**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**

**BEFORE THE ATOMIC SAFETY AND LICENSING BOARD**

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

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| 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) | January 9, 2009 |

# JOINT INTERVENORS' INITIAL WRITTEN STATEMENT OF POSITION AND PREFILED DIRECT TESTIMONY

Pursuant to 10 C.F.R. § 2.1207(a)(1) and the Atomic Safety and Licensing Board (the "Board") October 24, 2008 Memorandum and Order (Revised General Schedule), Joint Intervenors[1] hereby submit their initial written statement of position and prefiled direct testimony on Environmental Contentions 1.2 ("EC 1.2") and 1.3 ("EC 1.3"), as admitted by the Board in its March 12, 2007 Memorandum and Order (Ruling on Standing and Contentions), and Environmental Contention 6.0 ("EC 6.0"), as admitted by the Board in its October 24, 2008 Memorandum and Order (Ruling on Motion to Admit New Contention).

[1] The 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.

## INTRODUCTION

In this proceeding, Joint Intervenors challenge the adequacy of the Final Environmental Impact Statement (the "FEIS") for an Early Site Permit ("ESP") at the Vogtle Electric Generating Plant Site (the "VEGP site")[2]. The FEIS includes the Nuclear Regulatory Commission (the "NRC") staff's "analysis that considers and weighs the environmental impacts of constructing and operating new units ("Units 3 and 4") at the VEGP site or at alternative sites, and mitigation measures available for reducing or avoiding adverse impacts."[3] The Board admitted for hearing the following contentions regarding the staff's analysis:

> **EC 1.2.** The FEIS fails to identify and consider direct, indirect, and cumulative impingement/entrainment and thermal effluent discharge impacts of the proposed cooling system intake and discharge structures on aquatic resources.
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> **EC 1.3.** The FEIS fails to satisfy 10 C.F.R. § 51.45(b)(3) because its analysis of the dry cooling alternative is inadequate to address the appropriateness of a dry cooling system given the presence of extremely sensitive biological resources.
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> **EC 6.0.** Because Army Corps of Engineers (the "Corps") dredging of the Savannah River Federal navigation channel has potentially significant impacts on the environment, the NRC staff's conclusion, as set forth in the "Cumulative Impacts" chapter of the FEIS, that such impacts would be moderate is inadequately supported. Additionally, the FEIS fails to address adequately the impacts of the Corps' upstream reservoir operations as they support navigation, an important aspect of the problem.

[2] NRC000001 (FEIS for an ESP at the VEGP Site, Office of New Reactors, NRC, NUREG-1872 (Aug. 2008) ("FEIS").

[3] NRC000001 at iii (FEIS).

Although the admitted contentions all raise issues associated with the adequacy of the NRC staff's FEIS, Southern Nuclear Operating Company ("SNC") has the ultimate burden of proof relative to issuance of the requested ESP.[4]

**PROCEDURAL BACKGROUND**

On August 14, 2006, SNC submitted an ESP application to the NRC. As part of this application, SNC included an environmental report ("ER"). Joint Intervenors (then Joint Petitioners) filed a challenge to the ESP application on December 11, 2006, seeking to admit seven contentions related to the ER, designated as EC 1.1, 1.2, 1.3, 2, 3, 4, and 5. On March 12, 2007, the Board admitted two contentions, EC 1.2 and 1.3.[5] The Board then provided a schedule for filing new or amended contentions as well as motions for summary disposition regarding any admitted contention or new/amended contention.[6]

Then, on September 10, 2007, the NRC staff issued its Draft Environmental Impact Statement ("DEIS").[7] Because the admitted contentions were still applicable to the DEIS, Joint Intervenors chose not to amend them.

On October 17, 2007, SNC filed a motion requesting that summary disposition be entered in its favor for EC 1.2 and EC 1.3.[8] On November 13, 2007, Joint Intervenors

[4] 10 C.F.R. § 2.325 (2008).

[5] See SNC (ESP for Vogtle ESP Site), 65 NRC 237, 259, 261 (Mar. 12, 2007).

[6] See May 7, 2007 Memorandum and Order (Prehearing Conference and Initial Scheduling Order)(the "Initial Scheduling Order").

[7] DEIS for an ESP at the VEGP Site, Office of New Reactors, NRC, NUREG-1872 (Sept.2007).

[8] See SNC Motion for Summary Disposition on Intervenors' EC 1.2 (Cooling System Impacts on Aquatic Resources)(Oct. 17, 2007); and see SNC Statement of Undisputed Facts in Support of Applicant's Motion for Summary Disposition of Intervenors' EC 1.2 (Cooling System Impacts on Aquatic Resources)(Oct. 17, 2007); and see SNC Motion for Summary Disposition on Intervenors' EC 1.3 (Oct. 17, 2007); and SNC Statement of Undisputed Facts in Support of Applicant's Motion for Summary Disposition on Intervenors' EC 1.3 (Oct. 17, 2007).

filed an answer to the SNC dispositive motion, which included a statement of material facts at issue and supporting affidavits, asserting that summary disposition was inappropriate in this instance.[9] The Board, agreeing with Joint Intervenors, found that genuine issues of material fact existed on several issues raised by EC 1.2 and 1.3, and therefore upheld both contentions against the motions for summary disposition.[10]

Then, on August 14, 2008, the NRC staff issued the FEIS.[11] In light of the new information disclosed in the FEIS, on September 23, 2008, Joint Intervenors submitted a motion (dated September 22, 2008) to admit a new environmental contention, designated as EC 6.0.[12] On October 6, 2008, SNC and the NRC staff filed responses to Joint Intervenors contention admission motion.[13] Following this, on October 14, 2008, Joint Intervenors filed a reply asserting that they met both standards of timeliness and contention admissibly, so as to warrant the admission of their new contention.[14] On October 24, 2008, the Board ruled in favor of Joint Intervenors and admitted EC 6.0.[15]

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[9] See Joint Intervenors Answer Opposing SNC's Motion for Summary Disposition of EC 1.2 (Nov. 13, 2007).

[10] See SNC (ESP for Vogtle ESP Site), 67 NRC 54 (Jan. 15, 2008) (regarding Environmental Contention 1.2); SNC (ESP for Vogtle ESP Site), 67 NRC 54 (Jan. 15, 2008) (regarding Environmental Contention 1.3).

[11] See August 14, 2008 Letter from Patrick Moulding, NRC Staff Counsel, to Administrative Judges (notifying parties of availability of FEIS).

[12] See Joint Intervenors' Motion to Admit New Contention (Sept. 22, 2008).

[13] See NRC Staff Answer to "Joint Intervenors' Motion to Admit New Contention" (Oct. 6, 2008); SNC Answer to Joint Intervenors' Motion to Admit New Contention (Oct. 6, 2008).

[14] See Joint Intervenors' Reply to NRC Staff's Answer to Joint Intervenors' Motion to Admit New Contention and SNC's Answer to Joint Intervenors' Motion to Admit New Contention (Oct. 14, 2008).

[15] See October 24, 2008 Memorandum and Order (Ruling on Motion to Admit New Contention).

The issues raised in the three admitted contentions will be subject to an evidentiary hearing scheduled for March 16-19, 2009.[16]

**LEGAL ISSUES IN CONTROVERSY**

Each of Joint Intervenors' contentions challenge the National Environmental Policy Act of 1969 ("NEPA")[17] analysis conducted by the NRC staff in the FEIS.[18]

Joint Intervenors assert that because the NEPA analysis is insufficient, the FEIS for the construction and operation of Units 3 and 4 is incomplete. An environmental impact statement should "provide full and fair discussion of significant environmental impacts and shall inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment."[19] Thus, "[t]he principal goals of an EIS are twofold: to compel agencies to take a "hard look" at the environmental consequences of a proposed project, and to permit the public a role in the agency's decision-making process."[20] To understand these goals, Congress's purpose in enacting NEPA must be considered.

> Congress wanted each federal agency spearheading a major federal project to put on the table, for the deciding agency's and for the public's view, a sufficiently detailed statement of environmental impacts and alternatives so as to permit informed decision making. The purpose of NEPA is to require disclosure of relevant environmental considerations that were given a "hard look" by the agency, and thereby to permit informed public

[16] See October 24, 2008 Memorandum and Order (Revised General Schedule)

[17] 42 U.S.C. §§ 4321 *et seq*.

[18] Id. § 4332(2)(C). NEPA requires federal agencies, including the NRC, to prepare an environmental impact statement for "major Federal actions significantly affecting" the environment. There was no dispute that construction and operation of Units 3 and 4 constitutes "a major Federal action" that may "significantly affect the environment". Accordingly, an FEIS was required.

[19] 40 C.F.R. § 1502.1 (2008).

[20] La. Energy Servs., L.P. (Claiborne Enrichment Center), CLI-98-3, 47 N.R.C. 77 (1998).

> comment on the proposed action and any choices or alternatives that might be pursued with less environmental harm.[21]

This required "hard look" analysis is absent from the FEIS: (1) EC 1.2 asserts that the analysis of direct, indirect, and cumulative impacts on aquatic species is inadequate to satisfy NEPA requirements; (2) EC 1.3 asserts that the analysis of the dry cooling alternative is inadequate to satisfy NEPA requirements; and (3) EC 6.0 asserts that the analysis of the impacts of dredging the Savannah River Federal navigation channel is inadequate to satisfy NEPA requirements. Without the requisite analysis, the public is unable to play the role in NRC's decision-making process that Congress intended to create.

**SUMMARY OF KEY POINTS TO BE MADE IN THE TESTIMONY**

At the evidentiary hearing, and in support of EC 1.2, Dr. Shawn Paul Young will testify that the FEIS fails to adequately assess current baseline conditions for Savannah River fish. Without this baseline, conclusions on impingement/entrainment and thermal plume impacts are inappropriate and unsubstantiated. Dr. Young will also testify that the FEIS makes inaccurate assumptions regarding fish distribution, fish adaptation, water intake percentages, and water levels. Each of these inaccuracies prohibits an adequate assessment of impingement/entrainment impacts. Finally, Dr. Young will testify that the FEIS fails to adequately consider low flow rates and species specific thermal sensitivity in assessing impacts of thermal plumes and discharge on aquatic species.

In further support of EC1.2, Mr. Barry Sulkin will testify that the methodology employed in the FEIS to estimate potential impacts is fundamentally flawed. Mr. Sulkin will testify that using withdrawal rate as a percentage of total flow as an indicator of

[21] Lands Council v. Powell, 395 F.3d 1019, 1028 (9th Cir. 2005).

potential impacts has a number of significant weaknesses. Specifically, Mr. Sulkin will testify that there is no scientific or regulatory basis for the 5% threshold of significance for withdrawals employed in the FEIS. He will then explain that the calculations of the withdrawal percentages presented in the FEIS in support of the finding that impacts from withdrawals are "small" are inaccurate and misleading. Finally, Mr. Sulkin will testify that the method of estimating impacts on aquatic species is subject to manipulation because it is based entirely on assumptions and speculation rather than on site-specific information.

At the evidentiary hearing, Mr. Sulkin's testimony will also be offered in support of EC 1.3. Mr. Sulkin will testify that the alternative cooling system analysis in the FEIS provides no more than generalizations about cost, efficiencies, and environmental impacts of dry cooling as an alternative. He will then explain that the FEIS conclusion that the environmental impacts of the wet cooling system would be "small" rests exclusively on the flawed analysis of the potential impacts of the cooling water intake system. Because the discussion of cooling system alternatives is premised upon the inaccurate conclusion that aquatic impacts of the proposed wet cooling system are "small", Mr. Sulkin will opine that the dry cooling alternative was prematurely dismissed from consideration. In further support of EC1.3, Mr. Powers will testify that the FEIS's analysis of the cost effectiveness of a dry cooling system alternative is inadequate. Mr. William Powers will explain that dry cooling is a cost-effective and viable alternative to the proposed wet cooling system that would avoid all of the surface water-related impacts discussed in the FEIS.

At the evidentiary hearing, and in support of EC 6.0, Dr. Donald Hayes will testify that the FEIS and hearing record cannot possibly support the conclusion that navigation-related impacts are potentially "moderate." Dr. Hayes will offer a critique of the sparse analysis in the FEIS and will explain several potential impacts of dredging that are unexamined in the FEIS. Finally, Dr. Young will testify in support of EC6.0 that dredging and barging operations on the Savannah River have potential adverse impacts on threatened, rare, and endangered fish and mussel species.

**INITIAL POSITION STATEMENT**

**EC 1.2 – The Analyis of Impingement/Entrainment and Thermal Effluent Discharge Impacts in the FEIS Fails to Statisfy NEPA Requirements**

NEPA provisions governing the contents of environmental impact statements are meant to "ensure informed decision making to the end that the agency will not act on incomplete information, only to regret its decision after it is too late to correct."[22] However, the analysis of impingement/entrainment and thermal effluent discharge impacts in the FEIS lacks important information. In fact, although certain baselines must be established before any accurate assessment regarding environmental impacts can be made, baseline numbers on water discharge levels, aquatic species life stages, and drift concentration are not discussed in the FEIS. Moreover, the impingement/entrainment and thermal impact conclusions reached in the FEIS are based on improper assumptions and fundamentally flawed methodology. This incomplete and flawed analysis does not satisfy the NEPA mandate and accordingly prohibits informed decision-making by the NRC.

[22] Churchill County v. Norton, 276 F.3d 1060, 1072-73 (9th Cir. 2001).

A. Certain baseline data is required before impingement/entrainment and thermal effluent discharge impacts can be evaluated.

The FEIS fails to use quantitative analysis and field surveys to assess baseline habitat conditions, species diversity, and species abundance around the VEGP site. A NEPA analysis relating to aquatic impacts must, as a practical matter, have a baseline from which to operate.[23]

First, the FEIS fails to adequately assess current baseline conditions for Savannah River fish. The FEIS does not provide detailed data of the life history stages of Savannah River fish near the VEGP site, the migration timing of each species' life history, fish distribution patterns in the immediate vicinity of the VEGP site, or population numbers. As Dr. Young will testify, without this data, conclusions on impacts due to entrainment are inappropriate and unsubstantiated.[24] For example, the FEIS lumps all categories of fish and life stages together, and sets forth the blanket conclusion that "species and life stages evaluated in various studies could endure a velocity of 1ft/sec."[25] However, early life stages of fish are more susceptible to entrainment and thermal discharge because of the limited or nonexistent mobility in fish larvae and eggs. Moreover, some larvae are better swimmers than others. And, importantly, many of the endangered or important fish of the Savannah River cannot endure the 1ft/sec velocity set forth in the FEIS. Thus, such a group conclusion on the swimming abilities of all species and all life stages is

[23] SNC (ESP for Vogtle ESP Site) 65 NRC 237, 256 (March 12, 2007), citing American Rivers v FERC, 201 F.3d 1186, 1195 n.15 (9th Cir. 2000).

[24] Young Prefiled Direct Testimony at questions 11, 13-15; see also, JTI000003 (Affidavit of Young in support of Joint Intervenors' Answer to SNC's Motion for Summary Disposition of Environmental Contention 1.2 (Nov. 13, 2007)) ("Young 2007").

[25] NRC000001 at 5-30 (FEIS).

insufficient.[26] More specific baseline data is required to adequately assess entrainment and thermal discharge impacts on Savannah River fish.

As Dr. Young will further testify, baseline data on ichthyoplankton in the FEIS is also inaccurate and vague.[27] While American shad are the most dominant ichthyoplankton in the Savannah River, the FEIS provides only a cursory and inaccurate summary regarding this species.[28] Moreover, the conclusion in the FEIS that the construction of Units 3 and 4 will have only a minor impact on ichthyoplankton[29] incorrectly characterizes the location within the Savannah River where American shad eggs are concentrated,[30] inaccurately assumes a uniform distribution of ichtyoplankton,[31] and relies upon irrelevant data regarding the presence of oxbows.[32]

To obtain accurate estimates of the baseline conditions of ichthyoplankton and thus reach an accurate conclusion regarding impacts, a more complete scientific analysis should have been conducted. As Dr. Young will testify, ichthyoplankton-net collections are a scientifically accepted and detailed way to correctly determine ichthyoplankton numbers.[33] These collections, occurring in equal intervals along the entire area

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[26] Young Prefiled Direct Testimony at questions 11-15.

[27] Young Prefiled Direct Testimony at questions 18-19.

[28] NRC000001 at 2-82 (FEIS).

[29] NRC000001 at 5-31-32 (FEIS); see also NRC000001 at 2-81-82.

[30] Young Prefiled Direct Testimony at questions 18; see also JTI000005 (Declaration of Young in Support of Joint Intervenors' Motion to Admit New Contention (Sept. 22, 2008)) ("Young 2008").

[31] NRC000001 at 5-3 (FEIS); Young Prefiled Direct Testimony at question 16.

[32] NRC000001 at 2-82 (FEIS); Young Prefiled Direct Testimony at question 18; see also JTI000005 (Young 2008).

[33] Young Prefiled Direct Testimony at question 19.

surrounding the VEGP site and including the intake canals and locations of the thermal plumes, would give a more accurate picture of the baseline drift community that could be entrained by water withdrawal or affected by thermal plume.[34]

Finally, the FEIS does not adequately discuss baseline information relating to endangered and important species in the Savannah River. While the FEIS identifies six species in decline, it provides very little information regarding the causes for such decline.[35] As Dr. Young will testify, in order to accurately evaluate the impingement/entrainment and thermal impacts on aquatic species from the construction and operation of Units 3 and 4, the causes for population decline must be more fully articulated.[36]

B. The FEIS discussion of the direct, indirect, and cumulative impacts of impingement/entrainment is inadequate and makes inaccurate assumptions.

The FEIS makes an inaccurate assumption of a uniformly distributed drift community in assessing impingement/entrainment impacts.[37] During pre-operation monitoring of the first two nuclear reactor units at Plant Vogtle in 1983, fish egg and larval fish drift studies[38] and macro-invertebrate drift distribution studies[39] were

[34] Young Prefiled Direct Testimony at question 19.

[35] NRC000001 at 2-89-91 (FEIS).

[36] Young Prefiled Direct Testimony at questions 12, 26-27.

[37] NRC000001 at 5-31(FEIS).

[38] JTI000006 Wiltz, J. W. 1983. Vogtle Electric Generating Plant, Savannah River larval fish study, Burke County, Georgia, from January through August 1974. Operating license stage environmental report, Technical document. ("Wiltz 1983").

[39] JTI000007 Nichols, M. C. 1983. Vogtle Electric Generating Plant, survey of the drifting macroinvertebrates of the Savannah River, Burke County, Georgia, from September 1980, through August 1981. Operating license stage environmental report, Technical document. ("Nichols 1983").

conducted. Both studies found that the drift community, including eggs and larvae of 34 fish species, were non-uniformly distributed and varied over time and space in the vicinity of the VEGP site. As Dr. Young will testify, impacts must be assessed based upon the actual non-uniform distribution, and not the fictitious uniform distribution assumed by the NRC staff.[40]

The NRC staff also inaccurately assumes that fish and shellfish can easily adapt to the varying flow regimes and velocities which would result from operation of Units 3 and 4.[41] While it is true that fish and shellfish can often adapt to natural variability in velocity and flow, adaptation to human induced variability – such as the variability caused by operation of Units 3 and 4 (together with Units 1 and 2) – is more difficult.[42] In fact, it is generally accepted that human induced variation of velocities and flow regimes, when combined with increased entrainment mortality caused by operation of facilities such as Plant Vogtle, is the primary causes for the decline of freshwater biodiversity (including fish and shellfish) in the United States.[43] The NRC staff cannot simply ignore this scientific truth when assessing impacts on aquatic species.

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[40] Young Prefiled Direct Testimony at questions 16-17.

[41] See JTI000003 (Young 2007).

[42] See B.C. MARCY, D. E. FLETCHER, F. D. MARTIN, M. H. PALLER, AND M. REICHERT, FISHES OF THE MIDDLE SAVANNAH RIVER BASIN 460 (The University of Georgia Press) (2005) ("Marcy et al. 2005").

[43] Young Prefiled Direct Testimony at question 20; see also JTI000020 Williams, J. D., M. L. Warren, K. S. Cummings, J. L. Harris, and R. J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18:6-22 ("Williams et al. 1993"); JTI000017 Ricciardi, A., and J. B. Rasmussen. 1999. Extinction rates of North American freshwater fauna. Conservation Biology 13 (5):1220-1222.("Ricardi and Rasmussen 1999"); and JTI000019 Layzer, J. B., and E. M. Scott. 2006. Restoration and colonization of freshwater mussels and fish in a southeastern United States tailwater. River Research and Applications 22 (4):475-491. ("Layzer and Scott 2006").

The FEIS makes the additional inaccurate assumption that low river flows will not affect the impingement and entrainment impacts on aquatic species. Based on this assumption, the FEIS addresses impacts only under normal operation parameters and flows, and curtly dismisses impingement and entrainment impacts during low flows.[44] The NRC staff surprisingly concludes that even if there is a low flow of 3000 cfs or less, and even though such low flow "may result in greater levels of entrainment," the "effects are unlikely to have any long term persistent impacts. . . because the unusual low flow conditions would likely be temporary."[45] As both Dr. Young and Mr. Sulkin will testify, this is an unacceptable and inadequate conclusion for numerous reasons. First, the NRC staff provides no evidence or explanation for its assumption that low flows would be temporary – a remarkable omission in light of the fact that the actual Savannah River discharge was recently reduced to 3,100 cfs and drought conditions may continue to worsen. Second, NEPA requires the NRC staff to consider the reasonable range of likely future conditions. Because the actual Savannah River discharge has consistently been below 3,800 cfs ("Drought Level 3") since November 2007, Drought Level 4 flow rates must be considered. As Mr. Sulkin will explain, these Drought Level 4 rates can be calculated,[46] and the chronic and acute impacts resulting from Drought Level 4 conditions are at least as harmful as long term impacts during higher flow conditions, especially in relation to the survival of fish and egg larvae.[47] Third, the NRC staff

[44] NRC00001 at 7-24

[45] Id. In support of this conclusion, the NRC staff relied upon a study conducted over 20 years ago.

[46] Sulkin Prefiled Direct Testimony at questions 15 and 16; see also JTI000021 (Sulkin Tables).

[47] Sulkin Prefiled Direct Testimony at questions 9, 15-16; and Young Direct Testimony at questions 21-22; see also JTI000023 (Declaration of Young in Support of Joint Intervenors' Petition for Intervention (Dec. 11, 2006)) ("Young 2006").

incorrectly assumes that the increased entrainment caused by low flow conditions will not have a long term impact on the fish population. As Dr. Young will explain, this assumption is inadequately supported and misleading.[48]

C. The FEIS fails to consider low flow rates and species specific thermal sensitivity in assessing impacts of thermal plumes and discharge on aquatic species.

The discussion of thermal plumes in the FEIS is inadequate to assess the direct, indirect, or cumulative impacts of such plumes on aquatic species. The thermal plume data in the FEIS is based on maximum discharge rates during Drought Level 3 conditions. However, as noted above, Savannah River flows are below Drought Level 3. As Dr. Young will testify, when flows decrease, the density of aquatic species, and thus the thermal impacts on these species, increase.[49] Accordingly, an adequate discussion of thermal impacts must consider Drought Level 4 flows.

In addition to failing to adequately consider low flows, the discussion of thermal impacts in the FEIS lacks important information regarding the effects of increased temperatures on drifting eggs and larvae near the plume. The FEIS discussion predicting the size of the thermal plume, together with a general discussion of fish species in the Savannah River, is insufficient. As Dr. Young will testify, the effects of temperature increase are significant and vary depending on species, and a more detailed analysis is required.[50]

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[48] Young Direct Testimony at questions 21-22.

[49] Young Prefiled Direct Testimony at questions 24-26.

[50] Young Prefiled Direct Testimony at questions 27-28; see also JTI000024 Paller, M. H., Saul, B. M., and D. V. Osteen. 1986. Distribution and abundance of ichthyoplankton in the mid-reaches of the Savannah River and selected tributaries. DPST-86-798:ECS-SR-27. Environmental and Chemical Sciences, Inc., Aiken, SC. ("Paller 1986"); JTI000017 (Young 2006).

The methodology employed in the FEIS to estimate potential impingement/entrainment and thermal plume impacts is fundamentally flawed.

The impingement/entrainment and thermal impact conclusions reached in the FEIS are based upon fundamentally flawed methodology. As Mr. Sulkin will testify, the NRC staff uses withdrawal rate as a percentage of total flow as an indicator of potential impacts. In other words, the staff assumes that impacts on aquatic resources are directly proportionate to the percentage of water being withdrawn.[51] Rather than collecting data, the NRC staff assumes that, as long as withdrawals are less than 5% of the total flow, impacts will be "small." This methodology, however, has three significant weaknesses.

First, as Mr. Sulkin will explain, there is no scientific or regulatory basis for the 5% threshold.[52] Second, even assuming 5% is the proper threshold, the FEIS tables and text obscure the fact that several flow scenarios result in withdrawals that exceed 5% of the total river flow.[53] Third, because the methodology employed by the NRC staff is based entirely on estimate, assumption, and speculation, results are subject to manipulation.[54] Thus, the conclusion that aquatic impacts will be "small" cannot be relied upon. A more accurate and complete analysis is required.

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[51] Sulkin Prefiled Direct Testimony at question 10; see also Young Prefiled Direct Testimony at question 17.

[52] Sulkin Prefiled Direct Testimony at questions 11-13.

[53] Sulkin Prefiled Direct Testimony at questions 11, 14-23.

[54] Sulkin Prefiled Direct Testimony at questions 11, 24-29.

**EC 1.3 – The Discussion of Dry Cooling System Alternatives in the FEIS Fails to Statisfy NEPA Requirements**

NEPA requires the NRC staff to analyze in the FEIS all alternatives to the actions proposed by SNC.[55] This analysis of alternatives must be "sufficiently complete" to aid the NRC in developing and exploring, pursuant to § 102(2)(E) of NEPA, "appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."[56] To the extent practicable, the environmental impacts of the proposal and alternatives should be presented in comparative form.[57] Additionally, Regulatory Guide 4.2 (the "Guide") specifically enumerates cooling systems as a station design alternative that must be addressed by the applicant in the ER (and accordingly, as explained in note 56, by the NRC staff in the FEIS).[58] The Guide further provides that the discussion of alternatives "should describe each alternative, present estimates of its environmental impact, and compare the estimated impact with that of the proposed system. The assumption and calculations on which the estimates are based should be presented."[59] The Guide also states that "a

[55] 42 U.S.C. § 4332(2); see also 10 C.F.R. § 51.91 requiring that the environmental impact statement state how it will or will not satisfy the requirements set forth in NEPA.

[56] 10 C.F.R. § 51.45(b)(3). 10 C.F.R. § 51.90 provides that final environmental impact statements shall be prepared in accordance with the requirements for draft environmental statements set forth in 10 C.F.R. § 51.71. 10 C.F.R. § 51.71 provides that draft environmental statements shall be prepared in accordance with the requirements for environmental reports set forth in 10 C.F.R. § 51.45. Accordingly, the requirements that the applicant must satisfy in its environmental report pursuant to 10 C.F.R. § 51.45 are the same requirements the NRC staff must satisfy in its final environmental impact statement pursuant to 10 C.F.R. § 51.90.

[57] Id.

[58] JTI000032 (NUREG-0099, Regulatory Guide 4.2, Rev. 2 (July 1976) at 10-1).

[59] Id. at 10-2.

textual description of the process by which the tradeoffs were weighed and balanced in arriving at the proposed design" is required.[60]

The NRC staff failed to satisfy the requirements set forth in NEPA and the Guide, publishing instead an alternative cooling system analysis in the FEIS that provides no more than generalizations about the cost, efficiencies, and environmental impacts of dry cooling as an alternative. As explained above, and as Mr. Sulkin will testify, the conclusion that dry cooling need not be fully considered rests exclusively on the inaccurate finding that the environmental impacts of the wet cooling system would be "small". Moreover, as Mr. Powers will testify, the FEIS's brief analysis of alternative system designs misrepresents the effectiveness of a dry cooling system at the VEGP site.[61]

A. The Staff's conclusion that neither a dry nor hybrid wet/dry cooling system would be preferable rests on the erroneous conclusion that the impacts of the wet cooling system would be "small".

The FEIS section addressing alternative system designs begins with a discussion of the general economic and environmental advantages and disadvantages of wet and dry cooling systems.[62] The FEIS then promptly concludes that an assessment of whether, in light of the total anticipated environmental and economic impacts, a dry cooling system is preferable, is unnecessary, since the environmental impacts of a wet cooling system

[60] Id. at 10-2 and 10-3.

[61] Powers Prefiled Direct Testimony at questions 12-35; see also, Sulkin Prefiled Direct Testimony at 8, and NRC000001 at 9-26-27 (FEIS).

[62] NRC000001 at 9-26 and 9-27 (FEIS). The Staff's discussion lacks both estimates of the various environmental impacts and the assumptions and calculations on which the estimates are based on as recommended in the Guide. JTI000032 at 10-2 (NUREG-0099).

would be "small".[63] However, as explained above and in Mr. Sulkin's testimony, the methodology used to calculate wet cooling impacts is flawed and does not support a finding that the impacts will be "small".[64] In light of the fact that impacts may in fact exceed the "small" threshold, a more detailed analysis of the dry cooling alternative is required.[65] Reliance by the staff solely on an erroneous conclusion regarding the impacts of wet cooling is simply not acceptable.

B. The FEIS's analysis of the cost effectiveness of a dry cooling system alternative is inadequate.

The extent of the FEIS's analysis of the cost effectiveness of a dry cooling system is limited to the single generalization "that there are additional expenses associated with dry cooling, making this technology less cost effective."[66] As Mr. Powers will testify, this statement is misleading and incomplete because it fails to address site specific considerations which lessen the cost differential between wet and dry cooling system at the VEGP site, including (1) the compatibility of a dry cooling system with the standard

[63] NRC000001 at 9-27 (FEIS).

[64] See generally, Sulkin Prefiled Testimony at question 9.

[65] See generally, Sulkin Prefiled Direct Testimony at 9-10.

[66] NRC000001 at 9-26 (FEIS).

AP1000 Nuclear Plant design for the VEGP site[67], and (2) the economic effectiveness of other dry cooling systems in locations with similar climates.[68]

**EC 6.0 – The Analysis of Dredging Impacts in the FEIS Fails to Satisfy NEPA Requirements**

The NRC staff failed to satisfy its obligation to assess environmental impacts of dredging of the Savannah River Federal navigation channel (the "FNC"), and instead wholly deferred to future analyses of such impacts to be conducted by the United States Army Corps of Engineers (the "Corps of Engineers" or "USACE").[69] While the NRC may consider existing assessments prepared by the Corps of Engineers in its environmental impact analysis, where no such assessments exist, the NRC must establish its own impact determination.[70] Because the potential impacts of the dredging have not yet been analyzed by the Corps of Engineers, the staff's reliance on the prospective evaluations and certifications of the Corps of Engineers is inappropriate.[71] Additionally, the FEIS wholly ignores an important aspect of the problem. That is, the impacts on the upstream reservoirs and water users resulting from barge navigation in support of the construction.

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[67] The standard Westinghouse AP1000 Nuclear Plant design configuration accommodates both high and standard backpressure turbines. Powers Prefiled Direct Testimony at questions 13-18; see also JTI000035 Declaration of Powers in Support of Joint Intervenors' Answer to SNC's Motion for Summary Disposition of Environmental Contention 1.3 ¶12 (Nov. 12, 2007)) ("Powers 2007"). Thus, a dry cooling system, which requires high backpressures, can be accommodated by the standard design of the Vogtle plant without substantial alterations to the current design. Powers Prefiled Direct Testimony at questions 19-25.

[68] Powers Prefiled Direct Testimony at questions 26-35. The climate at the Vogtle plant would not significantly impair the economic viability of a dry cooling system as evidenced by the economic effectiveness of dry cooling systems in other locations such as Texas, Wyoming, and South Africa.

[69] NRC000001 at 7-20 (FEIS).

[70] JTI000036 (NUREG-1555 Regulatory Guide 4.2., Rev. 2 (July 1976) at 2-4,5).

[71] See Calvert Cliffs Coordination Comm. Inc. v. United States Atomic Energy Comm'n, 449 F.2d 1109 (D.C. Cir.1971).

NEPA requires the NRC to take a "hard look" at impacts related to barging on the Federal Navigation Channel.

NEPA and the NRC regulations implementing the agency's responsibilities pursuant to NEPA,[72] require a license applicant to describe, and the staff to consider, the potential environmental effects of the proposed agency action. Further the Council on Environmental Quality has implemented regulations providing guidance on agency compliance with NEPA, which direct the NEPA review.[73]

NEPA requires that federal agencies consider the environmental impacts of their proposed actions, and take these considerations into account in their decision-making process. In other words, NEPA imposes procedural restraints, calling for an agency to take a "hard look" at the environmental impacts of a proposed action, as well as reasonable alternatives to that action.[74] This "hard look" is, however, subject to a "rule of reason" in that the consideration of environmental impacts need not address every impact that could possibly result, but rather only those which are reasonably foreseeable or have some likelihood of occurring.[75] Agencies are given broad discretion in determining how thoroughly to analyze a particular subject, and may decline to examine issues the agency in good faith considers "remote and speculative" or "inconsequentially small".[76] Similarly, an agency may, in its discretion, rely on data, analyses, or reports

[72] 10 C.F.R. Part 51.

[73] See 40 C.F.R. Part 1500.

[74] See La. Energy Servs., L.P. (Claiborne Enrichment Ctr.), CLI-98-3, 47 N.R.C. 77, 87-88 (1998).

[75] See e.g., Long Island Lighting Co., (Shoreham Nuclear Power Station), ALAB-156, 6 A.E.C. 831, 836 (1973).

[76] Vermont Yankee Nuclear Power Corp., (Vermont Yankee Nuclear Power Station). ALAB-919, 30 N.R.C. 29, 44 (1989) (citing Limerick Ecology Action, 869 F.2d at 739).

prepared by persons or entities other than agency staff, including competent and responsible state authorities.[77] In such instances the agency "must independently review and find relevant and scientifically reasonable any outside reports were analyses on which it intends to rely."[78]

The NRC cannot satisfy its NEPA obligations by relying solely upon another agency's impact analysis that does not yet exist.

In this case, the NRC staff attempts to meet its NEPA obligations by relying upon outside analysis that does not yet exist. According to the FEIS, "specifics of the [dredging] project would be provided in the USACE's assessment to fulfill the NEPA requirement."[79] Then, if the Army Corps of Engineers' NEPA analysis reveals potentially significant impacts, the Corps "would presumably include mitigative actions."[80] This shifting of responsibility does not constitute a "hard look" at impacts associated with using the navigation channel. As a matter of law and logic, the NRC staff cannot meet its duty to "independently review" the determination made by the Army Corps of Engineers, when the Corps has made no such determination. As a result, the determination in the FEIS that navigation-related impacts are potentially moderate has no rational basis.

In the situation when two or more agencies have jurisdiction over different aspects of a major federal action, "*both* must evaluate the environmental consequences of the entire project and both must determine independently whether NEPA has been

[77] See, e.g., Public Serv. Co. of Okla. (Black Fox Station, Units 1 and 2), LBP-78-28, 8 N.R.C. 281, 282 (1978).

[78] La. Energy Servs. (National Enrichment Facility), 63 N.R.C. 241, 259 (2006).

[79] NRC000001 at 7-20 (FEIS).

[80] Id.

satisfied."[81] The FEIS does not identify any methodology used or make any reference to sources relied upon by the NRC staff in reaching its impacts determination. In fact, the FEIS admits that "a detailed assessment has not been conducted."[82] Contrary to the requirements of NEPA, neither the Army Corps of Engineers nor the NRC has yet considered navigation-related impacts associated with construction of the new Units 3 and 4.

Moreover, the fact that NRC "need *not* consider impacts attributable *solely* to" the Army Corps of Engineers' segment of the project, is of no relevance to the assessment of navigation-related impacts.[83] Here, navigation-related impacts are in furtherance of the action permitted under the ESP and limited work authorization (the "LWA") and cannot be solely attributed to the Army Corps of Engineers, regardless of the fact that the Corps has jurisdiction over the FNC. Thus, the NRC staff must consider the overall project, "even though it did not have complete jurisdiction over it."[84]

Dredging the FNC has foreseeable and environmentally significant impacts.

Dredging of the Federal navigation channel has potentially foreseeable and environmentally significant impacts.[85] Such dredging will likely result in "temporary loss of benthic habitat, disruption of spawning migrations, [and] resuspension of

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[81] Tenn. Valley Auth. (Phipps Bend Nuclear Plant, Units 1 and 2), 8 N.R.C. 533, 547 (1978).

[82] NRC000001 at 7-20 (FEIS).

[83] Philadelphia Elec. Co. (Limerick Generating Station, Units 1 and 2), 20 N.R.C. 848, 873 (1984).

[84] Id.

[85] Hayes Prefiled Direct Testimony at questions 11 and 12.

sediments that may be contaminated …".[86] The web dynamics, spawning success and population size of freshwater mussels, shortnose sturgeon (an endangered species), Atlantic sturgeon, striped bass, robust redhorse and other catostomids, catfish species and benthic organisms may also be affected.[87] Moreover, because the FNC dredging is a sizable project with a lengthy duration, the extent of these aforementioned impacts is expected to be substantial.[88] However, a more complete analysis and data must be provided in the FEIS before the full extent of such impacts can be realized.[89]

In addition to the impacts of the dredging itself, management of the sediments resulting from such dredging may also have substantial impacts.[90] To properly manage these sediments, multiple confined disposal facilities ("CDFs") will likely be required. These CDFs will permanently alter the landscape and associated return water discharges could potentially have significant impacts on the Savannah River.[91] In the event the sediments contain hazardous materials, additional sediment management and disposal issues will also arise.[92]

**RELIEF SOUGHT**

Joint Intervenors respectfully submit that the Board should deny the ESP requested by SNC. As explained above, the FEIS fails to meet the requirements set forth

[86] NRC000001 at 7-20 (FEIS).

[87] Young Prefiled Direct Testimony at questions 29-32.

[88] Hayes Prefiled Direct Testimony at question 12-17.

[89] Id. at 18-19.

[90] Id. at 20-23.

[91] Id.

[92] Id.

in NEPA, including without limitation, Section 102(2)(C).[93] Moreover, without the requisite NEPA analysis, NRC cannot adequately conduct its independent anlayisis of the environmental costs and benefits of constructing and operating Units 3 and 4.[94] In addition, the inadequacy of the NEPA analysis prevents NRC from determining whether issuance of the ESP would be "inimical to ... the health and safety of the public"[95] or whether issuance of the requested limited work authorization would result in "any significant adverse environmental impact."[96] Finally, (1) because analysis of the dry cooling alternative is inadequate, NRC cannot effectively consider all alternatives, and (2) because analysis of the impacts of the proposed cooling system and dredging is inadequate, NRC cannot determine whether it has taken "all practicable measures within its jurisdiction to avoid or minimize environmental harm."[97]

[93] See 10 C.F.R. § 52.24(a)(8), providing that NRC may issue an ESP if it finds that the requirements of subpart A of 10 CFR part 51 are met. Id. § 51.105(a)(1) (which can be found within subpart A of 10 CFR part 51) requires NRC to determine whether the requirements of Sections 102(2)(A), (C) and (E) of NEPA, that mandate the method and scope of analysis for an environmental impact statement, have been satisfied.

[94] See 10 C.F.R. § 52.24(a)(8), providing that NRC may issue an ESP if it finds that the requirements of subpart A of 10 CFR part 51 are met. Id. § 51.105(a)(3) (which can be found within subpart A of 10 CFR part 51) requires NRC to consider the environmental costs and benefits of the proposed action.

[95] Id.. §§ 50.40(c) and 52.24(a)(6).

[96].Id. § 52.24(a)(7); see also Id. § 50.10(e)(3) permitting the Director of New Reactors or the Director of Nuclear Reactor Regulation to issue a limited work authorization only if "issuance of the limited work authorization will provide reasonable assurance of adequate protection to public health and safety."

[97] Id. § 51.103(a).

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**[Original signed by L. Sanders]**

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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| In the Matter of | ) | |
| | ) | |
| SOUTHERN NUCLEAR OPERATING COMPANY | ) | Docket No. 52-011-ESP |
| | ) | |
| | ) | |
| (Early Site Permit for the Vogtle ESP Site) | ) | January 9, 2009 |

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing **JOINT INTERVENORS' INITIAL STATEMENT OF POSITION, PRE-FILED DIRECT TESTIMONY, AND EXHIBITS** were served upon the following persons by Electronic Information Exchange and/or electronic mail.

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