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 Originally Filed: January 9, 2009 Revised: February 2, 2009

REVISED PRE-FILED DIRECT TESTIMONY OF DONALD F. HAYES IN SUPPORT OF EC 6.0

Q1: Please state your name and current business address.

A1: My name is Donald F. Hayes, and my current business address is University of Louisiana at Lafayette, Department of Civil Engineering, P.O. Box 42291, Lafayette, LA 70504-2291.

Q2: What is your educational background?

A2: I received a B.S. degree with honors in Civil Engineering from Mississippi State University in 1981. I received a M.S. degree in Civil Engineering from Mississippi State University in 1986. I received a Ph.D. in Civil Engineering with emphases in Environmental Engineering and Water Resources Planning and Management from Colorado State University in 1990.

Q3: For whom do you work and in what capacity?

A3: I am the Director of the Institute for Coastal Ecology and Engineering and an Endowed Professor of Civil Engineering at the University of Louisiana at Lafayette.

Q4: What is your professional background?

A4: A copy of my curriculum vitae has been provided to the Board and other parties previously and is attached to this testimony as JTI000045. Briefly, I have twenty-seven years of experience as an engineer, much of it related to dredging and associated environmental impacts. I am a registered Professional Engineer in the State of Mississippi and a Board Certified Environmental Engineer by the American Academy of Environmental Engineers. I am also on the Board of Directors of the Western Dredging Association. In addition to the faculty position I currently hold, I was previously an Assistant and Associate Professor of Environmental and Water Resources Engineering at the University of Utah and an Assistant Professor of Civil Engineering at the University of Nebraska—Lincoln.

Q5: Have you published or presented in the field of dredging and the associated environmental impacts?

A5: Yes, I have published or contributed to more than 50 articles, book chapters, special publications, and technical reports relevant to dredging and the associated environmental impacts. I have presented scientific presentations at numerous conferences and academic seminars. The copy of my curriculum vitae, attached as JTI000045, supplies a detailed summary of my publications and presentations.

Q6: Have you testified as an expert previously in any jurisdiction or proceeding?

A6: Yes, I have been recognized as an expert in dredging and the associated environmental impacts in a variety of venues. I have provided depositions pertaining to dredging in four cases and testimony in two cases. My curriculum vitae, attached as JTI000045, supplies a detailed summary of my expert consulting activities, depositions, and testimony.

Q7: Do you have a written summary of your education, employment, experience and background, and papers and presentations you have made over your career?

A.7: The copy of my curriculum vitae, attached as JTI000045, supplies such a summary.

Q8: What materials have you reviewed and actions have you taken in preparation for your testimony?

A8: I am familiar with sections of the application of Southern Nuclear Operating Company ("SNC") for an Early Site Permit ("ESP") at the Vogtle Electric Generating Plant ("VPEG") site. I have reviewed excerpts of the Final Environmental Impact Statement ("FEIS") prepared by the staff of the Nuclear Regulatory Commission ("NRC"), and related documents submitted in this matter. I have also reviewed correspondence (including, e-mail attachments) by and among SNC, The Shaw Group Inc. and/or Westinghouse Electric Company, LLC, and their contractors, employees and agents.

Q9: Have you given affidavits or declarations in support of or in connection with any of Joint Intervenors' contentions in this ESP proceeding?

A9: Yes, on September 21, 2008, I gave a declaration in support of Joint Intervenors' Motion to Admit New Contention (filed as JTI000041).

Q10: What are the topics of your testimony?

A10: I will testify on two topics to a reasonable degree of scientific certainty. I will testify on the deficiencies in data, quantitative analysis, field studies, and logic of the FEIS conclusions regarding the potential impacts of (1) dredging and (2) sediment placement. My testimony will support contention EC 6.0, which provides that the FEIS fails to adequately analyze the cumulative impacts of dredging the Savannah River federal navigation channel and water flow regulation from upstream reservoirs.

Dredging Impacts

Q11: Please summarize your conclusions related to the dredging activities required in connection with the construction and operation of a new nuclear power generating facility at the VEGP site.

A11: According to the FEIS on page 4-27, dredging of the Federal Navigation Channel (the "FNC") in the Savannah River to its authorized dimensions of nine (9) feet deep by ninety (90) feet wide is required to allow barge traffic during normal river flow. Because SNC intends to ship its reactor components by barge, such dredging is required in connection with the construction and operation of Units 3 and 4. Although the potential impacts the dredging

activities are both foreseeable and environmentally significant, the FEIS fails to address and adequately analyze them.

Q12: Is it possible that the required dredging activities will have a significant impact on the Savannah River ecosystem?

A12: Yes, the dredging impacts to the Savannah River ecosystem could be significant. Dredging typically raises concerns about benthic habitat destruction and water quality impairment. Sediment resuspended into the water column by the dredging operation impairs water quality. The increase in suspended sediment concentrations within the river could potentially influence fish behavior, impact spawning habitat, and cover fish larvae and benthic habitat in undisturbed areas of the river. Environmental impacts are exacerbated when anthropogenic contaminants are associated with the sediments. Notably, the NRC staff seem to agree, identifying on page 7-20 of the FEIS "…temporary loss of benthic habitat, disruption of spawning migrations, resuspension of sediments that may be contaminated, …" as issues of concern for the federal navigation channel dredging. Unfortunately, the FEIS does not provide sufficient data and information to estimate the extent of these impacts on the Savannah River ecosystem.

Q13: Does the FEIS state the size and duration of the federal navigation channel dredging project?

A13: No, the FEIS does not estimate the duration of the dredging project or the volume of sediment that will need to be dredged and placed outside of the river. The FEIS provides on page 7-20, that "[a]t the present time the dredging project is incompletely defined, the amount of

material to be removed is unknown, and the locations of the dredged material disposal areas have not been identified."

Q14: Is it possible to estimate the size and duration of the dredging project, based upon information provided in the FEIS?

A14: Yes, it is evident from the FEIS that this will be a sizable dredging project with a significant duration. According to the FEIS, most of the federal navigation channel above RM 35 will require dredging. Plant Vogtle is located at RM 150.9; thus, about 116 miles of river channel (which has not been dredged since 1979 or before) will need to be dredged. For a 90 foot wide channel, the requisite dredging activities could disturb 140 acres or more of benthic habitat and result in about two million cubic yards of sediment to be dredged per foot of deepening required. Specific data on barge drafts and river bathymetry should be included in the FEIS so that the size and duration of the dredging project can be accurately determined. Sediment volume and dredging duration are necessary to support any evaluation of potential environmental impacts. Despite the lack of specific data, the FEIS could provide a range of estimates for sediment volume and dredging duration based upon some reasonable assumptions and ranges of conditions.

Q15: Based on various correspondence, it appears as though SNC may only dredge the channel to a width of 70 feet and a depth of 7 feet. How does that affect your impact analysis? Could impacts still be substantial? What if only a few portions of the river were dredged instead of the entire length of the river?

A15: I have not conducted or attempted an impact analysis, and instead have just opined that dredging could potentially have substantial environmental impacts. Reducing the length, width, and depth of the dredging would reduce the sediment volume to be dredged. Dredging impacts would like be reduced accordingly, although inadequate information exists to determine the extent of the reduction.

I should also point out that river conditions, both stage and velocity, can substantially influence the dredging requirements. The recent extended drought in this region has almost certainly led to lower than normal river flows and decreased water depths. Increased dredging may be required in these conditions.

Q16: Does the number of barge trips required to transport the reactor components affect your analysis (i.e. would your analysis change if only one barge trip was required)? Does the weight of the barge loads affect your analysis (i.e. the heavier the barge, the deeper the dredging required)?

A16: The impact of barge traffic is a different issue, and I have not attempted to opine on this issue.

Q17: Does the time of year the barge trips are made affect your analysis (i.e. if river volume is usually lower during certain seasons, would more dredging be required)?

A17: I anticipate that environmental impacts will vary throughout the year depending on how the ecology of the river changes. For example, impacts during spawning season may be of a particular concern. However, the ecological component of these analyses is outside of my area of expertise.

Q18: Does the FEIS provide sufficient data and analysis to support the suggested cumulative impacts rankings?

A18: No, the FEIS lacks sufficient data and analysis to support the suggested cumulative impacts rankings. The FEIS rates the potential cumulative impacts for the federal navigation channel dredging as MODERATE, but does not provide any evidence that the ranking is based upon a quantitative evaluation. Instead, the FEIS only mentions that Section 404 permits (from the US Army Corps of Engineers and the EPA) and 401 Water Quality Certifications (from the State of Georgia) will be required.

Q19: Is it possible to independently analyze the suggested cumulative impacts rankings, based on the information provided?

A19: No, since the FEIS does not provide a quantitative analysis or adequate data to independently conduct those analyses, I cannot evaluate the MODERATE ranking suggested by the FEIS for the federal navigation channel dredging. Conducting a comprehensive environmental analysis of dredging would require substantial environmental, ecological, physical, and hydrologic data not presented in the FEIS. A well-done comprehensive environmental

analysis would require input and synthesis from a multi-disciplinary group of professionals. The purpose of the FEIS is to present these data and analyses and justify the resulting conclusions.

Sediment Placement Impacts

Q20: Does the FEIS provide sufficient data to analyze sediment placement impacts?

A20: No. I did not find any information or discussion in the FEIS on the issue of sediment placement.

Q21: Will the dredging activities required in connection with the construction and operation of a new nuclear power generating facility at the VEGP site necessitate managing the generated sediments and carrier water?

A21: Yes. Whether the dredging is conducted hydraulically or mechanically, some sediment management will be necessary. Depending upon the sediment characteristics and volumes, these sediments will likely require the construction of multiple confined disposal facilities ("CDFs") along the Savannah River unless those facilities already exist and have adequate capacity.

Q22: Would the construction of multiple CDFs produce significant environmental impacts?

A22: Yes, it is likely that the construction of multiple CDFs would have a significant environmental impact. The CDFs will permanently alter the landscape, and associated return water discharges could potentially have significant impacts on the Savannah River environment. The resulting impacts will vary with the number of CDFs required and the environment in which they are constructed.

Q23: Does the FEIS indicate whether the sediments contain hazardous materials?

A23: No, the FEIS does not indicate whether the sediments contain hazardous materials. In the event the sediments contain hazardous materials, additional sediment management and disposal issues will arise. I understand, from Lauren Smith et al.'s paper entitled Chlor-alkali Plant Contributes to Mercury Contamination in the Savannah River (JTI000040 (2007)). This may suggest that hazardous materials are a concern. If so, data collection for the FEIS analyses will need to include sediment sampling and contaminant analysis in order to conduct a thorough evaluation of potential environmental impacts**.**

In accordance with 28 U.S.C. § 1746, I state under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on January 9, 2009.

Executed in Accord with 10 C.F.R. 2.304(d)
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