



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001

ACRSR-2275

November 20, 2007

Mr. Luis A. Reyes  
Executive Director for Operations  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

SUBJECT: INTERIM LETTER: SOUTHERN NUCLEAR OPERATING COMPANY  
APPLICATION FOR THE VOGTLE EARLY SITE PERMIT AND THE  
ASSOCIATED NRC SAFETY EVALUATION REPORT WITH OPEN ITEMS

Dear Mr. Reyes:

During the 547<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards (ACRS), November 1-3, 2007, we began our review of the Vogtle<sup>1</sup> early site permit application and the associated safety evaluation report (SER) with open items prepared by the NRC staff. This matter was also reviewed by our Subcommittee on Early Site Permits on October 24, 2007. During these reviews, we had the benefit of discussions with representatives of the NRC staff and Southern Nuclear Operating Company (Southern Nuclear or "applicant"). We also had the benefit of the documents referenced. We review early site permit applications to fulfill the requirement of 10 CFR 52.23 that the ACRS report on those portions of an early site permit application that concern safety.

## CONCLUSIONS

1. The staff has undertaken a thorough review and, where appropriate, independent analysis of the Vogtle early site permit application.
2. The staff has requested that the applicant further assess the post-construction hydrology of the site, the seismic hazard at the site, and weather extremes at the site. We support these requests for additional assessment.
3. The decision by the applicant to propose a specific nuclear power plant design in conjunction with the early site permit application has probably resulted in fewer permit conditions in the SER on the application.

## DISCUSSION

The site currently occupied by Units 1 and 2 of the Vogtle Electric Generating Plant was approved originally for four units, but only two were built. The units now present at the site are 3,565 MWt Westinghouse pressurized water reactors. Also on the site is Plant Wilson which is a six-unit, oil-fueled combustion turbine facility.

---

<sup>1</sup> Vogtle is named for Alvin Ward Vogtle whose exploits in World War II were the inspiration for the character played by Steve McQueen in the movie The Great Escape.

Southern Nuclear has proposed to locate two Westinghouse AP1000 advanced nuclear power plants on the site. The AP1000 has a thermal power of 3,400 MWt. These power plants, designated Vogtle Units 3 and 4, will be located adjacent to and west of the existing Vogtle units. The early site permit application is unusual in that the applicant has selected a specific nuclear power plant design rather than relying on a plant parameter envelope as has been the case in previous applications for an early site permit. The applicant has also provided a complete and integrated emergency plan rather than providing only the major features of an emergency plan, as has been the case in previous early site permit applications.

### **Population in the Vicinity of the Site**

The Vogtle site is located in rural Georgia approximately 15 miles east-northeast of Waynesboro, Georgia (population 5,813), and 26 miles southeast of Augusta, Georgia (population 195,182). Augusta, Georgia, is the population center nearest the site. Numerous small towns are located within 50 miles of the site. Only the town of Girard (population 227) is within 10 miles of the Vogtle site. The site is across the Savannah River from the Department of Energy's Savannah River Site, which has several thousand employees. There are several shutdown production reactors and active facilities for processing tritium and defense wastes at the Savannah River Site. The Department of Energy is proposing to construct the Mixed Oxide (MOX) Fuel Fabrication Facility on the Savannah River Site.

Based on 2000 census data, the combined resident and transient populations within 5 miles and within 10 miles of the site (aside from those working at the Savannah River Site) are 687 and 3,560, respectively. The population within 50 miles of the site is expected to approximately quadruple over the next 60 years but will not exceed an average of 500 people per square mile within 10 miles of the site.

### **Industrial Hazards in the Site Vicinity**

With the exception of activities at the Department of Energy's Savannah River Site, there are no industrial activities of substance near the site. Hazardous material transport by rail and highway pose little threat to the site. The Savannah River is not used as a commercial transportation route at this time. Though there is a large military reservation in the vicinity of the site, projected activities do not pose significant threats to the nuclear power plant site.

### **Aircraft Hazard**

A commercial airline route passes within 2 miles of the proposed site. Projected increases in traffic along this route are not sufficient to raise site hazards to the point of regulatory concern.

### **Meteorology**

Weather at the Vogtle site is mild. Extreme cold and heavy winter precipitation are not common. Summers are hot with periods of stable ambient atmosphere. The applicant has based estimates of temperature extremes on a database covering a period of 30 years. In light of the duration of an early site permit (20 years) and the design life of any modern nuclear power plant constructed on the site (60 years), this appears to be an inadequate base of data

for estimating temperature extremes. Moreover, the well known 50-year weather cycles along the east coast of the United States make the adequacy of the applicant's database even more dubious. The staff has asked the applicant to reassess the bases for estimates of weather extremes at the site.

### **Geology and Seismicity of the Site**

The Vogtle site is located on the coastal plain below the Appalachian Piedmont. The ground is largely uncompacted sediments above the Blue Bluff Marl and compacted sands below the Blue Bluff Marl. Bedrock is at a depth of over 1000 feet. The Charleston seismic center poses the greatest threat to the site. The applicant has gone to great lengths to demonstrate that the Pen Branch Fault underlying the site is not a capable fault and does not contribute to the seismic threat to nuclear facilities on the site. The Eastern Tennessee Seismic Zone is about 200 miles from the site and poses only a modest threat to the facility.

The applicant has proposed to excavate to the Blue Bluff Marl and replace the natural materials with an engineered fill for the entire power block of each of the two proposed nuclear power plants. This is much as was done for Vogtle Units 1 and 2. The excavation and engineered fill relieve a number of erosion and seismic concerns. The applicant has relied to a large extent on the characterization of the Blue Bluff Marl done for Units 1 and 2 to characterize the basement material for Units 3 and 4. The staff has asked for more characterization of the Blue Bluff Marl immediately below the proposed locations for the new units.

The applicant has used the Electric Power Research Institute seismic hazard methodology. The applicant has updated the seismic hazard posed by the Charleston seismic zone including a significant increase in the frequency of large earthquakes to once every 500 years. Unfortunately, the Charleston seismic zone is not associated with a specific geological feature and consequently its precise location is not well known. The applicant has used a weighted average of possible regions for the seismic zone. The staff has identified data that suggest the seismic zone might be closer to the Vogtle site than considered by the applicant. Consideration of this data may move the centroid of seismic activity closer to the site and increase the seismic risk at the site. The staff has asked the applicant to provide additional information to support its conclusion that large earthquakes most likely do not occur further inland, closer to the Vogtle site.

The applicant did not update the characterization of the Eastern Tennessee Seismic Zone in the assessment of the seismic threat to the site. The staff has identified data that suggest an update of the Eastern Tennessee Seismic Zone should be done.

The estimate of local seismicity, aside from that caused by the Charleston seismic center, has been based on averaging several expert opinions. The staff questions the inclusion of one of the expert opinions in the analysis.

## Hydrology

Failures of dams on the Savannah River could produce floods in the vicinity of the Vogtle site. Analyses performed by the applicant and reviewed by the staff show that conservative estimates of the maximum floods do not threaten the site.

Ground-water motion on the site will be affected by the construction of nuclear power plants on the site. The ground-water motion could affect transport of radionuclides. The applicant has analyzed the ground-water motion. The staff has, however, identified an alternative pathway for water flow and has asked the applicant to consider this alternative.

## Emergency Plan

The applicant has developed an integrated emergency plan and provided revised evacuation time estimates. The staff has asked the applicant to ensure that local agencies review these time estimates since they may affect the actions of the agencies in the event of an emergency.

We conclude that the staff is preparing a quality SER on the Vogtle early site permit application and we look forward to reviewing the final application and SER.

ACRS member Professor Said Abdel-Khalik did not participate in the Committee's deliberations regarding this matter.

Sincerely,

/RA/

William J. Shack  
Chairman

## References:

1. U.S. Nuclear Regulatory Commission, Safety Evaluation Report With Open Items, "Safety Evaluation Report for the Vogtle Early Site Permit Application," August 30, 2007.
2. Southern Nuclear Operating Company, "Vogtle Early Site Permit Application," Revision 2, NRC Docket No. 52-00011, April 2007.
3. Report dated October 12, 2007, from William J. Hinze, Advisory Committee on Nuclear Waste and Materials, to Dana Powers, ACRS, "Review of Vogtle Early Site Permit Application and NRC's Safety Evaluation Report for the Vogtle Application."

**Hydrology**

Failures of dams on the Savannah River could produce floods in the vicinity of the Vogtle site. Analyses performed by the applicant and reviewed by the staff show that conservative estimates of the maximum floods do not threaten the site.

Ground-water motion on the site will be affected by the construction of nuclear power plants on the site. The ground-water motion could affect transport of radionuclides. The applicant has analyzed the ground-water motion. The staff has, however, identified an alternative pathway for water flow and has asked the applicant to consider this alternative.

**Emergency Plan**

The applicant has developed an integrated emergency plan and provided revised evacuation time estimates. The staff has asked the applicant to ensure that local agencies review these time estimates since they may affect the actions of the agencies in the event of an emergency.

We conclude that the staff is preparing a quality SER on the Vogtle early site permit application and we look forward to reviewing the final application and SER.

ACRS member Professor Said Abdel-Khalik did not participate in the Committee's deliberations regarding this matter.

Sincerely,

*/RA/*

William J. Shack  
Chairman

References:

1. U.S. Nuclear Regulatory Commission, Safety Evaluation Report With Open Items, "Safety Evaluation Report for the Vogtle Early Site Permit Application," August 30, 2007.
2. Southern Nuclear Operating Company, "Vogtle Early Site Permit Application," Revision 2, NRC Docket No. 52-00011, April 2007.
3. Report dated October 12, 2007, from William J. Hinze, Advisory Committee on Nuclear Waste and Materials, to Dana Powers, ACRS, "Review of Vogtle Early Site Permit Application and NRC's Safety Evaluation Report for the Vogtle Application."

Distribution:

\*\*\*See Next Page

ADAMS ML073070005

<b>OFFICE</b>	ACRS	ACRS	SUNSI	ACRS	ACRS
<b>NAME</b>	DFischer	CSantos	DFischer	FPGillespie	FPG for WJS
<b>DATE</b>	11/13/07	11/16/07	11/16/07	11/20/07	11/20/07

**OFFICIAL RECORD COPY**

File Code FR390

Letter To: Mr. Luis A. Reyes  
Executive Director for Operations

From: William J. Shack, Chairman  
ACRS

Subject: INTERIM LETTER: SOUTHERN NUCLEAR OPERATING COMPANY  
APPLICATION FOR THE VOGTLE EARLY SITE PERMIT AND THE  
ASSOCIATED NRC STAFF'S SAFETY EVALUATION REPORT WITH OPEN  
ITEMS

Date: November 20, 2007

Distribution:			
RidsSecyMailCenter	RidsEDOMailCenter	RidsNRROD	
RidsNMSSOD	RidsFSMEOD	RidsOCAMailCenter	
RidsNSIROD	RidsRESOD	RidsNRROD	
RidsOIGMailCenter	RidsOGCMailCenter	RidsASLBPMailCenter	
RidsOCAAMailCenter	RidsOPAMailCenter	RidsRGN1MailCenter	
RidsRGN2MailCenter	RidsRGN3MailCenter	RidsRGN4MailCenter	
BChamp ABates JPerry SDuraiswamy DPelton	CSantos DBessette HNourbakhsh GShukla PTressler	MBanerjee CHammer JFlack CJaegers	SMcKelvin LMike ZAbdullahi DFischer