by the intake structure is only one of several considerations in the Staff's determination of impacts to aquatic species. Staff EC 1.2 Direct Testimony at A16, A21, A26, A28, A30, A43. In light of these statements, what is your basis for asserting that the Staff has simply defined the 5% threshold as a "threshold of significance"?

2. The Environmental Protection Agency's ("EPA") regulations at 40 CFR § 125.84(b) describe "Track I requirements for new facilities that withdraw equal to or greater than 10 MGD" and provide that the owner or operator of a new facility "must comply with the following requirements[.]" The requirements in § 125.84(b)(3) relate to how the owner or operator "must design and construct

[2] Prefiled Direct Testimony of Barry W. Sulkin (Jan. 9, 2009) (hereinafter "Sulkin Direct Testimony").

[its] cooling water intake structure[.]" In particular, § 125.84(b)(3)(i) states that "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[.]" You state that "I can tell you that the 5% threshold is not compelled by any statute or regulation." Sulkin Direct Testimony at A13. Doesn't your statement conflict with the EPA regulation?

3. You assert that "actual Savannah River discharge has consistently been below 3,800 cfs since November 2007, and was recently reduced to 3,100 cfs." Sulkin Direct Testimony at A14. In Exhibit JTI000021, you also list "3100 cfs" as "Current Flow" in each of your tables. By "actual Savannah River discharge" and "Current Flow," are you referring to the releases from Thurmond Dam?

   3a. The flow data from the Waynesboro, GA gauge near the VEGP site presented in Exhibit NRC-41 does not appear to indicate that flows at that gauge have "consistently been below 3,800 cfs since November 2007." Do you agree that the record from that gauge indicates that there is generally net inflow to the Savannah River between Thurmond Dam and the Waynesboro gauge?

   3b. If so, do you agree that the Staff's use of the Thurmond Dam releases is therefore conservative because it would tend to underestimate the flow at the VEGP site and thus overestimate the percentage of river flow that would be withdrawn by the Vogtle units?

4. You assert that for purposes of cumulative analysis, the FEIS should consider the scenario where all four Vogtle units are operating at maximum withdrawals – what you describe as "the plant parameter envelope." Sulkin Direct Testimony at A14. Under what circumstances would this scenario happen?

4a. Is such a scenario likely to actually occur?

4b. If not, why would it be necessary to consider such a scenario in the FEIS?

5. You assert that the FEIS should consider impacts at flows of 957 cfs, which you describe as the "hypothetical unimpaired minimum flow if there were no dams or reservoirs." Sulkin Direct Testimony at A15. You later describe it also as "the theoretical minimum flow." *Id.* at A20. Isn't this a worst-case assumption? What is your basis for asserting that such flows are likely to occur?

6. In your direct testimony you state that "even short term maximum withdrawal conditions can result in significant cumulative impacts on water resources and aquatic species." Sulkin Direct Testimony at A21. What is the basis for this statement?

Contention EC 1.3 Proposed Cross Examination Questions

The following questions address the testimony of the Joint Intervenors' witnesses with respect to evaluating the environmental impacts that are at issue in Contention EC 1.3.

Questions for William Powers

For contention EC 1.3, the Staff argues that because dry cooling was not determined to be environmentally preferable to the proposed closed-cycle wet cooling design, the Staff did not have to analyze cooling system design alternatives in greater detail in the FEIS. As part of its finding that a dry cooling system design was not environmentally preferable to the proposed wet cooling design, the Staff explained that there are several disadvantages to a dry cooling design. The following questions would be posed to establish Mr. Powers' agreement that, consistent with the Staff's position, there are in fact disadvantages of a dry cooling design when compared to the proposed wet cooling system.

1 Isn't it true that in your direct testimony[3] you testified that there would be an average efficiency penalty of 1.5% from using a dry cooling system at Vogtle? Powers Direct Testimony at A17.

2. Do you agree that dry cooling designs involve heat-exchange surface areas that require more land area than an equivalent capacity natural-draft or mechanical-draft cooling system?

3. Do you agree that a dry cooling system would require an increase in fuel use and an associated increase in spent fuel transport and spent fuel storage to match the electrical output of a similar plant with wet cooling?

4 Consequently, isn't it true that at least in these respects a dry cooling system has environmental disadvantages in comparison to the proposed wet cooling system?

Contention EC 6.0 Cross Examination Questions

The following questions address the testimony of the Joint Intervenors' witnesses with respect to evaluating the environmental impacts that are at issue in Contention EC 6.0.

The Staff has argued that dredging of the Savannah River Federal navigation channel ("FNC") is not necessary for the issuance of the Early Site Permit or ultimate construction of any nuclear facility that might be built at the Vogtle site, nor is it currently the subject of a specific plan or permit application before the U.S. Army Corps of Engineers ("Corps"); thus, that possible activity does not have to be analyzed as a "connected action" under NEPA. For similar reasons, the Staff has explained that, given the absence of a pending plan or application, in the FEIS it

[3] Prefiled Direct Testimony of William Powers (Jan. 9, 2009) (hereinafter "Powers Direct Testimony").

provided only a qualitative analysis of the impacts of the possible dredging action.

The following questions to be posed to the Joint Intervenors' witnesses for Contention EC 6.0 (Donald F. Hayes and Shawn P. Young) concern the need for or status of plans for dredging of the FNC. The factual basis for an expert's opinion must be adequately stated and explained. *Duke Cogema Stone* & *Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-04, 61 NRC 71, 80-81 (2005) (internal citations omitted). The questions would be posed to establish that the Joint Intervenors have no basis to dispute the facts and assumptions underlying the Staff's analysis of potential dredging of the Federal navigation channel.

Questions for Donald F. Hayes

I. Dredging of the FNC Is Not Necessary for the ESP.

1. In your direct testimony[4] you state that "Because SNC intends to ship its reactor components by barge, such dredging [of the FNC] is required in connection with the construction and operation of Units 3 and 4." Hayes Direct Testimony at A11. Do you have any basis for assuming that barge transportation is the only way to transport heavy components to the Vogtle site?

2. Assuming that dredging of the FNC may be necessary to allow barge traffic on the Savannah River under "normal river flow" as stated in the FEIS, do you have a basis for determining that dredging of the FNC would also be necessary to allow barge traffic under periods of higher river flow?

3. Do you disagree with the testimony of the Corps witnesses that while navigation is not currently possible because of low river levels, barging of heavy

[4] Pre-Filed Direct Testimony of Donald F. Hayes (Jan. 9, 2009) (hereinafter "Hayes Direct Testimony").

components has occurred on the Savannah River during flows of greater than 10,000 cfs? If so, what is your basis for that disagreement?

4. If barge traffic is possible during periods of higher flow, what is your basis for asserting that dredging of the FNC is "required" in connection with the construction of Units 3 and 4? Hayes Direct Testimony at A11.

5. Do you disagree with the testimony of the Corps witnesses that the Corps has not currently developed a plan for dredging of the FNC nor has it received a permit application to conduct such dredging? If so, what is your basis for that disagreement?

6. You state that information regarding "[s]ediment volume and dredging duration are necessary to support any evaluation of potential environmental impacts." Hayes Direct Testimony at A14. Does the volume of sediment removed ultimately depend on the extent of deepening required to allow navigation as well as the number of areas along the channel where deepening would be necessary?

7. Do you therefore agree that the volume of material to be removed and the duration of channel dredging activities would vary depending on the actual condition of the FNC along the length of the river where channel dredging would occur?

   7a. If so, do you agree that there is a wide range of potential volumes and durations of a channel dredging project, if the area of interest extends over about 116 miles of river channel?

8. If specific data regarding the actual scope of the potential project and its duration are not available because no formal request or application is before the Corps, what is your basis for asserting at this time that the Staff in the FEIS "could

provide a range of estimates for sediment volume and dredging duration based upon some reasonable assumptions and ranges of conditions"? (Hayes Direct Testimony at A14.)

9. Do you disagree with the testimony of the Corps witnesses that the Corps would conduct an environmental review pursuant to NEPA if it were to undertake dredging of the FNC or if it were evaluating a permit application to conduct such dredging?

II. The Extent and Detail of the FEIS Review Was Appropriate.

The Staff also argues that its review met applicable NEPA requirements by analyzing only information that was reasonably available to the Staff at the time the FEIS was prepared. The following questions are meant to challenge Mr. Hayes' assertions that the Staff could have provided a more in depth review of any possible project to dredge the FNC.

10. In your direct testimony you state that "this will be a sizeable dredging project with a significant duration." Hayes Direct Testimony at A14. However, although the FEIS identified the general area of the river where dredging might occur, the Staff also explained in the FEIS that any potential FNC dredging project is now incompletely defined. Please describe what you mean when you characterize the potential dredging of the FNC as both "sizeable" and of "significant duration" and your basis for making those assumptions at this time.

11. You state that "[r]educing the length, width, and depth of the dredging would reduce the sediment volume to be dredged," and also that "inadequate information exists to determine the extent of the reduction." Hayes Direct Testimony at A15. If the length, width and depth of the dredging that would be performed has not yet been determined, what is your basis for asserting that the NRC staff could have performed a more in depth impact analysis in its EIS?

Questions for Dr. Shawn P. Young

I. Dredging of the FNC Is Not Necessary for the ESP.

Like Mr. Hayes, Dr. Young in his testimony responds to questions concerning impacts of "proposed dredging required for construction of the New Units." Young Direct Testimony at A30. As with the questions proposed to be asked of Mr. Hayes, the questions below seek to establish that the Joint Intervenors have no basis to dispute the facts and assumptions underlying the Staff's analysis of potential Federal navigation channel dredging.

Dr. Young argues that the Staff should have presented a more thorough analysis of the impacts to aquatic resources that could result from dredging of the FNC. However, the Staff has explained its position that there was not more information available for the Staff to perform a quantitative analysis. The questions below are also meant to probe the basis for Dr. Young's assertion that a more detailed analysis was appropriate or feasible.

1. Portions of your direct testimony refer to impacts of "proposed dredging required for construction of the New Units." Assuming that dredging of the FNC may be necessary to allow barge traffic on the Savannah River under "normal river flow" as stated in the FEIS, do you have a basis for determining that dredging of the FNC would be necessary to allow barge traffic under periods of higher river flow?
2. Do you disagree with the testimony of the Corps witnesses that while navigation is not currently possible because of shallow river depths, barging of heavy components has occurred on the Savannah River during flows of greater than 10,000 cfs? If so, what is your basis for that disagreement?
3. If barge traffic is possible during periods of higher flow, what is your basis for asserting that dredging of the FNC is "required" for construction of Units 3 and 4?
4. Do you disagree with the testimony of the Corps witnesses that the Corps has not currently developed a plan for dredging of the FNC nor has it received a

permit application to conduct such dredging? If so, what is the basis for your disagreement?

5. In the absence of a plan or application for dredging of the FNC pending before the Corps, please describe your basis for characterizing the potential project as "large-scale dredging." Young Direct Testimony at A31; Paragraph 13 of Exhibit JTI000005.

6. Do you disagree with the testimony of the Corps witnesses that the Corps would conduct an environmental review pursuant to NEPA if it were to undertake dredging of the FNC or if it were evaluating a permit application to conduct such dredging? If so, what is the basis for your disagreement?

7. Do you disagree with the testimony of the Corps witnesses that the environmental review conducted by the Corps of a dredging plan or application would involve consultation with other federal and state resource agencies, including on matters such as mitigation of impacts to species such as freshwater mussels? If so, what is the basis for your disagreement?

8. You state that the FEIS "surprisingly" did not provide details concerning potential mussel relocation that might be implemented if dredging of the FNC were to occur. Young Direct Testimony at A30. Do you agree that details concerning mitigation of any impacts to benthic organisms such as freshwater mussels would be dependent on the specific scope and locations of channel dredging? And do you have any basis for disputing that those details are not yet proposed in a plan or application before the Corps?

9. Given that the Staff has described the potential project as "incompletely defined" and that the testimony of the Corps witnesses has indicated no plan or permit

application is under consideration, please explain your basis for asserting at this time that there will be "very large and severely negative impacts." Young Direct Testimony at A32; Paragraph 11 of Exhibit JTI000005.

Respectfully submitted,

/signed (electronically) by/

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Dated at Rockville, Maryland
this 2nd day of February, 2009

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before the Licensing Board:

G. Paul Bollwerk, III, Chairman
Nicholas G. Trikouros
Dr. James Jackson

In the Matter of	Docket No. 52-011-ESP
SOUTHERN NUCLEAR OPERATING CO.	ASLBP No. 07-850-01-ESP-BD01
(Early Site Permit for Vogtle ESP Site)	

JOINT INTERVENORS' PROPOSED CROSS-EXAMINATION QUESTIONS FOR CONTENTION EC 1.2

I. FOR SOUTHERN NUCLEAR WITNESSES

Cross Examination Questions for Mr. Thomas Moorer

AQUATIC IMPACTS OF THE PROPOSED COOLING WATER INTAKE SYSTEM

(1) You state in answer 7 of your pre-filed direct testimony: "The Staff's FEIS relied on the ER, consultation with regulatory agencies, and its own independent analysis in reaching the conclusion that aquatic impacts were SMALL. Both the ER and FEIS contain thorough discussion of aquatic impacts."

a. Do you agree that an adequate FEIS for the Vogtle ESP must include a thorough discussion of aquatic impacts?

b. In your opinion, what is the minimum amount of information that should be included in a cumulative impacts analysis?

c. In reaching its conclusion that impacts are likely to be SMALL, what past, present, and reasonably foreseeable actions are included in the cumulative impacts analysis?

(2) In answer 7 of your pre-filed direct testimony, you state: "the SRS studies concluded that at intake flows many times larger than those proposed for Vogtle, impingement and entrainment impacts remain small *and do not result in any quantifiable impact to the fishery or the general aquatic community*." Yet, SRS is consistently reported as a cause of declines of Savannah River aquatic species. Can you explain this apparent contradiction?

(3) In answer 8 of your pre-filed direct testimony, you state: "the ER and subsequent responses to RAIs and material collected during site visits provide a clear, well documented assessment of the baseline aquatic community *in the vicinity of plant Vogtle*."

a. What do you mean when you say "in the vicinity of plant Vogtle"?

b. How has the baseline aquatic community been effected by past and present actions of other entities?

c. To determine the baseline for a particular species or resource, how far downstream and upstream should the analysis extend?

<u>IMPINGEMENT AND ENTRAINMENT</u>

(4) What is the basis of your statement, in answer 10 of your prefiled direct testimony, that the eggs of bass, bream, and catfish are not normally subject to entrainment?

(5) What do you mean by "significant fish habitat" in answer 10 of your prefiled direct testimony, when you testify that no significant fish habitat exists within the area of influence of the intake structure?

(6) In answer 10 of your pre-filed direct testimony, you state: "drift within the water column can vary and that it is influenced by channel morphology, flow, and *other variables* which can affect habitat or spawning locations." How have human-induced changes in the Savannah River Basin, like impoundments and water withdrawals, affected habitat or spawning locations?

Cross-Examination Questions for Dr. Charles Coutant

NRC REQUIREMENTS APPLICABLE TO PREPARATION OF EISs

(1) In answer 15 of your prefiled direct testimony, you explain that "even though a prior study would by definition pre-date a new, applicant-performed study, this may have little or no bearing on the usefulness or validity of the data."

a. Have aquatic species populations on the Savannah River remained stable over time?

b. Have any species populations declined significantly from historic levels on the Savannah River?

c. What human-induced factors have influenced aquatic species habitat conditions on the middle Savannah River?

d. Would a study conducted in 1975 be indicative of current habitat conditions or population numbers?

e. Would a study of habitat or species abundance during a prolonged drought period be indicative of conditions during a year with normal rainfall?

REVIEW OF THE EIS FOR VOGTLE UNITS 3 & 4

(2) In answer 24 or your prefiled direct testimony, you state that "No significant changes in aquatic populations that one might reasonably attribute to a cooling water system at Vogtle have been observed in periodic biological surveys of the river by DOE contractors at the Savannah River Site, the Georgia and South Carolina departments of natural resources, other agencies or universities."

a. Have there been "significant changes" in Savannah River aquatic populations attributable to other causes?

b. Is it possible that Units 3 and 4 may have significant cumulative impacts, in combination with the current population baseline and habitat conditions?

SNC'S RESPONSE TO JOINT INTERVENOR'S CONTENTION EC 1.2

(3) In answer 27 of your prefiled direct testimony, you state: "In contrast to an open-cycle, once-through cooling system used at many power stations, the closed-cycle cooling system chosen for the proposed Vogtle units will reduce water withdrawal (and thus the numbers of drifting organisms entrained) by more than 95 percent."

a. Are there any power stations with once-through cooling on the Savannah River?

b. In your opinion, would it be possible to obtain a permit for a once-through cooling system for Units 3 and 4?

c. In your opinion, would a once-through cooling system at Units 3 and 4 comply with section 316(b) of the Clean Water Act?

d. Given that a once-through cooling system could not be implemented at Units 3 and 4 (FEIS at 9-26), isn't it then misleading to claim that a closed cycle cooling system will "reduce" withdrawals by 95%?

e. Isn't it true that total Savannah River withdrawals at Plant Vogtle will approximately double as a result of adding two additional units?

(4) In answer 27 of your prefiled direct testimony, you testify, “Thus, in my professional opinion, the design features of the cooling system make significant mortalities of Savannah River biota from entrainment and impingement unlikely, and lessen the need for further site-specific biological studies.”

a. What do you mean by "significant mortalities"?

b. Is it possible that the low level of entrainment and impingement could include short-nosed sturgeon?

c. Is there an acceptable level of mortality for short-nosed sturgeon, given the severely depressed baseline population?

d. Is it possible that some amount of robust redhorse eggs or larvae could be entrained?

e. Is there an acceptable level of human-induced mortality for the robust redhorse?

(5) In answer 28 of your prefiled direct testimony, you testify that the EIS relies on studies done in the 1980’s and before.

a. Is it problematic to rely on decades-old studies to determine the impact from impingement and entrainment today?

b. Are you aware of any changes in species populations and diversity in the Savannah River over the last two decades?

c. Have any species been located on the Savannah River in the past 20 years that were thought extinct, or were previously unknown to populate the Savannah River Basin?

d. Have any species been added to the state of federal lists of threatened, endangered, or species of concern in the past 20 years?

(6) In answer 33 of your prefiled direct testimony, you explain why you relied on certain scientific literature to reach your conclusions. You state, "certainly, they provide a broader perspective of the river ecosystem than would have been obtained by only detailed surveys at the existing Units 1 & 2 location and the site proposed for Units 3 & 4."

a. Are you suggesting that a "broader perspective of the river ecosystem" can be used in lieu of site-specific field data to assess impacts of the proposed Units?

b. Have Dr. Young or Intervenors argued that the analysis of impacts of the proposed Units should be limited to "*only* detailed surveys at the existing Units 1 & 2 location and the site proposed for Units 3 & 4." If so, when and where?

IMPINGEMENT/ENTRAINMENT AND THERMAL IMPACTS

(7) In answer 44 of your prefiled direct testimony, you state: "The source water of the river was sampled during the spring fish reproduction season, March 18-July 29."

a. In your opinion, were the conditions during "spring fish reproduction season" impacted by the persistent drought conditions during the spring of 2008?

b. Is it possible that sampling conducted in the spring of 2008 are not representative of normal ichthyoplankton diversity and abundance due to the drought?

(8) In explaining your conclusions from the March 18-July 29 sampling, you state: "All densities were rather low, ranging from about 8 organisms per 1,000 m^3 in late July to about 659 per 1,000 m^3 in late April."

a. When you say densities were "rather low," do you mean they were lower that you would expect in the Savannah River at this time of year?

b. Did you compare this data to data from similar surveys in the past?

(9) In answer 44 of your prefiled direct testimony, you summarize the entrainment sampling and its results. You state that "a few sucker post-yolk-sac larvae (mid-March to late April)… were also found."

a. What species of sucker were found during this sampling?

b. How many is "a few"?

c. Were any of those sucker larvae Robust Redhorse?

(10) In answer 45 of your prefiled direct testimony, you state: "The results of this study… fully support the EIS conclusion that the impacts of entrainment at the proposed intake for Units 3 & 4, designed similarly to that for Units 1 & 2, will be SMALL. Likewise, the study results, if doubled to represent both intakes operating, would show a cumulative impact that I believe is still SMALL."

a. What is the cumulative impact of impingement and entrainment from the proposed new Units when added to the two existing Units *and* the SRS D-Area Powerhouse withdrawals?

b. What is the cumulative impact of impingement and entrainment from the proposed new Units when added to the two existing Units, the SRS D-Area Powerhouse withdrawals, and the Urquat Station withdrawals?

c. What is the cumulative impact of the proposed Units when added to *all* past, present, and reasonably foreseeable future water withdrawals on the Savannah River?

(11) In your opinion, would it be beneficial to conduct entrainment and impingement sampling in normal and wet years, as well as in a record drought year?

(12) In answer 59 of your prefiled direct testimony, you state that "the thermal distributions suggest that exposure to elevated temperatures in the plume would be no greater in midsummer than organisms already receive from natural warming of the ambient surroundings." Would elevated temperatures in the plume be greater than the natural warming of the ambient surroundings during the other seasons?

(13) In answer 59 of your prefiled direct testimony, you state that "the velocity distributions suggest that the plume is widely dispersed downstream and is mainly in the center channel rather than impacting the more biologically productive shorelines." What is the distribution of ichthyoplankton in the thermal plume?

(14) In answer 59 of your prefiled direct testimony, you suggest that some of your calculations are "based on the scientific literature." Can you please specify which literature you are referring?

RESPONSE TO SPECIFIC BASES OF CONTENTION EC 1.2 REGARDING RIVER FLOWS AND UNIFORMLY DISTRIBUTED DRIFT COMMUNITY

(15) In answer 64 of your prefiled direct testimony, you state: "The 7Q10 flows are rather meaningless in this situation because they are statistical calculations based on a long-term flow record, which does not exist for the Savannah River as it is now regulated by the Corps' dams."

a. Do you know what the 7Q10 flow is at the Vogtle site?

b. Is 7Q10 typically based on a prediction of the unimpeded flow without impoundments or withdrawals, or is it based on actual flow data from recent years?

c. Are the persistent low flows on the Savannah River since 2006 higher or lower than the 7Q10 flow?

d. Because the 7Q10 flow is likely to occur only for 7 consecutive days every 10 years, are the aquatic species of the Savannah River adapted to withstand long-term flows equal to or less than the 7Q10 flow?

e. In your opinion, what are the potential impacts on aquatic species of the record low flows that have persisted on the Savannah River during the past 2 years?

(16) In answer 66 of your prefiled direct testimony, you state: "Dr. Young says that impacts could be 7% and the analysis in section 7 on cumulative impacts estimates 6.5%. These differences would not change the conclusion. First, Dr. Young's figure is based on withdrawals, whereas the EIS uses consumptive use totals for its calculations."

a. Isn't total withdrawal volume more useful than consumptive use for evaluating impingement and entrainment?

b. In your opinion, what is the threshold of significance for total withdrawals as a percentage river flow?

c. Would you be concerned over potential impacts to aquatic species if total withdrawals approached 20% of river flow?

(17) What is the factual basis for your statement, in answer 66 of your prefiled direct testimony, that simultaneous maximum withdrawal by all four units during record low flows is unlikely to occur?

a. Is it possible that simultaneous maximum withdrawal by all four units could occur during drought conditions?

b. Isn't it standard NRC practice to evaluate potential impacts using a design envelope that captures the full range of potential operational parameters?

c. Is it possible that all four Units could operate in maximum withdrawal mode some times?

d. Is it possible that there will be periods when three Units are operating normally while the fourth is withdrawing maximally?

e. Is it possible that there will be periods when two Units are operating normally and two Units are withdrawing maximally?

f. Is it possible that there will be periods when one Unit is operating normally and three Units are withdrawing maximally?

g. If any of the above scenarios occur, won't total withdrawals as a percentage of river flow, and therefore entrainment and impingement, be greater than the scenario where all four Units are withdrawing normally?

h. Does the FEIS analyze any scenario with one or more Units in maximum withdrawal mode?

i. Even if it is unlikely that all four Units will be withdrawing at the maximum rate simultaneously, is it reasonable to exclude every possible maximum withdrawal scenario from the FEIS?

(18) In answer 68 of your prefiled direct testimony, you state that “most entrainable life stages of fish and invertebrates are present in the spring and early summer months when river flows are usually high.”

a. What do you mean by “high”?

b. Were spring and early summer flows “high” in 2007 and 2008?

(19) In answer 81 of your prefiled direct testimony, you state: “I disagree with the implication from Dr. Young that the assumption used in the EIS is invalid because of these studies (referring to the studies of Wiltz and Nichols, both published in 1983). Instead, the EIS’s conclusion that impacts will be SMALL is correct.”

a. You stated earlier, in your answer to question 33, that it is appropriate to use studies at SRS, such as this study, to evaluate to potential impacts of the proposed Units, but doesn't this answer undermine that opinion?

b. Why do you rely on some of the studies conducted at SRS to support your conclusion, but reject the validity of these studies, which do not support your conclusions?

c. Is your opinion that a site-specific design feature--the 1-ft-high weir--was not recognized by Wiltz and, as a result, his results are not applicable to the Plant Vogtle intake?

d. How does this opinion differ from Dr. Young's, who also suggests that studies from SRS (and elsewhere) may not be reliable because they are not based on site-specific data?

Cross-Examination Questions for Mr. Anthony Dodd and Mr. Matthew Thomas Montz

IMPINGEMENT AND ENTRAINMENT MONITORING

(1) In answer 8 of your prefiled direct testimony, you state: “Since March of 2008, Georgia Power Company staff biologists have been conducting bi-weekly impingement sampling

at the VEGP cooling water intake structure. The monitoring is currently scheduled to end in February of 2009."

a. Was March 2008 through February 2009 a typical year, in terms of precipitation or Savannah River flow?

b. Do the persistent low flows experienced over the past two years impact fish and ichthyoplankton distribution and abundance?

c. Could the extreme drought conditions effect the results of the impingement study?

(2) In answer 9 of your prefiled direct testimony, you explain the process you employed in conducting bi-weekly impingement sampling at the VEGP site.

a. What was the mean daily flow at the Vogtle site for the period reported here?

b. What was the minimum and maximum flow rate?

c. What was the daily mean make-up water intake pumping flow for the period reported here?

d. What was the maximum and minimum intake flow?

(3) In answer 17 of your prefiled direct testimony, you state: "Among the unidentified taxa, members of the Catostomidae (suckers; 20 percent) and Centrarchidae (sunfishes; 16 percent) were the most dominant."

a. Why are some of the taxa unidentified?

b. Were any of the entrained Catostomidae Robust Redhorse?

<u>HYDRAULIC ZONE OF INFLUENCE DETERMINATION</u>

(4) In answer 22 of your prefiled direct testimony, you state that "during the May 7, 2008 survey, the intake flow was calculated at 71.2 MGD, or 110cfs (56% of full capacity)."

a. How would the results differ at 100% full capacity as compared to 56%?

b. Would the flow-through velocity across the screens change if the intake was at full capacity?

c. What percentage of total flow would have been withdrawn if the intake was operating at full capacity during the May 2008 survey?

(5) In answer 23 of your prefiled direct testimony, you state that "the HZI was only detectable in the river out to a distance approximately 50 feet from the mouth of the intake canal (or about 13 percent of the total distance across the river channel and proximal to the mouth of the canal)."

a. What area would be influenced if the intake was operating at full capacity?

b. What area would be influenced at flows of 3,000 cfs and 2,000 cfs?

c. What was the spatial distribution of the drift community, in terms of the HZI?

THERMAL PLUME

(6) In answer 26 of your prefiled direct testimony, you explain the process used to characterize the thermal plume.

a. What time of year was this study conducted?

b. What was the river water temperature above the thermal plume?

c. Would the results likely be different if the study had been conducted in a different season?

(7) In answer 29 of your prefiled direct testimony, you state: "The data indicated that the thermal discharge plume occupies a small zone (approximately 100 foot long by 75 feet wide) located immediately downstream of the discharge pipe/outfall."

a. What was the discharge from Thurmond Dam when the temperature data was collected?

b. What was the Savannah River flow at the Vogtle site when the temperature data was collected?

c. Would the thermal plume be larger at lower rates of flow?

II. E.C. 1.2, QUESTIONS FOR NRC STAFF WITNESSES

Cross-Examination Questions for Ms. Anne Kuntzleman

VULNERABILITY OF THE POTENTIALLY AFFECTED BIOTA

(1) In answer 5 of your prefiled direct testimony, you testify regarding the ANSP surveys of the Savannah River in the vicinity of the Plant Vogtle site.

a. How far upstream and downstream, in miles, were the two nearest survey sites from the proposed intake and discharge locations?

b. Were the habitat conditions (substrate, channel morphology, etc.) at the nearest survey sites upstream and downstream of the proposed intake and discharge identical to the conditions at the proposed intake and discharge structures?

(2) In answer 6 of your prefiled direct testimony, you testified that the ESRP "directs the staff's description of the aquatic environment and biota at and in the vicinity of the site."

a. Does the FEIS specifically describe the aquatic environment and biota of the Savannah River at Plant Vogtle site?

b. Did the staff rely on any survey data collected at RM 151, the site of the proposed intake structure?

Cross-Examination Questions for Dr. Michael Masnik

EFFECT OF DROUGHT CONDITIONS

(1) In answer 14 of your prefiled direct testimony, you testify that a recent study by Freeman and Marcinek supports the conclusion that operation of two additional Units will not result in habitat changes that cause a detectable alteration of the Savannah River fishery.

   a. Did this study look at withdrawals on a river that is like the Savannah River or smaller tributaries?

   b. Did this study calculate the 7Q10 flow based on natural unimpaired flows without impoundments and withdrawals?

   c. Did this study calculate the withdrawal index based on the total withdrawal or consumptive use?

   d. Did this study distinguish between normal and maximum withdrawal rates?

   e. Did Freeman and Marcinek study any sites with multiple withdrawals at the same location?

   f. Did this study address "persistent low flows?

(2) In answer 14 of your prefiled direct testimony, you testify that aquatic organisms inhabiting rivers and streams flowing into the Atlantic are adapted to tolerate a large variations in water flow and, prior to the construction upstream impoundments, flows in the Savannah River periodically dropped as low as 1000 to 1500 cfs.

   a. Prior to the construction of the upstream impoundments, how often did flows lower than 3,800 cfs occur?

   b. Prior to the construction of the upstream impoundments, what was the duration of the periodic very low flows?

c. Prior to 2006, had the discharge from Thurmond Dam persisted at 3,800 cfs or less for more than one month?

d. How long have the current flows below 3,800 cfs persisted?

EFFECTS OF THE FLOW VELOCITY INCLUDING IMPINGEMENT AND ENTRAINMENT IN THE VICINITY OF THE VOGTLE SITE

(3) In answer 21 of your prefiled direct testimony, you testify that impingement losses from the intake structure for Units 3 and 4 would be similar to those of the intake structure for Units 1 and 2. Prior to 2008, had there been any study of impingement losses at the existing intake for Units 1 and 2?

(4) In answer 22 of your prefiled direct testimony, you testify that adult fish inhabiting the Savannah River are capable of avoiding the 0.5 feet per second through-screen intake flow velocity. Could juvenile fish that are still maturing be harmed by the through-screen intake flow velocity of 0.5 feet per second?

(5) In answer 22 of your prefiled direct testimony, you testify that the two new Units will kill between 0.9 and 2.2 percent of the Savannah River's entrainable organisms.

a. How will the consistent loss of between 0.9 and 2.2 percent of the Savannah River's entrainable organisms affect the long-term health of the aquatic biota of the Savannah River?

b. Using the total withdrawal as a percent of flow as the entrainment rate, as you do in answer 22, what is the total cumulative entrainment of the two proposed Units in combination with other past, present, and foreseeable future withdrawals on the Savannah River?

(6) What is the annual mean flow of the Savannah River at the Vogtle site?

(7) What was the mean flow of the Savannah River at the Vogtle site in 2008?

(8) Were habitat and flow conditions different on the Savannah River more that 20 years ago when the comprehensive cooling study occurred?

(9) How many shortnosed sturgeon were reported impinged in the comprehensive cooling study?

(10) In your answer to question 38, you testify that maximum withdrawal would occur infrequently and only for short periods of time.

a. How often is "infrequently"?

b. How long are "short periods of time"?

c. Why is it reasonable to use 3,800 as the low flow when flows have been consistently lower than 3,800 cfs for the past two years?

Cross-Examination Questions for Ms. Rebekah Kreig

IMPINGEMENT AND ENTRAINMENT

(2) In answer 15 of your prefiled direct testimony, you testify that the FEIS is adequate because it provides a sufficient description of the aquatic resources in the vicinity of the Vogtle site based on data obtained in the vicinity by entities other than the applicant.

a. What data are you referring to?

b. When and where was it collected?

(3) In answer 15 of your prefiled direct testimony you testify regarding comments from other federal agencies. Did FWS, NMFS, or EPA express any concerns about aquatic impacts of construction and operation of the two new Units?

(4) In answer 28 of your prefiled direct testimony, you testify that the normal withdrawal rate represents 1.2% of the annual mean flow at Waynesboro.

a. What period of time was used to calculate the annual mean flow at Waynesboro?

b. What is the unimpaired annual mean flow at Waynesboro?

c. What was the annual mean flow at Waynesboro in 2008?

d. At the maximum withdrawal rate, what percentage of the 2008 annual mean flow at Waynesboro would be withdrawn by two new Units?

(5) In answer 33 of your prefiled direct testimony, you testify that striped bass and American Shad spawn during periods of naturally higher river flow when the fraction of water withdrawn is small.

a. What was the discharge from Thurmond dam during March and April 2008?

b. What was the Savannah River flow at Waynesboro during March and April 2008?

c. What percentage of the River flow was withdrawn by Units 1and 2 in March and April 2008?

(6) In answer 33 of your prefiled direct testimony, you testify that the nearest Robust Redhorse spawning area is 25 miles upstream from the VEGP site. You also testified that because this site is 25 miles upstream from the VEGP site, the likelihood of redhorse larvae entrainment is reduced.

a. Do robust redhorse eggs and larvae remain in place, or do they move downstream with the current?

b. Is it possible that robust reservoirs eggs and larvae in the water column may be entrained by the Vogtle intake?

(7) The answer 33 of your prefiled direct testimony, you testify about potential impacts of the intake structure on muscle species.

a. What are the known or suspected host fish species of these muscles?

b. Are these host fish susceptible to impingement or entrainment?

c. Were any of these host fish or their larvae entrained or impinged in Southern's recent studies of the intake canal for Units 1 and 2?

EFFECT OF DROUGHT CONDITIONS

(8) In your answer to question and 41, you testify that the stamp also consider the impacts to aquatic biota at River flow rates of 3000 and 2000 cfs. Did the Staff evaluation of these laower flow rates include normal and maximum withdrawal rates, or only consumptive use rates?

Cross-Examination Questions for Jill S. Caverly or Lance W. Vail:

(1) In answer 35 of your prefiled direct testimony, you testified that a Drought Level 4 for the Savannah River would be rare.

a. What is the predicted frequency of Drought Level 4?

b. Is Drought Level 4 equivalent to the theoretical hypothetical flow?

c. What would the entrainment and impingement rates at the proposed Units be at Drought Level 4?

(2) Throughout the FEIS, the Staff presumes that the Drought Level 3 discharge will be 3,800 cfs, when in fact flows have been lower than 3,800 cfs consistently over the past two years. On the other hand, you testify in answer 33 that Drought Level 4 will likely change at some time in the future.

a. Why is it reasonable to presume that flows lower than 3,800 cfs will not occur when this has not been the case during the current drought?

b. Isn't it inconsistent for the staff to assume that the Corps will follow the Drought Contingency Plan for Drought Level 3, but will diverge from the Plan for Drought Level 4?

c. Why is it conservative to base a low flow analysis on 3,800 cfs discharge when discharge has been consistently lower than 3,800 cfs during the past two years?

(3) In answer 35 of your prefiled direct testimony, you testified that the Staff expects that flows of 3,000 cfs and 2,000 cfs would be extremely rare and of only temporary duration.

a. What is "extremely rare" in this context?

b. What is "temporary duration"?

c. Are there computer modeling tools that could be used to predict exactly how often these advance would occur, and their duration?

d. Does the Corps of Engineers have such a model for the Savannah River?

(4) In answer 37 of your prefiled direct testimony, you mention the "two largest water withdrawals upstream" of the Vogtle site, but then only testify about Urquhart station. What is the other large withdrawal that you forgot to mention?

(5) In answer 37 of your prefiled direct testimony, you testify that the flow at the Vogtle site will exceed the release at Thurmond reservoir "as long as the inflow from tributaries and groundwater exceeds the consumptive water losses by users between Thurmond reservoir and the Vogtle site." How much additional consumptive use is required for this situation to manifest?

(6) In answer 46 of your prefiled direct testimony, you testify regarding the Staff's analysis of withdrawals and consumptive use at under normal and maximum withdrawal conditions under a variety of flow scenarios.

a. For each of the flow scenarios, did the Staff calculate both total withdrawals and consumptive use under both normal and maximum withdrawal?

b. Were all of these results reported in the text of the FEIS?

c. Why did the Staff exclude some of the results from the FEIS tables?

(7) In answer 46 of your prefiled direct testimony, you testify that using the revised consumptive use figures the Staff determined that consumptive use at 3,000 and 2,000 cfs would be 4.4 percent and 6.6 percent, respectively. Using the revised figures for total withdrawals rather than consumptive use, what would these percentages be?

(8) In answer 51 of your prefiled direct testimony, you testify that the staff used normal withdrawal rates to determine cumulative impacts of operating the proposed Units with the existing units.

a. What is the basis for your assumption that it is unlikely that maximum withdrawals would occur at more than one unit at a time?

b. If this is the case, then shouldn't the Staff analyze the scenario where three units are operating normally and one unit is operating maximally?

c. For Units 1 and 2, why didn't the Staff use actual withdrawal data?

d. Isn't it true that actual withdrawals at Units 1 and 2 are frequently higher than the "normal" withdrawal used by the Staff?

Respectfully submitted this 2nd day of February, 2009,

[Original signed by L. Sanders]

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before the Licensing Board:

G. Paul Bollwerk, III, Chairman
Nicholas G. Trikouros
Dr. James Jackson

In the Matter of SOUTHERN NUCLEAR OPERATING CO. (Early Site Permit for Vogtle ESP Site)	Docket No. 52-011-ESP ASLBP No. 07-850-01-ESP-BD01

JOINT INTERVENORS' PROPOSED CROSS-EXAMINATION QUESTIONS FOR CONTENTION EC 1.3

I. E.C. 1.3. QUESTIONS FOR SOUTHERN NUCLEAR COMPANY WITNESSES

Cross-Examination Questions for Charles C. Coutant

EFFECTS OF WET COOLING ON THE SHORTNOSE STURGEON AND ROBUST REDHORSE

(1) In answer 14 of your prefiled direct testimony, you stated that the principal problems facing the Robust Redhorse species relate to the limited amount of suitable spawning habitat within the Savannah River.

a. Will the Vogtle 3 and 4 sites further limit the amount of suitable spawning habitat within the Savannah River?

b. Will the wet cooling system at the Vogtle 3 and 4 units restrict spawning movements and access to probable spawning sites?

Cross-Examination Questions for James W. Cuchens

FEASIBILITY OF DRY COOLING IN THE VOGTLE 3 AND 4 UNITS

(1) In answer 13 of your prefiled direct testimony, you suggest that utilizing a dry cooling system would impede the current design of the AP1000 Nuclear Plant. Is there more than one way to alter the design of the AP1000 to accommodate a dry cooling system?

(2) In answer 15 of your prefiled direct testimony, you assert that large dry cooled units don't exist. Isn't it true that the Dominion plant in Virginia proposed to build a bigger unit, North Anna 4, using dry cooling? Additionally, aren't there non-nuclear plants in Texas and Wyoming that are currently utilizing large dry cooled systems?

(3) In answer 30 of his prefiled direct testimony, Mr. Powers asserts that an ACC design system would be simpler than the standard AP1000 design. Do you agree?

(4) In answer 32 of your prefiled direct testimony, you testify that changing from a wet-cooling system to a dry-cooling system will cause increased engineering costs. Leaving aside cost, is dry cooling a feasible alternative to wet cooling in the Vogtle 3 and 4 units?

Cross-Examination Questions for Thomas C. Moorer

FEASIBILITY OF DRY COOLING AT THE VOGTLE 3 AND 4 SITES

(1) Mr. Moorer, in answer 18 of your prefiled direct testimony, you state that "approximately 80 MWe would be required" to operate the dry cooling towers.

   a. Is this calculation based on the dry cooling system design that Mr. Cuchens describes in answer 31 of his prefiled direct testimony?

   b. How much power would be required to operate the wet cooling towers?

   c. How do you calculate the parasitic load for the proposed wet cooling towers?

d. How does the parasitic load of the proposed wet cooling towers compare to Mr. Powers' and Mr. Cutchens' calculation of the parasitic load of a dry cooling system?

II. E.C. 1.3 QUESTIONS FOR NRC STAFF WITNESSES

FEASIBILITY OF DRY COOLING AT THE VOGTLE 3 AND 4 SITES

(1) Mr. Vail and Ms. Caverly, in answer 14 of your prefiled testimony, you testify that "[t]he Staff has not evaluated the technical feasibility or precise costs of using dry cooling for the AP1000 design at Vogtle." How is it that the Staff is able to conclude that the wet cooling system design is preferable to the dry cooling system design without a complete evaluation of technical feasibility and costs of the dry cooling system?

(2) Mr. Vail, Ms. Caverly and Mr. Masnik, in answer 11 of your prefiled testimony, you testify that "the use of a dry cooling system would essentially eliminate all impacts to water resources." The Staff further notes that despite this significant advantage of dry cooling, there are still disadvantages of the dry cooling system, specifically with respect to "land use, fuel use, spent fuel transport, and spent fuel storage."

a. What is the basis of your conclusion concerning the disadvantages with the dry cooling system associated with fuel use, spent fuel and spent fuel storage?

b. How much additional land would be required?

c. How much additional fuel would be required over the operational lifetime of the new Units?

d. How much additional spent fuel would be generated and stored?

(3) Mr. Masnik and Mr. Vail, in answer 16 of your prefiled testimony, you state that the Staff determined that the SMALL impacts associated with the proposed system, combined with

the alleged disadvantages of the dry cooling systems "provided the basis for the Staff's concluding that the identified heat alternative heat dissipation-system alternative would not be environmentally preferable to the proposed wet cooling system." How did the Staff conclude that the wet cooling system is environmentally preferable without a complete evaluation of technical feasibility and costs of the dry cooling system?

Respectfully submitted this 2nd day of February, 2009,

[Original signed by L. Sanders]

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before the Licensing Board:

G. Paul Bollwerk, III, Chairman
Nicholas G. Trikouros
Dr. James Jackson

In the Matter of	Docket No. 52-011-ESP
SOUTHERN NUCLEAR OPERATING CO.	ASLBP No. 07-850-01-ESP-BD01
(Early Site Permit for Vogtle ESP Site)	

JOINT INTERVENORS' PROPOSED CROSS-EXAMINATION QUESTIONS FOR CONTENTION EC 6.0

E.C 6.0 QUESTIONS FOR SOUTHERN NUCLEAR COMPANY WITNESSES

Cross-Examination Questions for Jeffrey Neubert, Benjamin Smith, David Scott

(1) In answer 5 of your prefiled direct testimony, you testify that you identified eight locations where only approximately 36,500 cubic yards of material would need to be removed. Would this limited dredging restore the Federal Navigation Channel to its authorized specifications?

(2) Mr. Neubert, in answer 7 to your prefiled direct testimony, you testify that are currently planning March 2012 for the first shipment, and November 2014 for the final barge shipment. Approximately how many barge trips will occur between March 2012 and November 2014?

(3) Mr. Scott, in answer 17 of your prefiled direct testimony, you stated that the conditions of the river for the survey were optimal for a "worst case scenario."

a) Did the Corps reduce the discharge rate further after the survey?

b) Is it possible that the River flow will be less than the flow during the survey at the time of barging?

(4) In answer 18 of your prefiled direct testimony, you testify that the survey noted the locations where the depth of the practical navigational channel was less than 5 feet**.** However, in answer 19 you testify that the expected operational draft for a barge of this size with 730 tons of cargo weight is 5.5 feet.

a) If the draft is 5.5 feet, then why note only those sites with a depth less than 5 feet?

b) Are there locations where the depth is between 5 and 5.5 feet?

c) If only those areas with depths less than 5 feet are dredged, what happens to those areas with a depth between 5 and 5.5 feet?

d) How many additional sites beyond the 8 you identify in your testimony would require dredging if you identified all sites with a minimum depth of 5.5 feet instead of 5 feet?

e) If the Corps dredges all locations where the minimum depth is less than 5.5 feet instead of 5 feet, how much additional dredged material will be produced?

f) How many additional sites beyond the 8 you identify in your testimony would require dredging if you identified all sites with a minimum depth of 6 feet instead of 5 feet?

g) If the Corps dredges all locations where the minimum depth is less than 6 feet instead of 5 feet, how much additional dredged material will be produced?

h) How much dredged material would be produced if the Corps restores the channel to its authorized depth?

(5) In your answer to question 24, you testify that an increase in flow above 3,700 cfs could reduce or eliminate the required dredging.

a) What flow would be required to totally eliminate the need for dredging?

b) If the flow is reduced to 3,100 cfs, as it was this winter, how much additional dredging will be required?

(6) In answer 25 of your prefiled direct testimony, you testify that you discussed your survey analysis with the Army Corps of Engineers.

a) Did you provide a written report containing your analysis and conclusions to the Corps?

b) Did you provide your survey data to the Corps?

c) Did you meet with the NRC Staff to discuss your survey analysis?

(7) If dredged, will the river be navigable to Augusta, as congressionally authorized?

Cross-Examination Questions for Thomas C. Moorer

(1) Is barging Southern's preferred method of transportation for the components?

(2) Were there other methods of transportation considered by Southern?

(3) Is it possible to transport all necessary materials to the Vogtle site without using barges or the navigation channel?

(4) Did Southern or Westinghouse/Shaw evaluate transportation alternatives to barging?

(5) Is it feasible to construct the proposed Units without using the navigation channel?

(6) Why is barging Southern's preferred method of transporting materials to the Vogtle site?

(7) Does the project, as described in the ESP application materials submitted to the Corps, include barging materials to the site, construction of a new barge slip, and construction of a heavy haul road?

(8) If so, why does Southern prefer barging?

(9) In answer 6 of your prefiled direct testimony, you testify that the FEIS for Units 1 and 2 concluded that impacts would be generally small. Did the FEIS for Units 1 and 2 analyze the impacts of dredging the navigation channel?

(10) In answer 8 of your prefiled direct testimony, you testify regarding the Corps' 1976 EIS for the Savannah River Navigation project.

a) Does the Channel Maintenance Program described in the EIS accurately describe the Corps' maintenance activities over the past 30 years?

b) On what basis do you conclude that the Corps would use existing upland disposal sites to dispose the dredged materials?

c) Is there capacity in existing upland disposal sites for this material?

d) If existing disposal sites are not available, where will the dredged material be stored?

Cross-Examination Questions for Charles C. Coutant

(1) Your Curriculum Vitae (SNC000012) does not indicate any expertise in navigation, dredging, Corps of Engineers operations and maintenance, or river surveying. Why are you qualified to offer testimony on EC 6.0?

(2) Question 11 of your prefiled direct testimony enquires about the purpose of your testimony. In your answer to this question, you testify that you have prepared a report analyzing the environmental impacts of the dredging, and that a true and correct copy of the report is filed as Exhibit 000051.

a. Why do you rely upon an unsworn analysis you authored rather than incorporate your opinions into your sworn testimony, as you did with EC 1.2 and EC 1.3?

b. Has your analysis been subject to peer review?

c. What assumptions were required in preparing the report?

d. What are the bases for those assumptions?

(3) In your report, you state that "only slightly more than one mile . . . would need to be dredged in total. Thus, dredging would occur in less than one percent of the surveyed river" (prefiled direct testimony, exhibit SNC 000051, page 4). The dredging, however, would occur at multiple locations rather than on one contiguous mile. Are the potential impacts of dredging greater or less when the dredging is spread out over a large area instead of concentrated at one location?

(4) As far as you are aware, has the sediment at any of the 8 dredge sites you identify been analyzed for hazardous contaminants?

(5) Have any of the 8 dredge sites you identify been surveyed for mussels?

(6) In your report, why do you rely heavily on a mussel survey from the Pee Dee River (Savidge2006) when the same group of researchers also recently surveyed sites on the Savannah River?

(7) Are you aware that the Savidge survey of the Savannah River discovered several rare, threatened, endangered, or species of concern, including several species that had not been previously described from the Savannah River Basin?

(8) Are you aware that the Savidge survey of the Savannah River located rare, threatened, endangered, or species of concern in close proximity to the dredge sites you identify?

(9) Snags and woody debris provide velocity breaks, creating a refuge from velocity shear stress for organisms. How could organisms that rely upon these velocity breaks be affected by the removal or relocation of snags and woody debris?

E.C. 6.0 QUESTIONS FOR NRC STAFF WITNESSES

Cross-Examination Questions for Mark Notich, Anne Kuntzleman, Rebekah Krieg, Jill Caverly, Lance Vail

(1) Mr. Vail and Ms. Caverly, in your testimony, the NRC Staff maintains that there are other feasible means of transportation besides barging (see answer 10, prefiled direct testimony).

a. Might the other means be cost prohibitive for Southern?

b. Are the rail lines in the appropriate condition to provide for the transportation?

c. Were the supposed alternatives to barging analyzed for potential environmental impacts?

(2) Ms. Kuntzleman and Ms. Krieg, in answer 22 of your prefiled direct testimony, you indicate that the Staff decided to consider the effects of dredging, despite the Staff's belief that such dredging was not "certain to occur." Does the NRC Staff only analyze the potential effects of actions that are certain to occur?

(3) Mr. Vail and Ms. Caverly, in answer 13 of your prefiled direct testimony, you stated that NRC Staff assumed that Southern would not pursue dredging because it is "not implausible" that components could be moved without dredging. However, testimony in answer 6 of your prefiled direct testimony indicates that barging is Southern's preferred method of transportation and testimony from the USACE in answer 7 of its prefiled direct testimony indicates that the water levels are currently too low to support barging. Was the assumption that dredging would not be necessary or likely realistic given the desires of Southern, the current longstanding drought conditions, and the possible expense and difficulty of alternative methods?

(4) Mr. Vail and Ms. Caverly, does the FEIS state that "the navigation channel will likely need to be dredged"? Why did the Staff include this statement if, according to their prefiled direct testimony (answers 12 and 13), they believed that dredging would not be necessary?

(5) Ms. Kuntzleman and Ms. Krieg, in answer 22 of your prefiled direct testimony you state that because of comments received on the DEIS "the Staff decided it was appropriate to consider dredging."

a. If the NRC Staff did not think that dredging was likely to occur, why was dredging addressed at all under the "Cumulative Impacts" section of the FEIS?

b. Couldn't the NRC Staff have excluded the dredging impacts, despite the public comments?

c. Couldn't the NRC Staff have responded to the public comments regarding dredging in the appendix?

(6) In your testimony, the NRC Staff maintains that dredging is not part of the ESP project.

a. Was barging the preferred method proposed in the ESP application?

b. Is barging part of the proposal?

c. Is construction of a barge slip and a haul road from that slip part of the proposal?

(7) ALL, in several answers, such as answer 12 and answer 13 of the prefiled direct testimony, NRC staff members testified that the assumption that dredging was unlikely was based on informal discussion with the Army Corps of Engineers. Did Southern share with the NRC Staff any studies or surveys it sponsored or planned to sponsor regarding the need for dredging or did the Army Corps of Engineers discuss any such surveys during the informal conversations with the NRC Staff?

(8) Mr. Vail and Ms. Caverly, in answer 7 of your prefiled direct testimony, you stated that the NRC Staff assumed that "navigation would be feasible."

a. What facts, specifically, led the Staff to conclude that neither dredging nor additional releases from upstream reservoirs were necessary to support navigation given the flood control curve rule?

b. What reports, studies, or data were consulted for that conclusion?

(9) Mr. Vail and Ms. Caverly, in answer 14 of your prefiled direct testimony you state that "transportation of large components upstream by barge has occurred several times in the last ten years."

a. What was the water flow and river depth for those barge trips?

b. Are any of the previous barging projects on which the Staff relied comparable to this project in terms of the scope, magnitude, drought conditions, water and flow levels, time of year, etc.?

(10) ALL, in answer 13 of your prefiled direct testimony, you stated that you assumed there would be no dredging because members of the Corps had received no formal request from Southern regarding dredging by Southern or the Corps.

a. Did the Corps ever indicate that Southern intended to dredge or was considering dredging in the future?

b. Did either Southern or the Corps ever affirmatively indicate that they would not be pursuing or permitting a dredging project in the Federal navigation channel with regard to Plant Vogtle construction, or was the absence of the formal request the reason for the assumption?

(11) Mr. Vail and Ms. Caverly, in answer 12 of your prefiled direct testimony, you state that barging during periods of high flow "could expose Southern to financial risk" and "impact its desired construction schedule," but that the Staff did not consider those "factors to be material to an ESP environmental review." Wouldn't those factors be material if they altered the likelihood of dredging and created unexamined environmental impacts?

(12) ALL, what data, analyses, and methodologies were the bases for the MODERATE designation? What assumptions did the Staff make, and how did they arrive at those assumptions, given that the dredging was "incompletely defined"?

(13) Ms. Kuntzleman and Ms Krieg, in answer 28 of your prefiled direct testimony, you state that only qualitative analysis was appropriate.

a. Why didn't the staff at least attempt to make a quantitative analysis, given that they knew the goals of Southern?

b. Could the NRC have done a survey of the river to gain more information about potential dredging needs?

c. Wasn't it speculative to provide a MODERATE designation absent more specific information?

d. How could this MODERATE designation be accurate, if as the Staff indicates, the impacts of the dredging could not be predicted?

(14) Mr. Vail and Ms. Caverly, in answer 10 of your prefiled direct testimony, you state that "the Staff did not believe that dredging… was expected to occur." Ms. Kuntzleman and Ms. Krieg in answer 28 of the prefiled direct testimony stated that only qualitative review was appropriate, given that the project was "incompletely defined" and "the locations of the dredged material disposal area [had] not been identified." Given the testimony offered by Southern's witnesses,

does the NRC Staff still believe that quantitative analysis of potential dredging impacts is impossible?

(15) Ms. Kuntzleman and Ms. Krieg, in answer 30 of your prefiled direct testimony, you state that mitigation would be necessary to ensure the impacts would not be large.

a. Did the Staff consider the cost of assumed mitigation measures?

b. Did the Staff analyze which mitigation measures have been used, and to what extent, in previous similar dredging projects?

(16) Ms. Kuntzleman, you indicated in Answer 32 of your prefiled direct testimony that mitigating actions could be taken to protect threatened, endangered, and sensitive mussel species. However, Dr. Young in answer 30 of his prefiled direct testimony cites studies demonstrating that mussel relocation can result in a 100% fatality rate. Does this indicate that perhaps your "mitigating" measures would not result in reduced impacts?

Cross-Examination Questions for William G. Bailey, Carol L. Bernstein, Lyle J. Maciejewski, Stanley L. Simpson

(1) Ms. Bernstein, in answer 9 of your prefiled direct testimony, you explain the US Army Corps of Engineers NEPA process. Would the Corps of Engineers rely on the NRC's determination that navigation impacts could be MODERATE, or would the Corps conduct an independent analysis?

(2) Mr. Simpson, in answer 2 to your prefiled direct testimony, you testify that you maintain and implement state-of-the-art computer programs to manage the multipurpose projects of the Savannah River.

a. Would you please state the name of the computer programs to which you refer?

b. Could these programs be used to model the flow at the Vogtle site under different weather patterns and water consumption scenarios?

(3) Mr. Simpson, in answer 7 of your prefiled direct testimony, you testify that "transportation of large components by barge has occurred several times in the last 10 years" and note that it has generally required 10,000 cfs discharge. Did the Corps release water from the upstream reservoirs to support navigation in these instances?

(4) Mr. Simpson, storage in the upstream reservoirs is currently at Drought Level 3 and the Corps has reduced discharge from Thurmond Dan to below Drought Level 3 flows.

a. If Georgia receives normal rainfall from today going forward, how long will it take to refill the conservation pools of all three upstream reservoir projects?

b. Assuming normal precipitation going forward from today, what conditions must be present in the upstream reservoirs before normal reservoir operations and flows resume?

c. Under what conditions would the Corps augment river flows for the purpose of supporting Southern's navigation needs?

(4) Mr. Simpson, in answer 7 of your prefiled direct testimony, you state that due to shallow river depths, transportation by barge upstream is not currently possible.

a. In your opinion, what is the minimum discharge from Thurmond dam necessary for barge navigation on the Savannah River?

b. Do you agree with Southern's assessment that navigation is possible with a discharge of 3,700 cfs and only limited dredging of the Navigation Channel??

(5) Mr. Maciejewski, in answer 16 of your prefiled direct testimony, you state that Southern had a desire for river transportation and that Southern indicated dredging would be a Federal project.

a. Has Southern indicated when barging would begin and end?

b. Has Southern indicated the approximate number of barge trips that will be needed?

c. In your opinion, is it reasonable to assume that Southern can accomplish its proposed barging schedule with limited dredging and no flow augmentation?

(7) The NRC Staff maintains that the dredging project is distinct from the ESP process and that any dredging has independent utility.

a. When was the last time the channel was dredged?

b. If not for Southern's desire to use the channel, would the Corps dredge the Federal navigation channel?

c. If dredged, would the river be navigable up to Augusta, or only for the area needed for Southern's barging?

d. Would the channel be dredged to its full authorized dimentions or only as large as Southern's needs dictate?

e. In the years since the river was last dredged, has the Corps engaged in environmental restoration projects on the Savannah River?

f. Has the Corps considered seeking de-authorization of the savannah River Below Augusta project?

(8) Mr. Simpson, has Southern provided the Corps with the data and analysis from its recent river survey?

Respectfully submitted this 2nd day of February, 2009,

[Original signed by L. Sanders]

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March 2, 2009

Hon. G. Paul Bollwerk, III
Atomic Safety and Licensing Board
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: Southern Nuclear Operating Co., Inc. (ESP for Plant Vogtle)
Docket No. 52-011-ESP - ASLBP No. 07-850-01-ESP-BD01

Dear Judge Bollwerk:

In accordance with the order of the Atomic Safety and Licensing Board dated December 15, 2008, Southern Nuclear Operating Company's proposed cross-examination questions, directed to Joint Intervenors' rebuttal testimony filed on February 6, 2009, in the Vogtle 3 and 4 Early Site Permit Contested Hearing, are attached to this letter.

Please do not hesitate to contact me if you have any questions

Sincerely,

/s/ M. Stanford Blanton

M. Stanford Blanton

MSB:dc
Attachments

Confidential Pending Release by the Licensing Board
Pursuant to 10 C.F.R. § 2.1207 (a)(3)(iii)

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)	)	**March 2, 2009**

SOUTHERN NUCLEAR OPERATING COMPANY'S QUESTIONS FOR THE BOARD ON JOINT INTERVENORS' PRE-FILED REBUTTAL TESTIMONY OF BARRY W. SULKIN CONCERNING EC 1.2

Pursuant to the Atomic Safety and Licensing Board's ("ASLB" or "Board") Orders of October 24, 2008 and December 15, 2008,[1] and in accordance with 10 C.F.R. § 2.1207(a)(3), Southern Nuclear Operating Company ("SNC") hereby submits proposed questions for the Board to consider propounding to Mr. Barry W. Sulkin at the Hearing regarding Environmental Contention 1.2 ("EC 1.2"). These questions are based on Mr. Sulkin's rebuttal testimony filed on February 6, 2009.

Following the guidelines for submittals of requests for cross-examination by the parties, this submittal provides a description of the issues, the objective of the line of questioning and the proposed line of questions that will lead to the objective of the questioning. *See* 10 C.F.R. § 2.1204(b)(i) – (iii).

[1] Memorandum and Order (Revised General Schedule) ("October 24 Order") and Memorandum and Order (Contested Evidentiary Hearing Administrative Matters) ("December 15 Order").

I. Description of the Issues

A. Mr. Sulkin's Criticism of the Use of Thurmond Dam Discharges

B. Staff's Assessment of Impacts

II. Objectives

A. Mr. Sulkin's Criticism of the Use of Thurmond Dam Discharges

1. Explore Mr. Sulkin's understanding of the Staff's use of the Thurmond Dam discharge.

B. Staff's Assessment of Impacts

1. Establish that Mr. Sulkin's has no evidence that impacts from impingement or entrainment would be more than SMALL.

III. Proposed Line of Questions

A. Mr. Sulkin's Criticism of the Use of Thurmond Dam Discharges

1. Explore Mr. Sulkin's understanding of the Staff's use of the Thurmond Dam discharge.

    a. You state in A.2 of your rebuttal testimony that the Corps' calculation of withdrawal percentage is not very meaningful because releases from Thurmond dam do not reflect pre-reservoir conditions. However, the only rational evaluation of flows at Plant Vogtle must consider and cannot simply ignore the existence of the dams, isn't that correct?

    b. Using the Thurmond discharge to estimate impacts is much more conservative than using the Waynesboro gauge, because releases from the dam are notably lower than flows at Plant Vogtle, aren't they.

    c. Thurmond dam is approximately 90 miles upstream of Plant Vogtle, isn't it?

    d. As you point out in A.3 and A.4 of your rebuttal testimony, flows increase by 2400 cfs on average over that stretch of river, don't they?

    e. It is appropriate for the Staff to identify that conservatism, isn't it?

    f. Even if releases from Thurmond dam do not increase significantly during the spawning season, isn't it true that unregulated local

inflows over the 90 miles of river between the dam and Plant Vogtle would tend to be at their maximums during the spring spawning season?

B. Staff's Assessment of Impacts

1. Establish that Mr. Sulkin's has no evidence that impacts from impingement or entrainment would be more than SMALL.

   a. Table D-6 of Exhibit SNC00005 (the Entrainment Report provided by Messrs. Dodd and Montz) does identify the baseline amount of organisms in the river, doesn't it?

   b. And from this, it is possible to compare entrainment at Units 1 and 2 to the overall volume of organisms in the river, isn't it?

   c. Wouldn't you agree that by considering flows as low as 2000 cfs that the Staff considered extreme low flow conditions?

   d. Isn't it true that flows of 2000 cfs would correspond to even lower releases from Thurmond dam 90 miles upstream?

   e. You have no evidence that entrainment impacts will alter the aquatic resource notably, do you? Neither do you have any evidence that impingement impacts will alter the aquatic resource notably, do you?

Respectfully submitted,

(Original signed by M. Stanford Blanton)

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Dated this 2nd day of March, 2009.

Confidential Pending Release by the Licensing Board
Pursuant to 10 C.F.R. § 2.1207(a)(3)(iii)

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)	)	**March 2, 2009**

SOUTHERN NUCLEAR OPERATING COMPANY'S QUESTIONS FOR THE BOARD ON JOINT INTERVENORS' REBUTTAL TESTIMONY OF DR. SHAWN YOUNG CONCERNING CONTENTION EC 1.2

Pursuant to the Atomic Safety and Licensing Board's ("ASLB" or "Board") Orders of October 24, 2008 and December 15, 2008,[1] and in accordance with 10 C.F.R. § 2.1207(a)(3), Southern Nuclear Operating Company ("SNC") hereby submits proposed questions for the Board to consider propounding to Dr. Shawn Young at the Hearing regarding Environmental Contention 1.2 ("EC 1.2"). These questions are based on Dr. Young's rebuttal testimony filed on February 6, 2009.

Following the guidelines for submittals of requests for cross-examination by the parties, this submittal provides a description of the issues, the objective of the line of questioning and the proposed line of questions that will lead to the objective of the questioning. *See* 10 C.F.R. § 2.1204(b)(i) – (iii).

I. Description of the Issues

A. Dr. Young's Criticism of SNC's 2008 Field Studies

B. Staff's Assessment of Impacts

[1] Memorandum and Order (Revised General Schedule) ("October 24 Order") and Memorandum and Order (Contested Evidentiary Hearing Administrative Matters) ("December 15 Order").

II. Objectives

A. Dr. Young's Criticism of SNC's 2008 Field Studies

1. Clarify Dr. Young's criticism of SNC's 2008 entrainment and impingement studies.

B. Staff's Assessment of Impacts

1. Understand Dr. Young's criticism of the Staff's bases for determining impacts would be SMALL.

III. Proposed Line of Questions

A. Dr. Young's Criticism of SNC's 2008 Field Studies

1. Clarify Dr. Young's criticism of SNC's 2008 entrainment and impingement studies.

    a. In contrast to your statement in A6 of your rebuttal testimony, the Vogtle units were operating at full capacity during the HZI study, weren't they?

    b. The extent of the HZI is solely a hydraulic measurement and is completely independent of the presence or absence of a drift community isn't it?

    c. So your comment in A.6 of your rebuttal testimony that the HZI should have been performed during spawning conditions is irrelevant, isn't it?

    d. The lowest flows in the Savannah River at Plant Vogtle, that is, at the Waynesboro gauge, would not typically coincide with spawning season, would they?

B. Staff's Assessment of Impacts

1. Understand Dr. Young's criticism of the Staff's bases for determining impacts would be SMALL.

    a. In A.2 and A.7 of your rebuttal, you rely on a study by Paller (Exhibit NRC000006) for the proposition that Plant Vogtle and SRS have negative impacts on Savannah River fisheries. In fact,

the sections you reference on page 16 of that paper article do not reach this conclusion at all, do they? It says nothing about negative impacts to fisheries overall, all it says is that the largest single sources of entrainment and impingement are the SRS and Vogtle sites, doesn't it? Moreover, doesn't the report you cite state that "[t]he overall rates of impingement at the SRS intakes were low relative to those of other cooling-water intake facilities in the Southeast?" And it's undisputed that the impingement and entrainment impacts of Plant Vogtle are even lower, aren't they? Regardless, doesn't Paller explain on page 14 that these influences are among the *best documented*?

b. The ANSP studies were one of many studies consulted by the Staff in preparing the EIS section regarding aquatic impacts, weren't they?

c. You say in A.9 of your rebuttal testimony that data gathered ten miles from Plant Vogtle are not representative of site conditions. Yet you complain that Plant Vogtle has impacts in the estuarine portion of the River (approximately 100 miles away) and that flows measured at Thurmond Dam (approximately 90 miles away) are important considerations. Your comments are inconsistent, aren't they?

d. You have no evidence of any unusual fish kill at Plant Vogtle, do you?

Respectfully submitted,

(Original signed by M. Stanford Blanton)

_____

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Dated this 2nd day of March, 2009.

Confidential Pending Release by the Licensing Board
Pursuant to 10 C.F.R. § 2.1207 (a)(3)(iii)

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)	)	**March 2, 2009**

SOUTHERN NUCLEAR OPERATING COMPANY'S QUESTIONS FOR THE BOARD ON JOINT INTERVENORS' REBUTTAL TESTIMONY OF WILLIAM POWERS TO ENVIRONMENTAL CONTENTION 1.3

Pursuant to the Atomic Safety and Licensing Board's ("ASLB" or "Board") Orders of October 24, 2008 and December 15, 2008,[1] and in accordance with 10 C.F.R. § 2.1207(a)(3), Southern Nuclear Operating Company ("SNC") hereby submits proposed questions for the Board to consider propounding to Mr. William Powers at the Hearing regarding Environmental Contention 1.3 ("EC 1.3"). These questions are based on Mr. Powers' rebuttal testimony filed on February 6, 2009, related to EC 1.3.[2]

Following the guidelines for submittals of requests for cross-examination by the parties, this submittal provides a description of the issues, the objective of the line of questioning and the proposed line of questions that will lead to the objective of the questioning. *See* 10 C.F.R. § 2.1204(b)(i) – (iii).

[1] Memorandum and Order (Revised General Schedule) ("October 24 Order") and Memorandum and Order (Contested Evidentiary Hearing Administrative Matters) ("December 15 Order").

[2] References to Question and Answer numbers are to the Rebuttal Testimony of William Powers in Support of EC 1.3, filed by Joint Intervenors on February 6, 2009.

SNC's Proposed Cross Examination Questions for Mr. William Powers
Regarding EC 1.3 Rebuttal Testimony

I. Description of Issues and Objectives

A. Dry Cooling Proposed for North Anna 3

- Determine Mr. Powers' understanding of the operation of the "dry cooling" portion of the cooling system proposed for North Anna 3 and the related impacts of such operation.

B. Dry Cooling Related to North Anna 4

- Understand the basis for Mr. Powers' testimony that dry cooling is feasible for a nuclear plant based on the ESP for North Anna 4

C. Comparability of GE's ESBWR Turbine

- Understand the basis for Mr. Powers' assertion that the AP1000 can use a high backpressure turbine based on the GE ESBWR turbine

II. Proposed Cross Examination Questions

A. Dry Cooling Proposed for North Anna 3

- Determine Mr. Powers' understanding of the dry cooling facility proposed for North Anna 3 and the related impacts.

    1. In A2 of your testimony, you cite the FEIS of the North Anna 3 and 4 ESP, which states: "Under favorable meteorological conditions, the entire excess heat load from Unit 3 would be dissipated using closed-cycle dry cooling towers." (Exhibit JTI000050). What is your interpretation of the term "favorable meteorological conditions"?

    2. Is it your testimony that North Anna 3 will be able to operate at full power output using 100% dry cooling under these conditions?

    3. How often, based on historical data, would you expect these "favorable meteorological conditions" to occur at the North Anna site?

    4. Isn't it true that "favorable meteorological conditions" would not occur during the majority of the year? Or during the peak summer season?

    5. Would these "favorable meteorological conditions" occur more or less frequently at the Vogtle site?

6. Please see page 2-193 to 2-194 of the FSAR for the North Anna 3 COLA (attached hereto)[3], which read: "There are times of the year when the combination wet and dry cooling towers used for normal plant cooling could function in a completely dry mode, particularly during cold weather. . . . However, these conditions are expected to persist for relatively short durations and are not representative of transport conditions over longer time scales." Doesn't this statement indicate that the completely dry mode will be restricted to cold weather and utilized for only short durations?

7. Please see page 3-10 of JTI000050, which states that the dry towers "would be sized so that under the worst-case conditions (i.e., full power operation and a hot and humid atmosphere at tower level), a minimum of one-third of excess heat from Unit 3 would be dissipated via the dry cooling system. The remaining excess heat would be dissipated by the wet tower system. Therefore, although the MWC mode uses less water than the EC mode, it is possible that up to two thirds of the total heat load would be dissipated by wet cooling." Based on this statement in your exhibit, isn't it true that the North Anna System would not be capable of dissipating 100% of the total heat load on a peak day in July?

8. Isn't it most likely based on the statement in your exhibit that under "worst-case conditions," only one-third of the heat load from North Anna will be dissipated by the dry-only mode?

9. Isn't it also true, then, that North Anna 3 could not operate at full power output using 100% dry cooling under these "worst-case conditions"? If so, isn't it true that the unit would be at risk of tripping when the power is needed the most?

10. In A2 of your rebuttal testimony you state "The document [North Anna FEIS] goes on to state that "Dominion's combination wet and dry cooling system would have an energy efficiency penalty of 1.7 to 4 percent." (Exhibit JTI000050). The maximum efficiency penalty identified for North Anna 3, presumably when operating with 100% dry cooling, is 4 percent." In megawatts, what is a 4% efficiency penalty for a 1,560 MW ESBWR at North Anna 3? [62.4 MW]

[3] SNC will file a Motion to Supplement Exhibit in which it moves to supplement Joint Intervenors' Exhibit JTI000050 with pages 8-4 to 8-5 from the Final Environmental Impact Statement of the North Anna Early Site Permit and pages 2-173 to 2-174 and 2-193 to 2-194 of the North Anna Unit 3 Combined License Application. In the alternative, SNC asks to submit these pages as a new SNC exhibit solely for the purposes of cross examination of Mr. Powers. SNC has attached these pages for the Board's convenience.

11. Based on the statement in Exhibit JTI000050, isn't it true that only that the 4% performance penalty you hypothesize for the dry-cooling only mode would provide for the dissipation of only 1/3 of the heat load from North Anna 3?

12. Isn't it true that the dry cooling system proposed for North Anna 3 would also have a station service requirement?

13. Please see page 8-4 of the FEIS for the North Anna ESP (Section 8.2.3)(attached hereto). Isn't it true that a dry cooling system was analyzed as an alternative to the cooling system proposed by Dominion? Isn't it also true that Dominion estimated that the power needed to operate the dry cooling towers would 8.5 to 11 percent of the plant power output (or approximately 150 MW)?

14. Please see page 3-12 of the FEIS for the North Anna ESP (JTI000050). Isn't also true that the FEIS concluded that a dry only cooling system would result in 12% efficiency penalty in addition to the station service requirements of a dry cooling system?

B. Dry Cooling Related to North Anna 4

- Understand the basis for Mr. Powers' position that dry cooling is feasible for a nuclear plant based on the ESP for North Anna 4

1. In A6 of your rebuttal testimony, you state: "The GE-ESBWR reactor is larger than the AP1000, 1,560 MW net versus 1,117 MW net, and GE can provide a 100% air-cooled version of the GE-ESBWR nuclear plant. . . . A condition of the NRC Early Site Permit for North Anna 3 and 4 is that North Anna 4, if built, will be 100% dry cooled at all times (Exhibit JTI000052). It is not credible that GE can design and build much larger nuclear plants using 100% dry cooling and Westinghouse can not apply air cooling on the AP1000."

   Isn't it true that the North Anna 3 and 4 ESP is based on the Plant Parameter Envelope (PPE) approach? Doesn't this mean that Dominion did not name a technology in its ESP application for either North Anna 3 or 4 and, therefore, the ESP is not based on a specific technology (i.e., ESBWR)?

2. Isn't it also true that Dominion has not filed a Combined License Application for North Anna 4? Doesn't this mean that Dominion has not formally named a technology or identified a design for the North Anna 4 turbine or cooling system?

3. Isn't it true that the ESBWR has not yet been certified by the NRC?

4. Please see page 2-193 to 2-194 of the FSAR for the North Anna 3 COLA (attached hereto), which read: "There are times of the year when the combination wet and dry cooling towers used for normal plant cooling could function in a completely dry mode, particularly during cold weather. . . . However, these conditions are expected to persist for relatively short durations and are not representative of transport conditions over longer time scales." Doesn't the information in the North Anna FEIS regarding the conditions under which the dry cooling system could operate by itself suggest that the dry cooling would not allow the ESBWR to operate at full power except for very limited periods of cold weather?

C. Comparability of GE's ESBWR Turbine

- Understand the basis for Mr. Powers' assertion that the GE ESBWR turbine proves that the AP1000 can use a high backpressure turbine

1. In A6 of your rebuttal testimony, you challenge Mr. Cuchens' statement that there is not a "turbine manufacturer that offers a triple-exhaust turbine capable of handling the steam flows that would be associated with the current AP1000 steam cycle if the reactor used dry cooling[.]"

   You state, "The GE_ESBWR steam turbine is a triple-exhaust turbine, just like the AP1000 steam turbine (Exhibit JTI000051). The GE-ESBWR reactor has been proposed by Dominion Nuclear for the North Anna 3 plant in Virginia. The GE-ESBWR reactor is larger than the AP1000, 1,560 MW net versus, 1,154 MW net, and GE can provide a 100% air cooled version of the GE-ESBWR nuclear plant. . . . A condition of the NRC Early Site Permit for North Anna 3 and 4 is that North Anna 4, if built, will be 100% dry cooled at all times (Exhibit JTI000052). It is not credible that GE can design and build much larger nuclear plants using 100% dry cooling and Westinghouse can not apply air cooling on the AP1000."

   a. Given that Dominion has not filed a Combined License Application for North Anna 4 in which it names the GE ESBWR as the technology, what is the basis for your opinion that "GE can provide a 100% air cooled version of the GE-ESBWR nuclear plant"?

   b. The FSAR for North Anna 3 does not propose "a 100% air cooled version of the GE-ESBWR nuclear plant" does it?

c. Isn't it true that there is not a nuclear power plant operating today similar to the AP1000 that is 100% dry cooled?

d. Isn't it true that the NRC has not received a license application for a nuclear power plant that is 100% dry cooled?

Respectfully submitted,

(Original signed by M. Stanford Blanton)

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CO-COUNSEL FOR SOUTHERN NUCLEAR OPERATING COMPANY

Dated this 2nd day of March, 2009.

ATTACHMENT TO

SOUTHERN NUCLEAR OPERATING COMPANY'S QUESTIONS FOR THE BOARD ON JOINT INTERVENORS' REBUTTAL TESTIMONY OF WILLIAM POWERS TO ENVIRONMENTAL CONTENTION 1.3

the combination wet and dry cooling tower system's expected smaller impact on the aquatic environment, the staff concludes that a combination wet and dry cooling system for Unit 3 would be preferable to a once-through cooling system.

~~8.2.2 Plant Cooling System: Unit 3 Wet Cooling System~~

~~Wet, mechanical and natural draft cooling towers transfer heat to the atmosphere through evaporation and conduction. Assuming all the heat transfer is through evaporation, a wet cooling design would consume more water than either the once-through design or the combination wet and dry cooling system proposed in the ER (Dominion 2006). The increased use of makeup water requirements for a wet cooling design would increase impingement and entrainment slightly over the proposed design.~~

~~The use of a wet cooling tower design versus the proposed combination wet and dry cooling system design for Unit 3 would increase water withdrawals from Lake Anna. The impact of the increased evaporative losses of a wet cooling tower design would be particularly noticeable during drought years. The results of water balance calculations suggest that the use of a wet cooling tower system for the 2001 through 2003 critical water period would have resulted in an additional 1.0 m (3.4 ft) drawdown of the lake in September 2002. In comparison, use of the proposed combination wet and dry cooling system would only have drawn the lake down by an additional 0.5 m (1.6 ft). The use of a wet cooling tower design would also prolong the duration of low-flow conditions downstream of the dam. The staff concludes that based on the expected smaller impact on the lake level and downstream flows, a combination wet and dry cooling system design for Unit 3 is preferable to a wet cooling tower design.~~

8.2.3 Plant Cooling System: Unit 3 Dry Cooling System

The use of a dry cooling design versus the proposed combination wet and dry cooling system design for Unit 3 would largely eliminate the impacts on aquatic biota in Lake Anna and the North Anna River downstream. The lake would not be heated by rejected heat from Unit 3, and there would be no additional consumptive water use.

A dry cooling tower designed to dissipate heat may reduce water-related impacts of operating Unit 3, but it also has some disadvantages. In particular, dry cooling systems are more expensive to build and are not as efficient as wet cooling systems. To achieve the necessary cooling, dry systems move a large amount of air through a heat exchanger, and the fans that force the air through the heat exchanger use a significant amount of power. Dominion estimates that the power needed to operate dry cooling towers would be 8.5 to 11 percent of the plant power output (Dominion 2006). The power needed to operate a dry tower for Unit 3 would be about 150 MW(e). This power demand reduces the net power output of the plant. The power needed for operating the combination wet and dry cooling system would be 1.7 to 4 percent. This, in turn, would increase the environmental impacts of fuel use and spent fuel

transport and storage. The fans and the large volume of air required for cooling also result in elevated noise levels. The dry cooling tower would also occupy more land than a once-through or wet tower cooling system.

~~The staff concludes that based on its analysis that Lake Anna could support Unit 3 using a combination wet and dry cooling system and given the environmental impact of increased use of resources needed by using a less efficient dry cooling system, a combination wet and dry cooling system is preferable to a dry cooling system for Unit 3.~~

8.3 Alternative Sites, Region of Interest, and Selection and Evaluation Process

NRC regulations require that the ER submitted in conjunction with an application for an ESP include an evaluation of alternative sites to determine whether there is an "obviously superior" alternative to the site proposed (10 CFR 52.17(a)(2)). An ESP applicant has the option to provide as much or as little information regarding the impacts of constructing and operating the proposed unit(s); however, the ER must address all environmental impacts of construction and operation necessary to make the comparison and determination regarding alternative sites. For the North Anna ESP review, the staff concluded that it had sufficient information on the relevant environmental issues to determine that none of the alternative sites was environmentally preferable to the proposed site. This is the minimum determination that must be made; otherwise the staff would recommend that the ESP request be denied. At the CP/COL stage of the process, the applicant will be required to provide sufficient information to resolve environmental issues not considered in the ESP proceeding as well as any new and significant information regarding issues that were resolved in the ESP proceeding.

In the discussion that follows, based on the approach used by the staff to estimate environmental impacts and on the staff's expert judgment, the staff believes that the impact levels that were assigned for the resource areas are defined sufficiently to be used for the purposes of a comparison between the proposed and the alternative sites. While these impact determinations are estimates, the staff relied on higher level information (i.e., reconnaissance-level information) was informed by the provisions of state and local regulations, by extensive institutional experience with the licensing of existing reactors (including analyses developed during recent license renewal reviews, such as those in the associated License Renewal GEIS), and by the judgment and professional experience of individual staff reviewers with respect to their areas of expertise. The staff applied the same methodology to the North Anna ESP site and the alternative sites review. Therefore, although the comparisons in the alternatives analysis described in the following sections are based on reconnaissance-level information, the staff considers them to be informed comparisons, and has concluded that they are sufficient for making the determination concerning the existence of an obviously superior site. For certain environmental issues, there may not have been sufficient site-specific generated information to

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North Anna 3 Combined License Application

Part 2: Final Safety Analysis Report

Revision 1
December 2008

The second paragraph of this SSAR section is supplemented as follows with information to show that flood protection measures are not required for the Unit 3 site.

NAPS COL 2.0-21-A

A local PMP drainage analysis was performed assuming, conservatively, that all underground storm drains and culverts are clogged. Details of the local PMP analysis and the resulting flood levels are presented in Section 2.4.2.3. The maximum PMP water level in the power block area is predicted to be at Elevation 87.5 m (287.2 ft) msl, which is 0.9 m (2.8 ft) below Elevation 88.4 m (290.0 ft) msl, the design plant grade elevation for safety-related facilities. Thus, no Unit 3 safety-related structure is subject to static or dynamic loading due to flooding as a result of design basis flood events or local PMP events. No flood protection measures are required for the Unit 3 site. Additionally, no technical specifications or emergency procedures are required to implement flood protection activities.

2.4.11 Low Water Considerations

NAPS COL 2.0-22-A

The information needed to address DCD COL Item 2.0-22-A is included in SSAR Section 2.4.11, which is incorporated by reference with the following supplements.

2.4.11.5 Plant Requirements

This SSAR section is supplemented as follows with information on the operational modes for the circulating water cooling system (CIRC) with respect to low water conditions.

NAPS ESP COL 2.4-10

The Unit 3 CIRC operates in either of two operating modes:

- Energy Conservation (EC)—The dry cooling array is bypassed and cooling water is circulated directly to the hybrid tower with a provision for cold weather bypass.
- Maximum Water Conservation (MWC)—The dry cooling tower and hybrid cooling tower operate in series with a provision for cold weather bypass.

Generally, when the North Anna Reservoir water level is at or above Elevation 76.2 m (250 ft) msl at the dam, and adequate reservoir discharge is being maintained, the EC mode is used. However, if the reservoir water level falls below Elevation 76.2 m (250 ft) msl and is not

restored within a reasonable period of time, the MWC mode is used. While in the MWC mode, the dry tower fans may be turned off to provide additional electrical output during hours of peak demand.

As discussed in Section 2.4.14, Unit 3 will be shut down when the water level in Lake Anna drops below Elevation 73.762 m (242.0 ft) msl.

2.4.11.6 Heat Sink Dependability Requirements

This SSAR section is supplemented as follows with information on the effect of low water conditions on the UHS.

NAPS COL 2.0-22-A

The Unit 3 UHS is described in DCD Section 9.2.5. Lake Anna is not relied on as a safety-related source of water withdrawals for emergency cooling.

2.4.12 Groundwater

NAPS COL 2.0-23-A

The information needed to address DCD COL Item 2.0-23-A is included in SSAR Section 2.4.12, which is incorporated by reference with the following supplements and variances.

2.4.12.1.2 Local Hydrogeology

The third paragraph of this SSAR section is supplemented as follows based on additional borings.

NAPS COL 2.0-23-A

Borings drilled as part of the ESP subsurface investigation program (SSAR Appendix 2.5.4B) and the Unit 3 subsurface investigation program (Appendix 2.5.4AA) penetrated saprolite to depths ranging from about 1.52 m (5 ft) to 24.99 m (82 ft). The saprolite penetrated by these borings is classified as a micaceous, silty-clayey, fine to coarse sand or sandy silt, with occasional (less than 10 percent) to some (between 10 and 50 percent) rock fragments.

The fifth paragraph of this SSAR section is supplemented as follows with information on additional groundwater level measurements data.

Groundwater at the Unit 3 site occurs in unconfined conditions in both the saprolite and underlying bedrock. The results of previous investigations at the site indicate that a hydrologic connection exists between the saprolite and the bedrock. (SSAR Reference 45) This condition has been confirmed as part of the ESP and Unit 3 subsurface investigation programs (SSAR Appendix 2.5.4B and Appendix 2.5.4AA) by the

Conservatively ignoring hydrodynamic dispersion, this equation can be restated as:

$$F_{GW} = n_e v C_{GW} A \quad (2.4.13\text{-}21)$$

where: F_{GW} = total radionuclide flux in groundwater; C_{GW} = radionuclide concentration in the groundwater; A = cross-sectional area normal to the direction of groundwater flow; and the other terms are as defined previously. The cross-sectional area of the plume is conservatively assumed to extend over the entire saturated thickness of the unconfined aquifer and the entire length of the radwaste building. The saturated thickness is taken to extend from the water table to the top of the Zone III-IV, slightly weathered to moderately weathered rock. In the vicinity of the radwaste building, Figure 2.4-207 through Figure 2.4-214 indicate a water table elevation of about 82.30 m (270 ft) msl, while Table 2.5-208 indicates the Zone III-IV top of rock elevation to be 74.37 m (244 ft) msl. These values result in a saturated thickness of about 7.92 m (26 ft). DCD Figure 1.2-25 indicates the radwaste building to be 65 m (213 ft) in length normal to the direction of groundwater flow. The assumption that the plume extends the entire length of the building is conservative because the characteristic dimensions of the sources from which a release is postulated are a relatively small fraction of the 65 m length. The cross-sectional area is then the product of 26 ft and 213 ft, or 5540 ft^2.

The total radionuclide flux in the surface water of Lake Anna, induced by pumping from the water-supply intake for Unit 3, is calculated as:

$$F_{SW} = Q C_{SW} \quad (2.4.13\text{-}22)$$

where: F_{SW} = total radionuclide flux in surface water; Q = surface water flow rate; and C_{SW} = radionuclide concentration in the surface water. This approach for calculating the radionuclide flux in surface water is justified, considering that any radionuclides released to the groundwater would likely discharge to the Unit 3 intake forebay area, which has been isolated from the rest of the lake and from which the water intake for Unit 3 will obtain water. The surface water flow is determined by the water supply requirements for Unit 3, which total 1.42 m^3/s (50 cfs) when running in the energy conservation mode and 0.96 m^3/s (34 cfs) in the maximum water conservation mode. There are times of the year when the combination wet and dry cooling towers used for normal plant cooling

could function in a completely dry mode, particularly during cold weather. Under these conditions, no make-up water is required for the normal plant circulating water system, which comprises most of the total demand. However, these conditions are expected to persist for relatively short durations and are not representative of transport conditions over longer time scales.

Because the total radionuclide flux must be conserved, radionuclide concentrations in the surface water are estimated by equating Equation 2.4.13-21 and Equation 2.4.13-22 and solving for C_{SW}:

$$C_{SW} = \frac{n_e v A}{Q} C_{GW} \qquad (2.4.13\text{-}23)$$

where the quantity $n_e v A/Q$ defines the dilution factor. Assuming for conservatism that the plant is operating in the maximum water conservation mode, the dilution factor is calculated using the previously defined values for n_e, v, A, and Q to be:

$$\frac{n_e v A}{Q} = \frac{0.25 \times 0.54 / 86,400 \times 5540}{34} = 2.56 \times 10^{-4}$$

This dilution factor is applied to the H-3, Sr-90, Y-90, and Pu-239 concentrations reported in Table 2.4-209 to account for dilution in addition to radioactive decay and adsorption. Table 2.4-210 summarizes the resulting concentrations, which represent the concentrations in the surface water withdrawn by the water-supply intake for Unit 3. It is seen that the concentrations of each of these radionuclides are below their respective ECLs.

Most of the 0.96 m^3/s (34 cfs) withdrawn from Lake Anna is used as make-up water to replenish evaporative losses from cooling towers that are part of closed-cycle cooling systems. As discussed in Section 2.4.13.1.2, the non-volatile radionuclides concentrate in the circulating water by a factor of about four, prior to being discharged to the discharge canal. Even then, concentrations are well below ECLs. It should also be noted that radionuclides released in cooling tower blowdown discharge would mix with circulating water discharge from Units 1 and 2 (up to 120.2 m^3/s (4246 cfs)) as long as these units are operating. If Units 1 and 2 are shutdown, a minimum of 15.04 m^3/s (531 cfs) will continue to be circulated to provide adequate dilution for normal plant releases. These flows from Units 1 and 2 would further

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Pursuant to 10 C.F.R. § 2.1207 (a)(3)(iii)

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)	)	**March 2, 2009**

SOUTHERN NUCLEAR OPERATING COMPANY'S
QUESTIONS FOR THE BOARD ON JOINT INTERVENORS'
PRE-FILED REBUTTAL TESTIMONY OF DR. SHAWN YOUNG
CONCERNING CONTENTION 6.0

Pursuant to the Atomic Safety and Licensing Board's ("ASLB" or "Board") Orders of October 24, 2008 and December 15, 2008,[1] and in accordance with 10 C.F.R. § 2.1207(a)(3), Southern Nuclear Operating Company ("SNC") hereby submits proposed questions for the Board to consider propounding to Dr. Shawn Young at the Hearing regarding Environmental Contention 6.0 ("EC 6.0"). These questions are based on Dr. Young's rebuttal testimony originally filed on February 6, 2009.

Following the guidelines for submittals of requests for cross-examination by the parties, this submittal provides a description of the issues, the objective of the line of questioning and the proposed line of questions that will lead to the objective of the questioning. *See* 10 C.F.R. § 2.1204(b)(i) – (iii).

[1] Memorandum and Order (Revised General Schedule) ("October 24 Order") and Memorandum and Order (Contested Evidentiary Hearing Administrative Matters) ("December 15 Order").

I. Description of the Issues

A. Dr. Young's Understanding of NEPA Requirements

II. Objectives

A. Dr. Young's Understanding of NEPA Requirements

1. Explore Dr. Young's understanding of NEPA requirements.

III. Proposed Line of Questions

A. Dr. Young's Understanding of NEPA Requirements

1. Explore Dr. Young's understanding of NEPA requirements.

   a. NEPA does not require that 288 new fish and mussel surveys be performed at the location of every snag removal location, does it?

   b. Yet your testimony at A.10 demands this, doesn't it?

Respectfully submitted,

(Original signed by M. Stanford Blanton)

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Dated this 2nd day of March, 2009.

Confidential Pending Release by the Licensing Board
Pursuant to 10 C.F.R. § 2.1207 (a)(3)(iii)

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)	)	**March 2, 2009**

SOUTHERN NUCLEAR OPERATING COMPANY'S
QUESTIONS FOR THE BOARD ON JOINT INTERVENORS'
PRE-FILED REBUTTAL TESTIMONY OF DR. DONALD HAYES
CONCERNING CONTENTION 6.0

Pursuant to the Atomic Safety and Licensing Board's ("ASLB" or "Board") Orders of October 24, 2008 and December 15, 2008,[1] and in accordance with 10 C.F.R. § 2.1207(a)(3), Southern Nuclear Operating Company ("SNC") hereby submits proposed questions for the Board to consider propounding to Dr. Donald Hayes at the Hearing regarding Environmental Contention 6.0 ("EC 6.0"). These questions are based on Dr. Hayes' rebuttal testimony originally filed on February 6, 2009.

Following the guidelines for submittals of requests for cross-examination by the parties, this submittal provides a description of the issues, the objective of the line of questioning and the proposed line of questions that will lead to the objective of the questioning. *See* 10 C.F.R. § 2.1204(b)(i) – (iii).

[1] Memorandum and Order (Revised General Schedule) ("October 24 Order") and Memorandum and Order (Contested Evidentiary Hearing Administrative Matters) ("December 15 Order").

I. Description of the Issues

A. Dr. Hayes' Understanding of Potential Barging and Impacts Associated with Dredging

II. Objectives

A. Dr. Hayes' Understanding of Potential Barging and Impacts Associated with Dredging

1. Explore Dr. Hayes' knowledge of SNC's barging plans.

2. Understand Dr. Hayes' opinion regarding the River Survey submitted by SNC.

3. Demonstrate that Dr. Hayes' testimony is not intended to address biological impacts.

III. Proposed Line of Questions

A. Dr. Hayes' Understanding of Potential Barging and Impacts Associated with Dredging

1. Explore Dr. Hayes' knowledge of SNC's barging plans.

   a. You have no evidence that the construction of Vogtle Units 3 & 4 requires dredging, do you?

   b. While SNC's *preference* is to barge components, you do not contend this make barging a *necessity*, do you?

2. Understand Dr. Hayes' opinion regarding the River Survey submitted by SNC.

   a. Dredging at only 8 locations over 110 miles of river and removing a total of only 36,500 cubic yards of material to deepen the channel by 2 feet is not a substantial dredging project, is it?

   b. In light of the River Survey, do you maintain that 4 million cubic yards of material will need to be dredged?

   c. As you point out, the flow in the Savannah River at the time the River Survey was reported as 3700 cfs. That flow was measured at the Augusta gauge, approximately 60 miles downstream from the Thurmond Dam, wasn't it?

   d. The release from Thurmond Dam was even less than 3700 cfs during the survey, wasn't it?

e. The Augusta guage is closer to the site, and more accurately reflects flow and water level at the site, than releases 60 miles upstream at Thurmond Dam, doesn't it?

3. Demonstrate that Dr. Hayes' testimony is not intended to address biological impacts.

a. Your testimony is not intended to address biological impacts, is it?

Respectfully submitted,

(Original signed by M. Stanford Blanton)

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Dated this 2nd day of March, 2009.

March 2, 2009

G. Paul Bollwerk, III, Chair
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dr. James F. Jackson
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Nicholas G. Trikouros
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

In the Matter of
SOUTHERN NUCLEAR OPERATING CO.
(Early Site Permit for Vogtle ESP Site)
Docket No. 52-011-ESP

Dear Administrative Judges:

In accordance with the Licensing Board's Memorandum and Order (Revised General Schedule) (Nov. 13, 2008) (unpublished), please find enclosed the "NRC Staff Proposed Questions Regarding Rebuttal Testimony" (March 2, 2009).

Pursuant to 10 C.F.R. § 2.1207(a)(3)(i), the enclosed questions are being submitted only to the Board at this time. The Staff understands that, consistent with § 2.1207(a)(3), the questions will be confidential until propounded by the Board or until issuance of an initial decision, at which time they will be forwarded to the Secretary of the Commission for inclusion in the official record of this proceeding.

Respectfully submitted,

/signed (electronically) by/
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Dated at Rockville, Maryland
This 2nd day of March, 2009

Enclosure: NRC Staff Proposed Questions Regarding Rebuttal Testimony

March 2, 2009

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
SOUTHERN NUCLEAR OPERATING CO.	)	Docket No. 52-011-ESP
	)	
(Early Site Permit for Vogtle ESP Site)	)	

NRC STAFF PROPOSED QUESTIONS REGARDING REBUTTAL TESTIMONY

Pursuant to 10 C.F.R. § 2.1207(a)(3) and the Atomic and Safety Licensing Board's ("Board") Memorandum and Order (Revised General Schedule) (Nov. 13, 2008) (unpublished), the staff of the U.S. Nuclear Regulatory Commission ("Staff") hereby submits proposed questions for the Board to pose to the witnesses concerning prefiled rebuttal testimony.

Contention EC 1.2 Proposed Cross Examination Questions

The following questions address the testimony of the Joint Intervenors' witnesses with respect to evaluating the environmental impacts that are at issue in Contention EC 1.2.

Questions for Shawn P. Young

I. Impact Assessments

A. Sources and Data

In his rebuttal testimony,[1] Dr. Young criticizes some of the studies relied on by the Staff in its direct testimony. The Staff requests that the Board ask the following questions regarding the basis for Dr. Young's criticisms.

[1] Prefiled Rebuttal Testimony of Shawn P. Young Concerning Contention EC 1.2 (Feb. 6, 2009) ("Young EC 1.2 Rebuttal Testimony").

1. You state that "Marcy et al. is not an impact assessment, and therefore does not address conditions specific to plant Vogtle." Young EC 1.2 Rebuttal Testimony at A12. You further state that, "…it does not have the level of specificity necessary for an analysis of potential impacts of two addition [sic] Units at the Vogtle site." *Id.* Since you appear to assert earlier in your rebuttal testimony that M.H. Paller's opinion from Marcy et al. (Exhibit NRC000006) is that the SRS and VEGP sites have a "negative impact" on the Savannah River fisheries, why is your position that Marcy et al. does not contain information suitable for analyzing potential impacts of the proposed Vogtle units?

2. You state that Marcy et al. "does not have the level of specificity necessary for an analysis of potential impacts of two addition [sic] Units at the Vogtle site." Young EC 1.2 Rebuttal Testimony at A12. You appear to acknowledge that the Staff used other data in its assessment, including from the ANSP studies (whose sampling program is characterized by the ANSP as being "one of the most comprehensive ecological datasets available for any of the world's rivers," see Exhibit NRC000003 at v), which you acknowledge do "provide useful data." *Id.* at A11. If sources including what you term as "the most comprehensive source for information on the fish species of the Middle Savannah River and [an] invaluable resource" (*id.* at A12) are insufficient to enable reasonable impact determinations, aren't you really arguing that new site-specific studies would always be necessary to estimate impacts of a project such as the proposed Vogtle units?

5. You make several criticisms of the Staff's reliance on the ANSP studies (Exhibits NRC000002, NRC000003, NRC000004). Young EC 1.2 Rebuttal Testimony at A9. Please respond to the following questions.

5a. You state that the Staff relied on a single survey performed at least 10 miles distant from the Vogtle site. Young EC 1.2 Rebuttal Testimony at A9. Do you agree that the 2000 ANSP study at Table E-11 shows relative abundances of fish at four different stations? Exhibit NRC000002 at 239. Do you agree that Table C-4 of the 2000 ANSP study shows species of mussels collected at five different stations including station 2B, which is located at RM 149.8? *Id*. at 94. As the VEGP site is located between RM 150 and 152, would you not agree that the surveys performed at RM 149.8 occurred within 10 miles of the Vogtle site? And would you concur that surveys taken approximately 0.2 miles from the site are likely to be representative of conditions at the site?

5b. In A9, you also state that "the ANSP study provides only a snapshot of conditions in the fall of 2001 but tells us nothing about other seasons of the year." Young EC 1.2 Rebuttal Testimony. Do you agree that in the 2003 ANSP study, the title of Table B-3 is "Species of mussels collected during comprehensive surveys of the Savannah River, near the Savannah River Site, Georgia and South Carolina, from 1951 through 2001." Exhibit NRC000003 at 121. Do you also agree that the title of Table B-4 is "Species of mussels and stations collected during comprehensive surveys of the Savannah River near the Savannah River Site, Georgia and South Carolina from 1951 through 2001." *Id*. at 121. Do you agree that the data in this table is based on a 50-year period of time rather than "a snapshot of conditions in the fall of 2001"?

5c. Table E-13 of the 2001 ANSP study is entitled "Percentage of species in 1989 and 1993 comprehensive surveys and 1997 survey." Exhibit

NRC000002 at 248, 249. Do you agree that this data is based on a longer duration than just the year 2001, as stated in your rebuttal testimony? Young EC 1.2 Rebuttal Testimony at A9.

6. Is it your position that despite consideration of data from sources including Marcy et al. (what you describe as "the most comprehensive source for information on the fish species of the Middle Savannah River and [an] invaluable resource"; *id.* at A12), the ANSP studies, as well as impingement and entrainment sampling conducted by the applicant at Units 1&2, the analysis of impacts is not based on a full year of data? Young EC 1.2 Rebuttal Testimony at A10.

B. Analysis of Impacts

7. You state that the Staff only analyzed the "most abundant and common species" and that "in many instances we are more concerned with potential impacts on the uncommon and rare." Young EC 1.2 Rebuttal Testimony at A9. However, the Staff states that it analyzed "important species," including the robust redhorse and shortnose sturgeon. Are these "abundant and common" species? Aren't they "uncommon and rare"?

Questions for Barry W. Sulkin

I. Flows

8. In your rebuttal testimony,[2] you criticize the Staff, stating that it is "misleading to base all of the calculation in the FEIS on the Thurmond discharge and then switch to the Waynesboro gage in the testimony." Sulkin EC 1.2 Rebuttal Testimony at A6. Isn't it true, however, that the Staff's testimony first described why the

[2] Prefiled Rebuttal Testimony of Barry W. Sulkin Concerning Contention EC 1.2 (Feb. 6, 2009) ("Sulkin EC 1.2 Rebuttal Testimony").

Thurmond discharge was an appropriate value to use in the FEIS, then noted that the data from the Waynesboro gage supported this analysis? *See, e.g.,* "NRC Staff Rebuttal Testimony of Dr. Michael T. Masnik, Anne R. Kuntzleman, Rebekah H. Krieg, Dr. Christopher B. Cook, and Lance W. Vail Concerning Environmental Contention EC 1.2" at A37 (refiled Feb. 26, 2009).

9. In your rebuttal testimony you also claim that the Staff "wholly discount[ed] the possibility of flows lower than Drought Level 3." Sulkin EC 1.2 Rebuttal Testimony at A10. Didn't the Staff analyze flows at 2000 cfs and 3000 cfs? Aren't these flows lower than Drought Level 3 flows?

10. You acknowledge in your testimony that flow at the Vogtle site (at the Waynesboro gage) was significantly higher than the Thurmond discharge in 2008. Sulkin EC 1.2 Rebuttal Testimony at A11. Do you therefore agree that use of the Thurmond Dam releases results in a conservative estimate of the percentage of Savannah River flow that would be withdrawn and consumptively used by the existing and proposed units at the Vogtle site?

11. You state that "the Staff relies on the 5% threshold as long as it is not exceeded, but when withdrawal percentage is greater than 5% the Staff concludes that the result is unimportant." Sulkin EC 1.2 Rebuttal Testimony at A12. Doesn't the Staff testimony state that percentage of water withdrawn is only one of several factors considered in the Staff's impact determination?

12. You criticize the Staff's assertion that very low flows are expected to be temporary. Sulkin EC 1.2 Rebuttal Testimony at A12. Do you agree that the data records from the Waynesboro gage indicate that flows of 2000 cfs and 3000 cfs, the "very low flows" to which the Staff referred, have not been experienced at the Vogtle site even during the recent drought conditions?

Contention EC 1.3 Proposed Cross Examination Questions

The following questions address the testimony of the Joint Intervenors' witnesses with respect to evaluating the environmental impacts that are at issue in Contention EC 1.3.

Questions for William Powers

For contention EC 1.3, the Staff argues that because dry cooling was not determined to be environmentally preferable to the proposed closed-cycle wet cooling design, the Staff did not have to analyze cooling system design alternatives in greater detail in the FEIS. As part of its finding that a dry cooling system design was not environmentally preferable to the proposed wet cooling design, the Staff explained that there are several disadvantages to a dry cooling design. The following questions would be posed to establish Mr. Powers' agreement that, consistent with the Staff's position, there are in fact disadvantages of a dry cooling design when compared to the proposed wet cooling system.

1. Isn't it true that in your rebuttal testimony[3] you testified that there would be an average efficiency penalty of 1.5% from using a dry cooling system at Vogtle? Powers EC 1.3 Rebuttal Testimony at A2, A3.

2. Isn't it true that in your rebuttal testimony you testified that a dry cooling system would require about three times as much surface area as the proposed wet cooling design? Powers EC 1.3 Rebuttal Testimony at A5.

   2a. In A5 of your testimony, when responding to a statement in the NRC Staff's Direct Testimony, you state that "arguments against dry cooling at the Vogtle site are based on the presumption advanced by Mr. Cuchens that the dry cooling system would be spectacularly oversized[.]" Powers EC 1.3 Rebuttal

[3] Prefiled Rebuttal Testimony of William Powers Concerning Contention EC 1.3 (Feb. 6, 2009) ("Powers EC 1.3 Rebuttal Testimony").

Testimony at A5. Are you asserting that the NRC Staff relies on Mr. Cuchens testimony as the basis for any of its statements in its Direct Testimony? If so, what is the basis for your assertion?

3. Isn't it true that with respect to the energy penalty and land use, a dry cooling system has environmental disadvantages in comparison to the proposed wet cooling system?

Questions for Shawn P. Young

I. Impact Assessment on Extremely Sensitive Biological Resources

In his rebuttal testimony,[4] Dr. Young criticizes several aspects of the Staff and applicant's discussions of Extremely Sensitive Biological Resources and the impacts to these resources. The Staff requests that the Board ask the following questions regarding the basis for Dr. Young's criticisms.

1. You state that "just because an effective zone of passage may exist in the presence of Units 1 and 2, and Units 3 and 4, alone, is meaningless." Young EC 1.3 Testimony at A4. Didn't both the Staff and applicant describe other reasons why the impacts on the robust redhorse and shortnose sturgeon would be small, in addition to asserting that there would still be an effective zone of passage?[5]

2. You allege omissions in the Staff analysis of vulnerabilities of juvenile sturgeon and robust redhorse. Young EC 1.3 Testimony at A8. Specifically, you assert that following the embryo stage for these species there is a period of 30 days "of

[4] Prefiled Rebuttal Testimony of Shawn P. Young Concerning Contention EC 1.3 (Feb. 6, 2009) (hereinafter "Young EC 1.3 Rebuttal Testimony").

[5] See, e.g., "NRC Staff Testimony of Dr. Michael T. Masnik, Rebekah H. Krieg, Dr. Christopher B. Cook, and Lance W. Vail Concerning Environmental Contention EC 1.3" (refiled Feb. 26, 2009) at A21 to A23; "Testimony of Dr. Charles C. Coutant on Behalf of Southern Nuclear Operating Company Concerning Environmental Contention 1.3 (Jan. 9, 2009) at A8 to A16.

elevated risk" from entrainment or the thermal plume. *Id.* Isn't the risk to these juveniles encompassed by the potential impacts to the drift community already evaluated by the Staff's use of a uniform distribution assumption and asserted by the Staff to be small?

Contention EC 6.0 Cross Examination Questions

The following questions address the testimony of the Joint Intervenors' witnesses with respect to evaluating the environmental impacts that are at issue in Contention EC 6.0.

The Staff has argued that dredging of the Savannah River Federal navigation channel ("FNC") is not necessary for the issuance of the Early Site Permit or ultimate construction of any nuclear facility that might be built at the Vogtle site, nor is it currently the subject of a specific plan or permit application before the U.S. Army Corps of Engineers ("Corps"); thus, that possible activity does not have to be analyzed as a "connected action" under NEPA. For similar reasons, the Staff has explained that, given the absence of a pending plan or application, in the FEIS it provided only a qualitative analysis of the impacts of the possible dredging action.

The following questions to be posed to the Joint Intervenors' witnesses for Contention EC 6.0 (Donald F. Hayes and Shawn P. Young) concern the need for or status of plans for dredging of the FNC. The factual basis for an expert's opinion must be adequately stated and explained. *Duke Cogema Stone* & *Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-04, 61 NRC 71, 80-81 (2005) (internal citations omitted). The questions would be posed to establish that the Joint Intervenors have no basis to dispute the facts and assumptions underlying the Staff's analysis of potential dredging of the Federal navigation channel.

Questions for Donald F. Hayes

I. Dredging of the FNC Is Not Necessary for the ESP.

1. In response to Question 3 of your rebuttal testimony[6] you appear to assert that "dredging is inextricably linked to the granting of an Early Site Permit with Limited Work Authorization for the Vogtle ESP site[.]" Hayes EC 6.0 Rebuttal Testimony at A3. If so, other than plans to construct a new barge slip and heavy haul road as indicated in the ESP application, what is the basis for this assertion? Do you have any basis to disagree with the testimony of the applicant's witnesses that "construction of Vogtle 3 & 4 does not depend on delivery of the components by barge"? Prefiled Direct Testimony of Jeffrey Neubert, Benjamin Smith, and David Scott Concerning EC 6.0 at A9 (January 9, 2009) ("Neubert-Smith-Scott EC 6.0 Direct Testimony").

   1a. If not, why does construction of a barge slip and heavy haul road make dredging "necessary" rather than just a transportation method that Southern is considering?

2. You also state that dredging of the Savannah River Federal navigation channel will support the activities being authorized under the limited work authorization. Hayes EC 6.0 Rebuttal Testimony at A3. What is the basis for this assertion?

II. The Extent and Detail of the FEIS Review Was Appropriate

The Staff also argues that its review met applicable NEPA requirements by analyzing only information that was reasonably available to the Staff at the time the FEIS was prepared. The following questions are meant to challenge Mr. Hayes' assertions that the Staff could have provided a more in depth review of any possible project to dredge the FNC.

[6] Prefiled Rebuttal Testimony of Donald F. Hayes Concerning Contention EC 6.0 (Feb. 6, 2009) ("Hayes EC 6.0 Rebuttal Testimony").

1. You state that the project described in the FEIS includes "substantial dredging requirements." Hayes EC 6.0 Rebuttal Testimony at A2. Do you disagree with the testimony of Corps and Staff witnesses that no dredging project has been proposed and the scope of such a potential project has not yet been defined?
2. You state that Southern's testimony and exhibits do not include sufficient information to calculate an estimate of the amount of dredging required. Young EC 6.0 Rebuttal Testimony at A5. If you believe this is so, why do you believe that the Staff could have conducted a quantitative evaluation in the FEIS without details to describe such a project?
3. You appear to state that, although the river survey conducted by Southeastern Marine Surveying Company ("SMS") was performed during drought conditions, the river depth may decrease prior to the actual time of barging. Hayes EC 6.0 Rebuttal Testimony at A6. Assuming the possible barging timeframe of Spring 2012 described in the applicant's testimony (Neubert-Smith-Scott EC 6.0 Direct Testimony at A7), isn't it also possible that the river depth may increase during that time if the drought conditions are alleviated?
4. You state that not enough information is available regarding possible sediment disposal sites. Hayes EC 6.0 Rebuttal Testimony at 14. Do you therefore agree that conducting a quantitative analysis of impacts from sediment disposal is not feasible when potential sediment volume is unknown and no sediment disposal sites have been identified?
5. You suggest that impacts will increase "if major construction is necessary to restore these disposal sites prior to use" and "[i]f the volume of sediment is significantly more than Southern estimates." Hayes EC 6.0 Rebuttal Testimony at

A14. Don't these very uncertainties highlight why impacts could only be evaluated in the FEIS qualitatively?

6. You suggest that the sediment volume of any FNC dredging project could expand "to a much larger volume once approved." Hayes EC 6.0 Rebuttal Testimony at A16. Do you disagree that any FNC dredging project would need to be authorized by the Corps (whether undertaken by the Corps itself or by issuance of a permit to an applicant)?

   6a. Can a dredging project be expanded beyond that authorized by the Corps without prior Corps review and approval?

   6b. If, after Corps authorization of a FNC dredging project, the project were to be expanded, do you agree that such expansion would be subject to environmental review by the Corps?

7. You state that a "sediment barge [used to transport dredged materials] will need to dock near the disposal facility to be pumped out or have the sediment removed mechanically." Hayes EC 6.0 Rebuttal Testimony at A16. You suggest that additional dredging may be required at the disposal facility dock, adding to the possible impacts of any FNC dredging project. *Id.* Without knowing the specific disposal facility that might be used, do you have any reason to believe such dredging is necessary or would occur?

Questions for Dr. Shawn P. Young

Like Mr. Hayes, Dr. Young in his testimony responds to questions concerning impacts to "the stretch of river to be dredged for construction of Units 3 and 4." Young EC 6.0 Rebuttal Testimony at A7. As with the questions proposed to be asked of Mr. Hayes, the questions below seek to establish that the Joint Intervenors have no basis to dispute the facts and assumptions underlying the Staff's analysis of potential Federal navigation channel dredging.

I. The Extent and Detail of the FEIS Review Was Appropriate

1. In your rebuttal testimony[7] you state that the impacts of dredging of the Savannah River Federal Navigation channel are "more likely to be" significant rather than moderate. Young EC 6.0 Rebuttal Testimony at A1. Dr. Hayes states that "moderate impacts could well be significant." Hayes EC 6.0 Rebuttal Testimony at A8. Doesn't the definition of MODERATE impacts used by the Staff in the FEIS already thereby acknowledge the possibility of impacts that "are sufficient to alter noticeably, but not to destabilize, important aspects of the resource"? Exhibit NRC000001 at 1-4 and 7-20.

2. In response to Q10, you state that the studies cited so far are "not sufficient" and that "more studies are necessary." Young EC 6.0 Rebuttal Testimony at A10. Doesn't the scope of a potential dredging project have to be defined before studies of such a project's impacts can be meaningfully assessed?

Respectfully submitted,

/signed (electronically) by/

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Dated at Rockville, Maryland
this 2nd day of March, 2009

[7] Prefiled Rebuttal Testimony of Shawn P. Young Concerning Contention EC 6.0 (Feb. 6, 2009) ("Young EC 6.0 Rebuttal Testimony").

UNITED STATES OF AMERICA
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ATOMIC SAFETY AND LICENSING BOARD PANEL

Before the Licensing Board:

G. Paul Bollwerk, III, Chairman
Nicholas G. Trikouros
Dr. James Jackson

In the Matter of	Docket No. 52-011-ESP
SOUTHERN NUCLEAR OPERATING CO.	ASLBP No. 07-850-01-ESP-BD01
(Early Site Permit for Vogtle ESP Site)	

JOINT INTERVENORS' PROPOSED CROSS-EXAMINATION REBUTTAL QUESTIONS FOR CONTENTION EC 1.3

EC 1.3 QUESTIONS FOR SNC WITNESSES

Cross-Examination Questions for Mr. James W. Cuchens

(1) Mr. Cuchens, in answer 5 of your prefiled rebuttal testimony, you state, "Mr. Powers contends that dry cooling is a viable option for Vogtle Units 3 and 4 based on several erroneous premises." One premise your offer is that "Mr. Powers claims that the climate at the Vogtle site does not impact the effectiveness of a dry cooling system." Yet, in your answer, you never explain why Mr. Powers' assertions were incorrect. Can you please explain?

(2) Mr. Cuchens, in answer 9 of your prefiled rebuttal testimony, you assert that the Midlothian, Wyodak, and Matimba power plants are not "comparable examples of the dry cooling facilities that would be required for the capacity of the Vogtle units, which are 1,117 MW each." However, isn't it true that the proposed dry cooling system at

North Anna 4 is comparable to a two unit AP1000 power plant, such as Vogtle? Powers Rebuttal Testimony at A6, Exhibit JTI000051.

(3) Mr. Cuchens, will a dry cooled system outperform the proposed wet cooled system at the Vogtle 3 and 4 sites when the temperature is below 60° F?

(4) Mr. Cuchens, in answer 19 of your prefiled rebuttal testimony, you state that "any realistic ACC design would not be able to duplicate the performance of a wet cooling system and would incur exorbitant cost increases." Does this mean that the ACC design is not feasible at Vogtle Units 3 and 4?

(5) Mr. Cuchens, in answer 18 of your prefiled rebuttal testimony, you state, "an ACC is, in a sense, thermodynamically simpler because it involves no evaporative heat transfer, but I would have a hard time saying it is a simpler system than a wet system." Please explain your basis for reaching this conclusion.

Cross-Examination Questions for Mr. Charles R. Pierce

(1) Mr. Pierce, in answer 10 of your prefiled rebuttal testimony, you assert that a change to the turbine would require a re-evaluation of the final site safety analysis. Please detail the projected expenses related to this re-evaluation.

EC 1.3 QUESTIONS FOR NRC STAFF WITNESSES

Cross-Examination Questions for Mr. Lance Vail

(1) Mr. Vail, in answer 4 of your prefiled rebuttal testimony, you state, "The Staff clearly states in the FEIS and its Direct Testimony that dry cooling would eliminate hydrological impacts and aquatic ecology impacts; however, these are not the only considerations."

(a) What are the other considerations, in addition to financial concerns, that must be taken into account in comparing the wet and dry cooling systems?

(b) Has the Staff conducted an in-depth review of these other considerations, in addition to hydrological and aquatic ecology impacts?

(2) Mr. Vail, in answer 5 of your prefiled rebuttal testimony, you state that you cannot evaluate certain aspects of Mr. Powers' criticism of the EPA §316(b) rulemaking.

(a) Can you comment upon his statement that "the fact that the EPA does not require air cooling as BTA does not mean that air cooling is not preferable in specific cases."?

(b) Can you comment upon his statement that "state of the art in cooling technology has changed since the EPA published its cooling water intake regulations in 2001."?

(3) Mr. Vail, to the best of your knowledge, do the requirements of ESRP 9.4.1. differ in any manner from the requirements of Regulatory Guide 4.2? That is, by complying with the requirements set out for the staff under ESRP 9.4.1, would you also be in compliance with Regulatory Guide 4.2?

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JOINT INTERVENORS' PROPOSED CROSS-EXAMINATION REBUTTAL QUESTIONS FOR CONTENTION EC 1.2

EC 1.2 QUESTIONS FOR SNC WITNESSES

Cross-Examination Questions for Dr. Charles C. Coutant

(1) Dr. Coutant, in your answer 5 of your prefiled rebuttal testimony, you state that because the estuary is 120 miles from Plant Vogtle, the proposed plant's intake and discharge will not have impacts on the downriver estuary. Is it possible that the plant's intake and discharge may have cumulative impacts downriver? How can you assess this?

(2) Dr. Coutant, in answer 6 of your prefiled rebuttal testimony, you assert that the ANSP studies are adequate for initial evaluations of impacts, and that SNC's field studies provide additional detail.

(a) Did SNC collect survey data for an entire year?

(b) Did the SNC survey the Savannah River and existing intake over the range of flow conditions likely to occur during operation of Units 3 and 4?

(c) Were Savannah River flows during the 2008 field studies representative of flows in a year with normal precipitation?

(d) Is it possible that the prolonged and extreme drought conditions in the Savannah River Basin have impacted the species composition of the drift community, thereby rendering SNC'c field surveys unreliable indicators of entrainment and impingement potential of the proposed Units?

(e) Has SNC conducted field studies of impingement and entrainment during normal or wet periods?

(3) Dr. Coutant, in answer 7 of your prefiled rebuttal testimony, you claim that the causes of species decline on the Savannah River is not relevant to an evaluation under NEPA because the intake and discharge system will have little of no impact on any species.

(a) Is it possible to say with certainty that the existing and proposed intake and discharge system will have no direct impact on any species in decline?

(b) Assuming that the new Vogtle Units will have a small but not insignificant direct impact on declining species, what are the cumulative impacts of the new withdrawals and discharges in combination with other past, present, and likely future actions occurring in the Savannah River Basin?

(4) Dr. Coutant, in answer 14 of your prefiled rebuttal testimony, you state that entrainment does not increase as river flow drops.

(a) During the period of peak ichthyoplankton abundance in the spring, would entrainment be greater if river flow is low or if it is high?

(b) When the Drought Contingency Plan is in effect, does the Corps of Engineers increase the rate of discharge in the spring?

(c) During a drought, could extreme low flows occur at the same time that ichthyoplankton abundance is greatest?

Questions for Mr. Anthony Dodd and Mr. Matthew Montz

(1) Mr. Dodd and Mr. Montz, in answer 5 of your prefiled rebuttal testimony, you testified about the hydraulic zone of influence or HZI for the two existing Vogtle Units. What would be the size of the HZI for all four Vogtle Units during normal operation?

(2) Mr. Dodd and Mr. Montz, in answer 5 of your prefiled rebuttal testimony, you state that Plant Vogtle's discharge permit limit requires that cooling water discharge temperatures be no greater than 5º above ambient. How does SNC monitor its compliance with this permit requirement?

Cross-Examination Questions for Mr. Thomas Moorer

(3) Mr. Moorer, in answer 5 of your prefiled rebuttal testimony, you state that the FEIS analyzed the field data to establish the baseline and the impacts of proposed Units 3 and 4. How does this "baseline" analysis account for cumulative impacts of other water users in the Savannah River Basin?

(4) Mr. Moorer, in answer 5 of your prefiled rebuttal testimony, you claim that the proposed recirculating cooling system is the "undisputed Best Available Technology." Wouldn't dry cooling, which reduces entrainment and impingement to near zero, be even better than a recirculating system for minimizing impacts to aquatic species?

EC 1.2 QUESTIONS FOR NRC STAFF WITNESSES

(1) Mr. Vail, in answer 4 of your prefiled rebuttal testimony, you state that "the maximum monthly average withdrawal value of 104 cfs …would be an appropriate, although still

conservative, basis for evaluating the cumulative impacts analysis with respect to the ESP application." You also note in answer 4 that the maximum withdrawal for any specific day in 2006 was reported as 136 cfs.

(a) You state in answer 4 that "use of the 136 cfs value … however, is not an appropriate basis for a NEPA analysis, since such a withdrawal rate would occur only occasionally and would be for a short duration." What section of NEPA supports this conclusion? Does NEPA provide that withdrawal rates may be summarily dismissed from consideration merely because they occur infrequently or for short duration? Could high withdrawal rates, even if short in duration, have significant impacts?

(b) While NEPA does not call for a "worst-case" inquiry, it does require agencies to address reasonably foreseeable impacts. If the plant actually withdrew flows of 136 cfs in 2006, would this be a "reasonably foreseeable" withdrawal rate, or a speculative "worst-case" scenario?

(c) You note that, using the 136 cfs withdrawal rate, when flows are 6,691 cfs, the plant would withdraw 3.8 percent. What would the value be at a 3,800 cfs river flow? 3,000 cfs? 2,000 cfs? Are any of these values significant?

(2) Dr. Masnik and Ms. Krieg, in answer 6 of your prefiled rebuttal testimony, you state that the Staff's cumulative impacts analysis was based on many factors, including "the characteristics of the watercourse in the immediate vicinity of the intake location … [and] the results of the SRS studies of impingement and entrainment …"

(a) What is the cumulative impact of impingement and entrainment from the proposed new Units when added to the two existing Units *and* the SRS D-Area

Powerhouse withdrawals (which studies you rely upon in your cumulative impacts analysis)?

(b) What is the cumulative impact of impingement and entrainment from the proposed new Units when added to the two existing Units, the SRS D-Area Powerhouse withdrawals, *and* all other withdrawals in the surrounding watercourse?

(3) Dr. Masnik and Ms. Krieg, in answer 6 of your prefiled rebuttal testimony, you state that, when using the 104 cfs withdrawal rate, at river flows of 2000 cfs, 9.4% of the river will be withdrawn. You then state that, even at this value, the Staff's impact determinations remain unchanged.

(a) Nearly 10% of the river seems substantial. In fact, in the FEIS at 7-24, the Staff notes that "water withdrawal rates that approach ten percent, even in a riverine environment, may result in some adverse and detectable impact to some fish populations." How much of the river would have to be withdrawn before the Staff's impact determination must be reevaluated?

(b) How much of the river will be withdrawn when the plant operates at a 136 cfs withdrawal rate at river flows of 2000 cfs? Is that about enough to change the Staff's impact determination?

(c) You state that the Staff's impact determination remains unchanged, at least in part, because "very-low flows are expected to be temporary, on the order of days or weeks, rather than months." What is your basis for this conclusion? How long was the drought in Georgia, which began in the summer of 2008? Would the

Staff's impact determination change if these "very-low flows" lasted longer than a few weeks?

(4) Dr. Masnik and Ms. Krieg, in answer 6 of your prefiled rebuttal testimony, you state that "under very-low flow conditions, Southern could be directed by the State resource agencies to reduce power or cease power operations (actions which would reduce water withdrawals significantly) for reasons including increased impingement rates, or to protect aquatic biota during a critical spawning period for an important species when fish eggs and larvae would be present." Instead of relying on other agencies, in the event a permit is issued, should the NRC impose a condition requiring reduced power or cease power operations to protect these biota during very-low flows?

(5) Mr. Vail, in answer 8 of your prefiled rebuttal testimony, you state that there are several causes for fish population decline, including dredging. In your opinion, if dredging is a part of SNC's permit application, should the impacts of this dredging be considered?

(6) Mr. Vail, in answer 9 of your prefiled rebuttal testimony, you state that "the Staff used the ANSP studies to provide an overall indication of the SRS facilities and the existing VEGP Units 1 and 2 on the health of the Savannah River."

(a) What is the impact on the health of the Savannah River from the proposed new Units when added to the two existing Units and the SRS facilities?

(b) What is the impact on the health of the Savannah River from the proposed new Units when added to the two existing Units, the SRS facilities, and all other past, present, and reasonably foreseeable future water withdrawals?

(7) Dr. Masnik, in answer 11 of your prefiled rebuttal testimony, you state that the robust redhorse and shortnose sturgeon could be entrained by the intake structure, and

experience 100 percent mortality. Given the endangered status of these species, how many individual organisms must be taken before the impact will be deemed greater than SMALL?

(8) Dr. Masnik, in answer 16 of your prefiled rebuttal testimony, you state that "although lower flows would result in an increase in the hydraulic zone of influence, the increase would not extend all the way across the river, and also would be less likely to occur in the spring and early summer during the spawning season when flows in the river have been historically higher."

(a) Were there low flows in the river during the spring and early summer of 2008?

(b) Could an increase in the hydraulic zone of influence have an increased impact, even if it did not extend all the way across the river?

(9) Dr. Mansik, in answer 17 of your prefiled rebuttal testimony, you state that the Staff is "unaware of any species having been extirpated from the middle Savannah River for any reason, including very-low flow river rates …."

(a) How many endangered species live in the middle Savannah River? How do low flow rates affect these species?

(b) Could low flow rates be attributed to their endangered status?

(10) Mr. Vail, in answer 19 of your prefiled rebuttal testimony, you state that Drought Level 3 has never been exceeded.

(a) In the past year, what have been the flows at Thurmond Dam?

(b) In light of these flows, is it reasonable to assert that Drought Level 3 has never been exceeded?

(11) Mr. Vail, in answer 20 of your prefiled rebuttal testimony, you state that "tributaries and groundwater do contribute to the Savannah River between Thurmond Dam and VEGP site."

(a) Are there any withdrawals from the Savannah River between Thurmond Dam and the VEGP site?

(b) What is the cumulative impact of the proposed new units, when added to the two existing units and these other withdrawals?

(12) Mr. Vail, in answer 23 of your prefiled rebuttal testimony, you state that "the FEIS did calculate flow percentages consistently for the range of conditions that the Staff considered to be representative of likely flow conditions and likely operating conditions." You then state that the Staff does not believe that 2,000 cfs is a likely flow condition.

(a) Are you thus conceding that the Staff did not calculate flow percentages consistently for this flow rate?

(b) If not, does that affect the Staff's assertions throughout their direct and rebuttal testimony (see, e.g., rebuttal answers 6, 18 and 19) that the Staff did in fact consider "very low-flow" levels?

(13) Mr. Vail, in answer 24 of your prefiled rebuttal testimony, you state that "flows are likely to be higher at the VEGP site as a result of runoff between Thurmond Dam and the VEGP site and, therefore, withdrawals from the proposed Vogtle units would result in even smaller impacts than those analyzed for 3,800 cfs."

(a) Are there any withdrawals from the Savannah River between Thurmond Dam and the VEGP site?

(b) What is the cumulative impact of the proposed new units, when added to the two existing units and these other withdrawals?

(14) Mr. Vail, in answer 24 of your prefiled rebuttal testimony, you state that flow rates of 3,000 cfs and 2,000 cfs would be of short duration.

(a) What is your basis for this conclusion?

(b) In light of the recent drought, do these levels seem more likely?

(15) Ms. Krieg, in answer 33 of your prefiled rebuttal testimony, you state that "should low flow rates result in an unacceptable thermal impact or should the Applicant exceed its mixing zone requirements, Southern could be directed by the State resource agencies to reduce power or cease power operations." Instead of relying on other agencies, in the event a permit is issued, should the NRC impose a condition requiring reduced power or cease power operations to protect aquatic biota during low flows?

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ATOMIC SAFETY AND LICENSING BOARD PANEL

Before the Licensing Board:

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JOINT INTERVENORS' PROPOSED CROSS-EXAMINATION REBUTTAL QUESTIONS FOR CONTENTION EC 6.0

EC 6.0 QUESTIONS FOR SNC WITNESSES

Cross-Examination Questions for Dr. Charles C. Coutant

(1) Dr. Coutant, in answer 5 of your prefiled rebuttal testimony, you state that "since the information to narrow the range is not yet available, the only range would be from zero to maximum impacts" which would not be helpful to the decision-maker.

(a) However, if it is impossible to even specify a range, did the Staff just split the difference between the two extremes and settle on a "moderate" designation?

(b) Because they merely indicated what "could" be the degree of the impacts, wouldn't it be equally valid to say the impacts "could" be maximum, based on your statement?

(c) If information necessary to evaluate potential impacts of the project is not available, then how can the Board make a meaningful determination of its potential impacts?

(2) Dr. Coutant, in answer 6 of your prefiled rebuttal testimony, you continue to cite the Pee Dee River basin study regarding mussel populations. However, the more recent, more relevant study of the Savannah River mussels indicates the places where mussels do in fact live in the Savannah River.

(a) Why is the Pee Dee River study appropriate for estimating impacts on the Savannah River when the same group of researchers also conducted surveys on the Savannah River?

(b) Isn't is misleading to rely on the Pee Dee River study while failing to even mention the Savannah River study?

(c) Was the Pee Dee River study published in a peer reviewed journal?

(3) Dr. Coutant, in answer 7 of your prefiled rebuttal testimony, you indicate that there would be no dredging attributable to Vogtle in the estuary, but you then conclude that this means there were would be no impacts extended to the estuary. Couldn't there be impacts on the estuary from upstream dredging even if no dredging were required in the estuary?

(4) Dr. Coutant, in answer 8 of your prefiled rebuttal testimony, you state that the estimated scope of the dredging project is geographically limited, making the impacts on the Savannah River ecosystem small.

(a) Isn't this conclusion contradictory to your statement in answer 5 of your prefiled direct testimony that there is not enough information to narrow the estimated impacts into a range?

(b) Couldn't the impacts be significantly larger than you have anticipated if additional or deeper dredging were required due to lower flow levels than existed when the measuring was done?

(c) Couldn't the impacts be significantly larger than you have anticipated if the measuring techniques used were inadequate?

(5) Dr. Coutant, in answer 8 of your prefiled rebuttal testimony, you refer to Exhibit SNC000051 as your previous testimony, when in fact Exhibit SNC000051 is an unsworn analysis you authored.

(a) Was your analysis and report published in a peer reviewed journal?

(b) Are you qualified to offer an expert opinion on dredging, waste disposal, barging, etc., as you do in Exhibit SNC000051?

(c) Is it accepted scientific practice to base conclusions on a report such as SNC000051, as you do in your prefiled direct and rebuttal testimony?

(d) Would peer review and careful editing catch some of the deficiencies of SNC000051?

(6) Dr. Coutant, in answer 9 of your prefiled rebuttal testimony, you make the assumption that sediment will be loaded onto barges and used downstream where sand is needed or to dispose of the sand in existing disposal areas in the lower river.

(a) Is this method included as part of SNC's permit application?

(b) Did the NRC Staff analyze the environmental effects of this action in the EIS?

(c) Does SNC or the NRC Staff know the current conditions and capacities of the existing disposal areas?

EC 6.0 QUESTIONS FOR NRC STAFF WITNESSES

Cross-Examination Questions for Ms. Anne Kuntzleman

(1) Ms. Kuntzleman, in answer 4 of your prefiled rebuttal testimony, you indicate that important details about the potential dredging for construction of Units 3 and 4 were not available to the NRC Staff, including parameters such as existing depths, required maintenance depth, quantity of maintenance dredging, quantity of allowable overdepth dredging, material disposal methods, potentially affected habitats, fish migration patterns, spawning and nursery habitat, and presence of benthic macroinvertebrates. Kuntzleman Rebuttal Testimony at Answer 4.

(a) However, couldn't the NRC Staff have collected some of the missing information from published studies and surveys, SNC, or the Army Corps of Engineers to better predict the scope of planned dredging and its anticipated impacts?

(b) That the NRC Staff concluded that impacts could be moderate, despite lacking such important details, suggests that the Staff merely split the difference in a wide range of degrees of potential impacts. How accurately could the Staff predict the impacts given this lack of information?

(c) Isn't any analysis of impacts incomplete without knowledge of several impact-determining details?

(2) Ms. Kunztleman, in answer 5 of your prefiled rebuttal testimony, you refer to a NEPA analysis the Corps has not yet conducted. However, you fail to mention the NEPA process at the center of this dispute—that of the NRC.

(a) Does the recent MOU between the Corps and NRC require NRC to act as lead agency and assess dredging impacts in its NEPA analysis?

(b) Does NEPA or the MOU allow NRC to defer to the analysis of another agency which has not yet been conducted?

(3) Ms. Kuntzleman, in answer 5 of your prefiled rebuttal testimony, you mention that the permit issuance process may span several years. But, SNC has stated that it intends to begin its limited work authorization activities soon. Specifically, SNC intends to make barge deliveries in about 2 years. Neubert, Smith, and Scott, Prefiled Direct Testimony at Answer 7. How does this reduced time-frame affect your analysis? Given that these activities are reasonably foreseeable, does NEPA require an analysis of their impact now?

(4) Ms. Kuntzleman, in answer 5 of your prefiled rebuttal testimony, you state that the Staff was unable to conduct a comprehensive environmental analysis because (1) the project parameters were not available, and (2) the Corps had not developed a formal plan or received a formal request for the dredging project.

(a) Does NEPA require a comprehensive environmental analysis of connected actions?

(b) Does NEPA require a comprehensive environmental analysis of reasonably foreseeable actions, even if some forecasting and predictions are required?

(c) Now that SNC has provided some project parameters, what additional environmental analysis should be conducted?

(d) Had the Corps developed a formal plan or received a formal request for dredging the barge slip and intake channel? How could the Staff analyze the impacts from these actions without such plans or requests?

(5) Ms. Kuntzleman, in answer 6 of your prefiled rebuttal testimony, you maintain that “it was not appropriate for the Staff to provide quantitative evaluation of the Federal navigation channel dredging.”

(a) How was the Staff able to qualitatively analyze the potential impacts without assuming underlying quantitative estimates?

(b) Doesn’t qualitative valuation depend on quantitative predictions?

(c) Absent project details, isn’t qualitative analysis as speculative as quantitative analysis?

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March 27, 2009

Hon. G. Paul Bollwerk, III
Atomic Safety and Licensing Board
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Re: Southern Nuclear Operating Co., Inc. (ESP for Plant Vogtle)
Docket No. 52-011-ESP - ASLBP No. 07-850-01-ESP-BD01

Dear Judge Bollwerk:

In accordance with the Atomic Safety and Licensing Board's request, Southern Nuclear Operating Company's proposed cross-examination questions submitted during the Vogtle Early Site Permit Contested Hearing are attached to this letter.

Please do not hesitate to contact me if you have any questions

Sincerely,

/s/ M. Stanford Blanton

M. Stanford Blanton

MSB:dc
Attachment

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)	)	**March 27, 2009**

SOUTHERN NUCLEAR OPERATING COMPANY'S PROPOSED CROSS EXAMINATION QUESTIONS SUBMITTED DURING THE CONTESTED HEARING

Pursuant to the Atomic Safety and Licensing Board's ("ASLB" or "Board") request, and in accordance with 10 C.F.R. § 2.1207(b)(6), Southern Nuclear Operating Company ("SNC") hereby submits its proposed cross examination questions that were submitted to the Board during the Vogtle ESP contested hearing. These questions were directed at multiple witnesses and concern all three contentions.

SNC'S QUESTIONS REGARDING EC 1.2

- **Dr. Shawn Young**

  Dr. Young, you stated the FEIS doesn't reference reports assessing the shad, shortnose sturgeon or striped bass. Don't the lists in the FEIS beginning on pages 2-124 and 5-97, identifying the various reports referenced in the FEIS, include reports assessing these species? For example, page 5-104, "Final Recovery Plan for the Shortnose Sturgeon."

SNC'S QUESTIONS REGARDING EC 1.3

- **Mr. William Powers**

Have you evaluated the parasitic load of a wet system with natural draft cooling towers?

As I understand your testimony, you are saying that the makeup water pumps for a natural draft wet cooled system would reduce the difference in parasitic load between a wet and dry system. What are you saying the load of those makeup water pumps is? What evidence is that based on?

What is the largest turbine in your experience that has been converted from low backpressure to high backpressure? Is it true that conversion is accomplished by removal of two rows of last stage blades? What is the impact on turbine performance from this conversion?

Are you aware of any high backpressure turbines capable of handling the 8.4 million pounds per hour of steam produced by the AP1000?

Are you aware of a high backpressure turbine in use in a commercial nuclear power plant, regardless of the specific cooling system applied at the plant?

Please refer to SNC000096. Did you take the statement on page 2-193 and 2-194 that dry cooling could function in cold weather and for relatively short duration into account in reaching your conclusions regarding the relevance of the North Anna 3 system to your testimony?

If the North Anna 3 system can only be operated as a dry only system infrequently or during cold weather, how would that affect your opinion of the viability of a totally dry system at Plant Vogtle?

- **Dr. Shawn Young**

  As I understand your testimony, you say that SNC000097 demonstrates that fish populations are improving in the Savannah River. Haven't Vogtle Units 1 and 2 been operating during the period in which these species have recovered?

SNC'S QUESTIONS REGARDING EC 6.0

- **Mr. Benjamin B. Smith, Jr.**

  Mr. Smith, based on your experience with the Corps dredging on the inter-coastal waterway, do you think it would be consistent with the Corps' practice for them to only dredge a six foot channel on the middle Savannah River?

- **Dr. Shawn Young**

Please refer to page 5 of NRC000005. The second sentence under section 4.1 in the Results section states that mussels were "rare to absent" in shifting sands, does it not?

Can you tell from the description of site 15 (on page 8) whether the mussels were collected from the "shifting sand in the channel" or the "sandy mud on the banks"?

Considering the overall conclusion of the study that mussels are "rare to absent" in shifting sands, isn't it likely that the sandy mud on the banks of site 15 contain the mussels?

Isn't it true that snags are routinely relocated by natural high flow events?

Respectfully submitted,

(Original signed by M. Stanford Blanton)

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Dated this 27th day of March, 2009.

Vogtle ESP
March 18, 2009

NRC Staff Question for the Army Corps of Engineers

Mr. Bailey and Mr. Maciejewski
Could you please describe the difference between an authorized project where you are doing maintenance dredging and work on a new Federal dredging project?

Vogtle ESP
NRC Staff
March 19, 2009

Ms. Kuntzleman, when you spoke about mitigation measures that might be imposed if a permit application to dredge the Federal navigation channel is submitted to the Corps, were you referring to mitigation measures that would be imposed by the Corps in its permit, rather than by the NRC?

Ms. Kuntzleman, you spoke about the information that would be submitted with a permit application to the Corps to dredge the Federal navigation channel (or considered by the Corps in determining whether to undertake maintenance dredging). You mentioned that in assessing potential impacts to mussels from that dredging, there would need to be site-specific information. Would that necessarily be new studies if information about the relevant locations is available?

Ms. Kuntzleman and Ms. Krieg, you described a goal of ensuring that impacts to mussels from any potential dredging of the Federal navigation channel would be SMALL. Were you referring to that as a goal of the Corps or of the NRC?

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before the Licensing Board:

G. Paul Bollwerk, III, Chairman
Nicholas G. Trikouros
Dr. James Jackson

In the Matter of	Docket No. 52-011-ESP
SOUTHERN NUCLEAR OPERATING CO.	ASLBP No. 07-850-01-ESP-BD01
(Early Site Permit for Vogtle ESP Site)	

JOINT INTERVENORS' EVIDENTIARY HEARING PROPOSED CROSS-EXAMINATION QUESTIONS

A. Questions for SNC on EC1.2

1. (Moorer) Does the current discharge permit for Units 1 and 2 contain a mixing zone? If so, what are the dimensions of the mixing zone and where is it located? If not, then what is the basis for your testimony that the thermal discharges comply with Georgia water quality standards?

2. (Coutant) What are the host fish species for Savannah River mussel species in decline?

3. (Montz/Dodd) Did SNC identify any mussel host species during the 2008 impingement and entrainment studies?

4. (Coutant) Would you expect a multi-year drought to impact species diversity and abundance on the Savannah River? If so, would this affect the results of the 2008 impingement and entrainment studies?

5. (Montz/Dodd) The 2008 entrainment study found significant numbers of unidentified catostomid (sucker) larvae were entrained. You testified that it was not possible to determine if any of these were robust redhorse. Could genetic testing determine if any the unidentified suckers were robust redhorse?

B. Questions for NRC Staff on EC 1.2

1. (Vail) You testified that in 2006, withdrawal rates of 136 cfs occurred, at least once. Could this withdrawal, and other similar "rare" events, when viewed cumulatively, have long-lasting impacts on aquatic species? If so, aren't these appropriate to be considered in a cumulative impacts analysis?

C. Questions for Joint Intervernors on EC 1.2

1. (Sulkin) Did you calculate "worst case" scenario in your analysis?

2. (Sulkin) Does the "theoretical low flow" represent the "worst case" scenario?

3. (Sulkin) Why did you include the "theoretical low flow" in your analysis?

D. Questions for SNC on EC 1.3

1. (Cuchens) You testified that air-cooled units in South Africa are regularly knocked off line unpredictably by weather. What evidence do you have to support this assertion? Do you have any trip reports or other information documenting the alleged problems with these plants? If such events actually occur with regularity, why are air-cooled units so prevalent in South Africa, with additional units being planned?

2. (Cuchens) You testified that a 20-30 MW annual average output degradation with ACC would be expected. You also testified that the EPA estimated 8-10% energy penalty would be expected an annual average. 20-30 MW on a 1,117 MW turbine is 1.8-2.7%. Can you explain this apparently contradictory testimony?

3. (Moore/Cuchens) SNC000057 sets forth examples of natural draft cooling towers with air-cooled condensers. How many acres would such a system sized for the AP1000 require?

E. Questions for Powers-Cuchens EC 1.3 "Debate."

1. Mr. Cuchens, in your prefiled direct testimony, Al8, you describe abrupt daily fluctuations of the ACC to demonstrate its impracticality.

    a. Does the example you give of a hot Georgia day (98 degrees F), combined with a sudden breeze recirculating hot air, presume a standard turbine?

    b. Do you have any documentation supporting your statement that an ACC, assuming such ACC has properly designed wind skirts, if subject to a breeze, would experience such severe recirculation that the ACC steam condensation temperature would instantly rise

5º F?

c. If a high backpressure turbine is used, would that breeze cause the ACC to operate above its alarm set point, whether or not it had properly designed wind skirts?

d. You say, "it would be virtually impossible to control and/or modulate a large ACC system (with approximately 300 fans) to react to fluctuating weather influences without impacting unit performance." The 4000 MW Matimba plant in South Africa has far more than 300 fans (see JTI000037). Does your impossibility conclusion rest on current data or is it based on information on initial operating experience with the large South African air-cooled plants gathered during your trip to South Africa a decade ago?

2. Mr. Cuchens, you identify in SNCR000024 p. 3 that the steam turbine for the AP1000 consists of one high pressure (HP) turbine and three low pressure (LP) turbines. Isn't the steam turbine used with the GE-ESBWR the same design, one high pressure (HP) turbine and three low pressure (LP) turbines per JTI000051 ?

3. Mr. Cuchens, in A19 you state that ambient temperatures in the vicinity of Plant Vogtle have ranged from 105º to 112º F. Is this statement consistent with the ambient temperature range data for Augusta provided by SNC in SNC000037? Doesn't SNC000037 indicate a maximum 1-hour site temperature of 100º F?

4. Mr. Cuchens, SNC000024 p.22 shows a capital cost delta of $l90 million between a natural draft wet tower and a 35º F ITD ACC. Mr. Cuchens, does SNC have a current capital cost estimate for Vogtle 3 and 4? Using the capital cost estimate, can you estimate the incremental capital cost, in percent, imposed on the project if a 35º F ITD ACC is specified for the plant?

F. <u>Questions for SNC on EC 6.0</u>

1. Would there be any track repair or other construction required to ship heavy components by rail instead of barge?

2. How much will other transportation alternatives cost, compared with barging?

3. Has Southern evaluated environmental impacts of trucking, versus rail, versus barge?

4. Does the FEIS discuss transportation alternatives in detail?

5. Given the apparent time constraints associated with this project, why hasn’t Southern submitted a formal request to the Corps for barging?

6. Is the 5.5 draft calculated when the barge is standing or when it is underway?

7. Dr. Coutant, have you personally conducted any field research on Savannah River?

8. If Southern decides to dredge on its own, why would it need to amend its permit application to allow for dredging of the entire river channel, if only 8 discreet locations need to be dredged?

9. What is the basis for concluding that all dredging will occur in habitats poor for muscles? Has habitat at proposed dredging locations been characterized?

10. Would snag and tree removal cause shifting sands? If so, could current muscle habitat be lost or degraded?

11. Are you aware of any studies related to toxicity of sediment pore water on the Savannah River?

12. Are river bends such as the proposed dredging sites important habitat for any species?

13. Are there already permitted disposal sites available for the spoils of dredging associated with the proposed barging?

14. Dr. Coutant, please explain the seeming discrepancy between the fact that there are fish consumption warnings for Savannah river fish, and your statement that the Savannah River sediment does not likely contain contaminants.

G. <u>Questions for the Corps on EC 6.0</u>

1. SNC's witnesses testified that they provided the Corps with a copy of their recent river survey. Have you reviewed that survey?

2. Does the magnitude of dredging proposed by SNC seem consistent with that required to support a 5.5 ft draft barge with a flow of 3700 cfs?

3. From your testimony it sounds like it would be difficult or impossible to dredge the channel at SNC's request without a local sponsor. Have you discussed with SNC how they intend to get around this problem? Have you discussed potential local sponsors with SNC?

4. Has the Corps made funding requests for dredging the Savannah River since 1979? Why or why not?

5. Is the Corps considering seeking funds for dredging the navigation channel in the FY2011 budget that is currently being prepared?

6. Has the Corps sought stimulus money to fund dredging the navigation channel?

7. Would dredging, such as that described by SNC, be considered "routine operation and maintenance" of the channel?

8. Has the Corps followed "routine operation and maintenance" analyzed in the 1976 FEIS?

9. How have river conditions changed since publication of the 1976 FEIS?

10. Do you foresee any problem with tiering to a 33 year old EIS?

11. Did NRC Staff contact the Corps to discuss the Vogtle project during preparation of its FEIS? The 2008 MOU revised a previous MOU that also encourage cooperation between the Corps and NRC. Why didn't that happen in this case?

12. Could the Corps' computer model of the Savannah River basin be used to predict flows at the Vogtle site?

H. Questions for NRC Staff on EC 6.0

1. What investigation of potential dredging impacts did the Staff perform?

2. When Staff received comments relating to dredging the navigation channel, did the Staff contact the Corps to discuss potential impacts?

3. Is there a record of any meetings or discussions between the Staff and the Corps in the Electronic Hearing File?

4. The Corps testified yesterday that they had no contact with the Staff regarding dredging the navigation channel until after this contention was admitted. Is that correct? When did the Staff first contact the Corps to discuss dredging the navigation channel?

5. Do NEPA, NRC regulations or guidance require the Staff to consult with sister federal agencies on issues within those agencies' jurisdiction or particular expertise?

6. Did the Staff investigate how much dredging may be required?

7. Did the Staff discuss potential impacts of dredging on aquatic species with the Fish and Wildlife Service?

8. Did the Staff discuss potential impacts of dredging on water quality with the EPA?

9. Did the Staff investigate potential interruption of spawning migration on the Savannah River related to dredging the federal navigation channel?

10. Did the Staff investigate potential impacts on the Savannah River related to resuspension of contaminated sediments from dredging the federal navigation channel?

11. Did the Staff investigate potential impacts related to sediment disposal in connection with dredging the federal navigation channel?

12. In this case (not a hypothetical situation), what specific mitigation measures did the Staff consider to reduce impacts of dredging, when it concluded that "impacts could be moderate"?

13. In this case, will mussel relocation be required?

14. On FEIS 2-123, the Staff states that it determined "there were no federal project activities that would make it desirable for another federal agency to become a cooperating agency." How did the Staff come to this conclusion, given the fact that Southern intends to use the federal navigation channel?

15. On FEIS 4-27, the Staff states that a detailed assessment of impacts to river biota by the NRC Staff is not possible at this time. Why not? Doesn't NEPA require such an assessment?

16. Clarification: Did the Staff make a dredging impacts determination without any information regarding the dredging project?

17. Why didn't the Staff request additional information from Southern about intended dredging of the navigation channel when it received comments relating to dredging this channel?

18. Could the dredging and barging begin before a COL is issued?

Respectfully submitted this 31st day of March, 2009,

[Original signed by L. Sanders]

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
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SOUTHERN NUCLEAR OPERATING COMPANY	)	Docket No. 52-011-ESP
	)	
	)	
(Early Site Permit for the Vogtle ESP Site)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing LB MEMORANDUM AND ORDER (PROVIDING PROPOSED QUESTIONS FOR DOCKETING) have been served upon the following persons by Electronic Information Exchange.

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[Original signed by Christine M. Pierpoint]
Office of the Secretary of the Commission

Dated at Rockville, Maryland
this 24th day of July 2009