



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

October 2, 2007

MEMORANDUM TO: Dr. Dana A. Powers, Chairman  
Early Site Permits Subcommittee

FROM: David C. Fischer, Senior Staff Engineer  
ACRS

SUBJECT: **STATUS REPORT FOR THE MEETING OF THE EARLY SITE PERMITS  
SUBCOMMITTEE, October 24, 2007– ROCKVILLE, MARYLAND**

The purpose of this memorandum is to provide a status report for the meeting of the ACRS Early Site Permits Subcommittee on October 24, 2007. The purpose of the meeting is to review and discuss the application submitted by Southern Nuclear Operating Company (Southern Company or SNC - the applicant) for the Vogtle early site permit (ESP) and the associated NRC staff draft safety evaluation report (DSER) with open items. The Committee must review the application and the final SER 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. The Subcommittee will also discuss with the NRC staff the efficiency and effectiveness of staff's implementation of lessons learned from its review activities performed pursuant to 10 CFR Part 52. The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, for deliberation by the full Committee. Attached please find the agenda, status report, and background materials.

Attendance by the following members is anticipated and reservations have been made at the following hotels for the night of October 23, 2007:

Powers	RESIDENCE INN	Maynard	RESIDENCE INN
Corradini	RESIDENCE INN	Shack	RESIDENCE INN
Armijo	WARDMAN PARK		

Please notify Ms. Barbara Jo. White at (301) 415-7130 if you need to change or cancel the above reservations.

Attachments:

1. Agenda
2. Status Report
3. SNC's application- **CD** , previously submitted to all members
4. NRC Staff's DSER- **CD** (Chapter 1, 2, 3, 11, 13, 15, 17, 18, and 19), previously submitted to all members

cc: ACRS Members  
C. Santos  
S. Durraiswamy

ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
EARLY SITE PERMITS SUBCOMMITTEE  
VOGTLE EARLY SITE PERMIT APPLICATION  
OCTOBER 24, 2007  
ROCKVILLE, MARYLAND

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Attachments:

1. Letter dated September 22, 2006, from G. B. Wallis, Chairman, ACRS, to L. A. Reyes, Executive Director for Operations, NRC, Subject: Lessons Learned From the Review of Early Site Permit Applications.
2. Memorandum dated November 8, 2006, from Annette L. Vietti-Cook, Secretary, NRC, to John T. Larkins, Executive Director, ACRS, Subject: Staff Requirements — Meeting with Advisory Committee on Reactor Safeguards, 2:30 p.m., Friday, October 20, 2006, Commissioners' Conference Room, One White Flint North, Rockville, Maryland (Open to Public Attendance).

Cognizant ACRS Member:

Dr. Dana A. Powers

Cognizant ACRS Staff Engineer:

David Fischer

**Advisory Committee on Reactor Safeguards  
Early Site Permits Subcommittee  
Vogtle Early Site Permit Application  
October 24, 2007  
Rockville, Maryland**

-PROPOSED AGENDA-

Cognizant Staff Engineer: David C. Fischer [DCF@NRC.GOV](mailto:DCF@NRC.GOV) (301) 415-6889

Topics		Lead	Presentation Time
I	Introduction	Dr. D. Powers, ACRS	8:30 am - 8:35 am
II	Southern Nuclear Operating Company - Overview of Application - Response to NRC Issues - Schedule	SNC Rep.	8:35 am -10:15 am
	BREAK		10:15 am - 10:30 am
III	NRC Presentation - Status and Overview - DSER Review - Open Items - Upcoming Milestones - Schedule	T. Bergman, NRO/DNRL C. Araguas, NRO/DNRL	10:30 am - 12:00 pm
	LUNCH		12:00 pm - 1:00 pm
IV	Geology, Seismology, and Geotechnical Engineering	SNC Rep. Y. Li, NRO/DNRL	1:00 pm - 3:00 pm
	Break		3:00 pm - 3:15 pm
V	Radiological Consequences of DBAs	SNC Rep. M. Hart, NRO/DNRL	3:15 pm - 3:30 pm
VI	NRC Staff's Conclusions	C. Araguas, NRO/DNRL	3:30 pm - 3:45 pm
VII	Public Comments		3:45 pm - 4:00 pm
VIII	Status of Implementing Lessons Learned While Conducting Licensing Activities Pursuant to 10 CFR Part 52	C. Araguas, NRO/DNRL	4:00 pm - 4:50 pm
IX	General discussion / Adjourn	Dr. D. Powers, ACRS	4:50 pm - 5:00 pm

**NOTE:**

- Presentation time should not exceed 50 percent of the total time allocated for a specific item. The remaining 50 percent of the time is reserved for discussion.
- 35 copies of the presentation materials to be provided to the Subcommittee.

**ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
EARLY SITE PERMITS SUBCOMMITTEE  
VOGTLE EARLY SITE PERMIT APPLICATION  
OCTOBER 24, 2007  
ROCKVILLE, MARYLAND**

**- STATUS REPORT -**

**PURPOSE**

The purpose of this meeting is to review and discuss the application submitted by Southern Nuclear Operating Company (Southern Company or SNC - the applicant) for the Vogtle early site permit and the associated NRC staff draft safety evaluation report (DSER) with open items. The Committee must review the application and the staff's safety evaluation report (SER) 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. The Subcommittee will also discuss with the NRC staff the efficiency and effectiveness of staff's implementation of lessons learned from its review activities performed pursuant to 10 CFR Part 52.

**BACKGROUND AND DISCUSSION**

**Vogle ESP Application**

By letter dated August 14, 2006, Southern Company submitted an ESP application (ADAMS Accession No. ML062290246) for the Vogtle ESP site. SNC is requesting an ESP with a permit duration of 20 years pursuant to Subpart A, "Early Site Permits", of 10 CFR Part 52. The application was accepted for docketing on September 19, 2006. Some delays were encountered in completing the staff's review of the Vogtle ESP application as a result of SNC revising the methodology it used to generate the seismic response spectra, a methodology not previously approved by the staff.

The Vogtle ESP site, which spans 3,169 acres, is located on a coastal plain bluff on the southwest side of the Savannah River in eastern Burke County, Georgia. The site is approximately 26 miles southeast of Augusta, Georgia and 100 miles northwest of Savannah, Georgia. Directly across from the site, on the eastern side of the Savannah River, is the U.S. Department of Energy's (DOE's) Savannah River Site in Barnwell County, South Carolina.

Years ago (1974), this site was approved for four units, but only two units were constructed. The ESP site is adjacent to two existing nuclear power reactors, Vogtle, Units 1 and 2, operated by SNC. Vogtle Units 1 and 2 are Westinghouse pressurized water reactors (PWRs), each rated at 3,565 MWt. Also on the site are their supporting structures, which include two natural-draft cooling towers (one per unit), associated pumping and discharge structures, water treatment building, switchyard, and training center. Plant Wilson, a six-unit, oil-fueled combustion turbine facility, is also located on the VEGP site, east of Units 1 and 2.

The proposed location of the two additional units is adjacent to the west side of the VEGP Units 1 and 2. The applicant has selected the Westinghouse AP1000 certified reactor design for the ESP application. The design parameters specified in the applicant's SSAR are based on the

addition of two Westinghouse AP1000 units, to be designated Vogtle Units 3 and 4. Each AP1000 has a thermal power rating of 3,400 MWt and a net electrical output of 1,117 megawatts electric. Vogtle Units 3 and 4 will use natural-draft cooling towers architecturally similar to the existing Unit 1 and 2 cooling towers and will be located just south of Units 3 and 4. The cooling towers will be approximately 600 feet high and require an area of 69.3 acres for both towers and their supporting facilities.

In accordance with 10 CFR Part 52, the Vogtle ESP application includes (1) a description of the site and nearby areas that could affect or be affected by a nuclear power plant(s) located at the site, (2) a safety assessment of the site on which the facility would be located, including an analysis and evaluation of the major structures, systems, and components (SSC) of the facility that bear significantly on the acceptability of the site, and (3) a complete and integrated emergency plan. The application describes how the site complies with the requirements of 10 CFR Part 52 and the siting criteria of 10 CFR Part 100, "Reactor Site Criteria."

The SER summarizes the results of the staff's technical evaluation of the suitability of the proposed VEGP site for construction and operation of a nuclear power plant(s) falling within the design parameters that SNC specified in its application. The SER delineates the scope of the technical matters that the staff considered in evaluating the suitability of the site. NRC Review Standard (RS)-002, "Processing Applications for Early Site Permits," provides additional details on the scope and bases of the staff's review of the radiological safety and emergency planning aspects of a proposed nuclear power plant site. RS-002 contains regulatory guidance based on NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (hereafter referred to as the SRP). The SRP reflects the staff's many years of experience in establishing and promulgating guidance to enhance the safety of nuclear facilities, as well as in evaluating safety assessments.

The DSER presents the status of the staff's review of information the applicant submitted to the NRC through June 14, 2007. The staff has identified open items that the applicant must resolve before the NRC can complete its review of the ESP application. To close these items, the staff needs the additional information identified in the SER. The staff will provide the conclusions of its review of the Vogtle ESP application in its final SER (FSER).

The staff's SER summarizes the results of the its technical evaluation of the VEGP site. The staff's evaluation included a technical review of the information and data the applicant submitted, with emphasis on the following principal matters:

- population density and land use characteristics of the site environs and the physical characteristics of the site, including meteorology, hydrology, geology, and seismology, to evaluate whether these characteristics were adequately described and appropriately considered in determining whether the site characteristics are in accordance with the Commission's siting criteria (10 CFR Part 100, Subpart B, "Evaluation Factors for Stationary Power Reactor Site Applications on or After January 10, 1997")
- potential hazards of man-made facilities and activities to a nuclear power plant(s) that might be constructed on the ESP site (e.g., mishaps involving storage of hazardous materials (toxic chemicals, explosives), transportation accidents (aircraft, marine traffic, railways, pipelines), and the existing nuclear power plant at the nearby VEGP units)

- potential capability of the site to support the construction and operation of a nuclear power plant(s) with design parameters falling within those specified in the application under the requirements of 10 CFR Parts 52 and 100
- suitability of the site for development of adequate physical security plans and measures for a nuclear power plant(s)
- proposed complete and integrated emergency plan, should an applicant decide to seek a license to construct and operate a nuclear power plant(s) on the ESP site, any significant impediments to the development of emergency plans for the VEGP site, and a description of contacts and arrangements made with Federal, State, and local government agencies with emergency planning responsibilities
- quality assurance measures SNC applied to the information submitted in support of the ESP application and safety assessment
- the acceptability of the applicant's proposed exclusion area and low-population zone (LPZ) under the dose consequence evaluation factors of 10 CFR 50.34(a)(1)

In developing the DSER, the staff identified certain issues that require additional information. The staff refer to these issues as "Open Items". In addition, the staff has identified items (verification that any ESP application revision is consistent with request for additional information- RAI responses) as resolved, but for which the staff needs confirmation that the applicant has taken the planned action. Also, the staff has identified permit conditions and site-related COL action items that it will recommend the Commission impose should an ESP be issued to the applicant.

A tabulation of permit conditions, COL action items, and SER open items by SER section is provided below along with a summary description of each.

#### Vogle Early Site Permit Application

FSAR/SER Section	Permit Conditions	COL Action Items	Open Items
2.2.3 Nearby Facilities		2	
2.3.1 Regional Climatology		1	1
2.4.8 Cooling Water Canals & Reservoirs	1		1
2.4.12 Groundwater			1
2.4.13 Accidental Releases			2
2.5.2 Vibratory Ground Motion			9
2.5.3 Surface Faulting			1
2.5.4 Stability of Subsurface Materials and Foundations	1	11	12

2.5.5 Stability of Slopes		1	
13.3 Emergency Planning		3	13
13.6 Physical Security		1	
Totals	2	19	40

Permit Conditions

- 2.4.8 Cooling Water Canals & Reservoirs: ESP holder must not rely on external water sources for safety-related cooling (except for initial fill and occasional makeup)
- 2.5.4 Stability of Subsurface Materials and Foundations: Perform geologic mapping of future excavations for safety-related structures

COL Action Items

- 2.2.3 Nearby Facilities: Potential accidental release of hydrazine and other chemicals and subsequent impact on control room habitability
- 2.3.1 Regional Climatology: If applicant relies on cooling towers following a LOCA then assess effect on site meteorological characteristics (typically the AP1000 design would not).
- 2.5.4 Stability of Subsurface Materials and Foundations: Confirm the absence of soft material in the load bearing layer, tests of backfill material, plot plans, ground water conditions, etc.
- 2.5.5 Stability of Slopes: Detailed slope stability analysis for permanent slopes
- 13.3 Emergency Planning: Proposed common TSC location with Units 1 & 2 (as opposed to the TSC location specified in the AP1000 certified design).
- 13.6 Physical Security: Control measures to address the existing rail spur

Open/Confirmatory Items

- 2.3.1 Regional Climatology: AP 1000 specific temperature site characteristics for 100 year return interval. **SNC did not provide adequate site characteristics.**
- 2.4.8 Cooling Water Canals & Reservoirs: Safety-related water for initial fill and occasional makeup
- 2.4.12 Groundwater: Complete description of current and future local hydrological conditions and groundwater-induced loadings on subsurface portions of safety-related structures. **SNC did not provide adequate design parameters, and also did not consider alternate conceptual models for ground water flow at the site.**
- 2.4.13 Accidental Releases: Change in hydrology and its impact on potential release pathways

- 2.5.2 Vibratory Ground Motion: Justification for low weights for the larger  $M_{max}$ , TIP study, evidence to rule out large island earthquakes, justification to support the claim that the equivalent linear approach is suitable for higher strain levels, justification regarding the applicability of Lee (2001) and NUREG/CR-6728 V/H ratios, etc.
  - 2.5.3 Surface Faulting: detailed description of the injection sand dikes and their spatial association with dissolution depressions
  - 2.5.4 Stability of Subsurface Materials and Foundations: Field data and lab test results for soils, site-specific engineering parameters for the load-bearing layer (Blue Bluff Marl), shear wave velocity measurements, etc. **The applicant did not conduct sufficient site investigation to rely on actual data for developing site characteristics (e.g., site SSE, minimum bearing capacity, etc.)**
- 13.3 Emergency Planning: Applicability of Unit 3 ITAAC results to Unit 4, agreements with RMC, update the Burke County EP, basis for sportsmen population in Yuchi Wildlife Management Area, etc. **Although not required for acceptance of the ESP application, the staff identified that SNC did not provide the emergency action levels necessary for approval of a complete and integrated emergency plan. Of concern is the staff's ability to complete its review of SNC's complete and integrated emergency plans. The guidance document under which SNC has submitted its EALs i.e., NEI 07-01, is currently in house for NRC approval and has been experiencing delays. This ESP will contain an emergency planning ITAAC.**

In the Site Safety Analysis Report (SSAR) of the ESP application, SNC provided a list of postulated design parameters, referred to as the PPE. The applicant stated that the PPE approach provides sufficient design details to support the NRC's review of the ESP application. SNC states that the PPE is intended to bound more detailed design to be submitted at the combined license (COL) stage to ensure that the more detailed design fits within the PPE. The PPE references the AP1000 (Westinghouse) design.

The staff has reviewed the proposed PPE values and has found them to be acceptable. Should an ESP be issued for the Vogtle ESP site, an entity might wish to reference that ESP, as well as a certified design, in a COL or construction permit (CP) application. Such a COL or CP applicant would need to demonstrate that the site characteristics established in the ESP bound the postulated site parameters established for the chosen design, and that the design characteristics of the chosen design fall within the PPE values specified in the ESP application.

## GEOLOGY, SEISMOLOGY, AND GEOTECHNICAL ENGINEERING

The Vogtle ESP applicant investigated an area with a radius of 200 miles with progressively finer resolution closer to the site. The site is next to VEGP Units 1 and 2, which were constructed in 1980's and is near the Savannah River site (SRS). The Safety Analysis Report (SAR) integrated all the previous research for VEGP Units 1 and 2 and SRS as well as the applicant's own investigation results for the ESP site. For the purpose of discussion, the NRC staff would like to bring up the following issues to the attention of the ACRS committee. Some of these issues may be site-specific, but some of them may have impact to other future ESP or COL applications too.

### Geology and Seismology (Sections 2.5.1-2.5.3)



- Pen Branch Fault

The fault was detected beneath the ESP site, dipping towards southeast at an angle about 45 degrees. Previous researchers identified the fault as a non-capable fault, not causing earthquakes and with no recent activity. The ESP applicant did further investigations to confirm this conclusion.

- Charleston seismic source updates

One of the largest historical earthquakes (1886) occurred east of the Rocky Mountains in the Charleston area. The Charleston earthquake epicenter is about 100 miles from the site. The earthquake triggered extensive liquefaction in the area. Paleoliquefaction evidence was found in the area indicating similar liquefaction triggering events occurred prior to the 1886 earthquake. The applicant used this evidence to characterize the Charleston seismic source in terms of magnitude and recurrence and integrated the new source configuration into its Probabilistic Seismic Hazard Analysis (PSHA) model for the ESP site.

- Other seismic sources

The ESP applicant used EPRI's seismic source model, developed during the late 1980s, as a starting point for its regional seismic source characterization. The applicant updated its source model with the new Charleston seismic source model, described above. However, the applicant chose not to update other regional seismic source zones described by the EPRI source models. One of the EPRI teams (Dames and Moore) assigned very low probabilities of activity for two seismic source zones, which the staff believes should be updated. Earlier seismic source characterizations for the SRS also reached this conclusion. The effect of these lower probabilities of activity is to lower the seismic hazard for the ESP site.

#### Geotechnical Engineering (Section 2.5.4-2.5.5)

- Limited borings and laboratory tests

The applicant did sufficient soil borings and testing for the ESP site but frequently used previous test results from VEGP Units 1 and 2 results to define design values, such as the undrained shear strength. The applicant's reliance on older data for Units 1 and 2 is due to some anomalous values that it obtained from the ESP site. The applicant is supplementing the ESP data with additional data from its COL site investigations, which has been submitted as part of the LWA request.

- Foundation settlement

Applicant referenced Peck settlement guidelines (total settlement up to 2 in and differential settlement up to  $\frac{3}{4}$  in) but also notes that observed settlements for Units 1 and 2 have been as high as 4.7 in (total). The applicant will perform a settlement analysis as part of its COL application.

#### RADIOLOGICAL CONSEQUENCES OF DESIGN BASIS ACCIDENTS (DBAs)

The Vogtle ESP DSER discussion of the staff's review of the radiological consequences of DBAs

is in Chapter 15.0.3. SNOC used only the approved version of the AP1000 DCD (Rev. 15) as the basis for the site safety analysis. SNOC evaluated the conformance with Part 100 and 50.34 siting dose acceptance criteria by determining the ratio of the Vogtle site-specific atmospheric dispersion factors to the reference atmospheric dispersion factors for the AP1000 design, then applying that ratio of atmospheric dispersion factors to the dose result in the AP1000 DCD for each accident evaluated and found acceptable for the AP1000. Since all the Vogtle site-specific atmospheric dispersion factors for each averaging period are less than the design reference values for the same time period, the accumulated dose during each time period, and consequently the total accumulated dose, would be less for the AP1000 plant on the Vogtle site than it was calculated to be in the AP1000 DCD. Since the AP1000 DCD showed that the dose consequence of each of the DBAs met the dose acceptance criteria and Part 100 and 50.34 limits, the AP1000 on the Vogtle site would also meet the appropriate regulations. This is the same procedure the staff previously used for the ESPs for Grand Gulf, North Anna and Clinton. Vogtle is different than the previous reviews in that only one design (the approved version of the AP1000) is used as the reference plant for the Vogtle ESP.

The staff used the write up in the Grand Gulf ESP DSER to develop the Vogtle ESP DSER Chapter 15.0.3 discussion, so any clarifications that were found necessary in the Grand Gulf review should have been captured in the Vogtle text as well.

### **Implementation of Lessons Learned While Conducting Licensing Activities Pursuant to 10 CFR Part 52**

In a Staff Requirements Memorandum (SRM) dated November 8, 2006, the Commission directed that:

As licensing under Part 52 continues the Committee should advise the Commission on effectiveness and efficiency of staff's implementation of lessons learned in areas it has reviewed, for example, the development of guidance documents for early site permits.

The SECY suspense date for responding to this SRM is November 30, 2007.

### **Staff Engineer Comments and Recommendations**

Based on the Committee's September 22, 2006 letter to the EDO on lessons learned from the review of early site permit applications, the following questions should be addressed during the meeting:

1. What has the staff done to develop a "common understanding" between the staff and the applicant regarding expectations for the application (e.g., RG 1.206, SRP Section 19.0)?
2. Has the staff developed any guidance to ensure reliability of internet information and the continuing ability to retrieve such information?
3. What has the staff done to facilitate the electronic submission of COL applications and updates to these applications?

4. Has the staff taken any steps to ensure that there is advanced dialog between the staff and applicant to identify any new analysis methodologies (such as the performance-based seismic hazard analysis used by the Clinton ESP applicant) that might be introduced in early site permit or COL applications?
5. What, if anything, has the staff done to formalize and/or clarify:
  - the definition and criteria for pertinent site characteristics,
  - criteria for the controlling elements of the plant parameter envelope,
  - guidance on the treatment of the high frequency (10-100 Hz) component of seismic ground motion,
  - guidance on the depth of review of major features of the emergency plan for a proposed new site, and
  - criteria and review guidance for the computation of the probable maximum flood at a proposed site?
6. What guidance has the staff promulgated related to the processes for reporting deficiencies and quality control of activities (e.g., the applicability of 10 CFR Part 21 and 10 CFR Part 50, Appendix B to the early site permit process and holders of early site permits)? The staff's expectation related to the quality controls that a design certification or COL applicant's PRA should be subjected to are specified in new SRP Section 19.0.
7. What has the staff done to ensure that historical weather data used to characterize a site extend over sufficient time intervals to capture cyclical extremes in the weather that will affect plant design?

#### **EXPECTED SUBCOMMITTEE ACTION**

The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, and prepare an interim report to the Chairman on the Vogtle early site permit application and the associated draft Safety Evaluation Report (SER) with open items prepared by the NRC staff. The Vogtle ESP application is scheduled to be discussed during the November 1-3, 2007 ACRS full Committee meeting.

The Subcommittee will gather information, analyze relevant issues and facts, and formulate proposed positions and actions, as appropriate, and prepare a report to the Chairman on the staff's implementation of lessons learned while conducting licensing activities pursuant to 10 CFR Part 52 (e.g., early site permit and design certification reviews). This SRM response is scheduled to be discussed during the November 1-3, 2007 ACRS full Committee meeting.

#### References:

1. Southern Nuclear Operating Company Early Site Permit Application, Revision 2, April 2007, NRC Docket No. 52-00011 (Disc previously provided on 9/6/07).
2. U.S. Nuclear Regulatory Commission, Safety Evaluation Report With Open Items, "Safety Evaluation Report For The Vogtle Early Site Permit Application," August 30, 2007. [Disc previously provided on 9/6/07]

September 22, 2006

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

SUBJECT: LESSONS LEARNED FROM THE REVIEW OF EARLY SITE PERMIT  
APPLICATIONS

Dear Mr. Reyes:

During the 535<sup>th</sup> meeting of the Advisory Committee on Reactor Safeguards (ACRS), September 7-8, 2006, we met with representatives of the NRC staff; Dominion Nuclear North Anna, LLC; System Energy Resources, Inc.; and, Southern Nuclear Operating Company, Inc. to discuss any lessons that may have been learned in the submission, evaluation, and review of the North Anna, Grand Gulf, and Clinton early site permit applications. This matter was also discussed by our Subcommittee on Early Site Permits on September 6, 2006. We had the benefit of the documents referenced.

In accordance with 10 CFR Part 52, Subpart A, early site permit applications address separately safety and environmental issues. The ACRS is required to report on those portions of the applications that concern safety. We have reported separately on each of the applications for North Anna, Grand Gulf, and Clinton. Generally, we have praised both the quality of the applications and the quality of the staff safety evaluation reports on these applications.

Based on our review of the applications and discussions with representatives of the NRC staff and the applicants, two lessons emerged that may have generic applicability, especially to the many Combined License (COL) applications now anticipated by the agency. One lesson concerned the development of a "common understanding" between the staff and the applicant regarding expectations for the application. The second concerned the use of data obtained from the internet to substantiate portions of an application and safety analysis.

The applications we have reviewed have been the first opportunity to exercise the early site permit regulations. Not all the guidance that might be desired has been in place. Some available guidance was written for rules in place in a previous era. Applicants found it important to establish through direct discussions with the staff a common understanding of staff expectations concerning portions of the early site permit applications. Where this common understanding had been established, the preparation of the application and review process were generally smooth. Where a common understanding was not established, the processes often were more time consuming. Time spent by the staff to establish guidance and develop a common understanding with the applicants should facilitate processing of anticipated COL applications.

In the current electronic age, ever more information is becoming available through the internet. This trend will continue and eventually the internet may replace libraries and other information repositories that support engineering and safety analyses. Internet resources have advantages in comparison to familiar printed resources. They also have vulnerabilities that are not suffered by printed resources. Though internet information sources were conservatively and

appropriately handled for the three early site permit applications we have reviewed, it is evident that eventually the staff will have to establish guidance to ensure reliability of internet information and the continuing ability to retrieve such information.

Two of the applicants made specific note of the challenges they faced in the electronic submission of their applications and continuing challenges they face in the electronic submission of updates to these applications. The NRC staff is addressing these challenges in anticipation of electronic submissions of COL applications.

In the course of reviews of the first three early site permit applications, the staff found that it had to discipline the review process by defining criteria for the imposition of permit conditions and COL action items. We have reviewed the criteria staff established and reported favorably on these criteria in our March 24, 2006, report. The applicant for an early site permit application for the Clinton site surprised the staff by invoking a novel, performance-based, seismic hazard analysis. This new methodology deviated markedly from the staff-approved seismic analysis methodology. The staff was able to examine and approve this methodology as it applied to the Clinton early site permit. Again, we reviewed the staff's analysis and reported favorably in our March 24, 2006 report. Nevertheless, the new approach to seismic hazard analysis did strain staff resources. Timely processing of future early site permit applications and COL applications will depend on advance dialog between the staff and the applicants when new analysis methodologies are to be introduced.

The staff has identified other lessons from the review of the first three early site permit applications and is acting upon these lessons. Among the lessons are the needs for:

- definition and criteria for pertinent site characteristics,
- criteria for the controlling elements of the plant parameter envelope,
- guidance on the treatment of the high frequency (10-100 Hz) component of seismic ground motion,
- guidance on the depth of review of major features of the emergency plan for a proposed new site, and
- criteria and review guidance for the computation of the probable maximum flood at a proposed site.

The priority that staff ascribes to addressing these lessons is influenced by its anticipation that future applicants will adopt specific reactor technologies and will not rely on the plant parameter envelope option permitted under the current regulations. The staff also anticipates that future applicants will provide fully integrated emergency plans and will not ask for approval of just specific major features of an emergency plan.

During the review of the early site permit applications, a number of questions arose concerning the applicability of 10 CFR Part 21 and 10 CFR Part 50, Appendix B to the early site permit process and holders of early site permits. The staff did conclude that processes for reporting deficiencies and quality control of activities are needed. The staff now proposes rule changes to make these elements of the regulations applicable to the early site permit process.

Among the characteristics of a proposed site considered in the early site permit process are extremes of weather. There is an evolving understanding of climatic cycles that affect extremes

of weather especially for sites on the east coast of the United States and near the Gulf of Mexico. Though it cannot be claimed that the understanding is well established, it is evident that there are weather cycles with periods on the order of decades that can affect site characteristics. The popular press ensures that the public is aware of this growing understanding of weather cycles. This public awareness may make it particularly important that the staff demonstrate some understanding of these processes and the likely effects of weather cycles on the suitability of proposed sites for nuclear power plants. The staff needs to ensure that historical weather data used to characterize a site extend over sufficient time intervals to capture cyclical extremes in the weather that will affect plant design.

In our meeting with the staff and applicants, a consensus developed that the experiences gained in the course of the early site permit process would aid considerably the preparation of applications for COLs at the sites. Applicants that have not been through the process will benefit from an effort to derive their own lessons to the extent they can from the review of these three early site permit applications. We anticipate that additional lessons will be learned should the staff undertake a review of an early site permit for a so-called "green field" site that is not adjacent to the site of a currently operating nuclear power plant.

Sincerely,

/RA/

Graham B. Wallis  
Chairman

References:

1. Report dated March 12, 2003, from Mario V. Bonaca, Chairman, ACRS, to Richard A. Meserve, NRC Chairman, Subject: Draft Review Standard, RS-002: "Processing Applications For Early Site Permits."
2. Letter dated March 11, 2005, from G. B. Wallis, Chairman, ACRS, to L. A. Reyes, Executive Director for Operations, NRC, Subject: Interim Letter: Draft Safety Evaluation Report on North Anna Early Site Permit Application.
3. Letter dated June 14, 2005, from G. B. Wallis, Chairman, ACRS, to L. A. Reyes, Executive Director for Operations, NRC, Subject: Interim Letter: Draft Safety Evaluation Report on Grand Gulf Early Site Permit Application.
4. Report dated July 18, 2005, from G. B. Wallis, Chairman, ACRS, to N. J. Diaz, Chairman, NRC, Subject: Dominion Nuclear North Anna, LLC, Early Site Permit Application and the Associated NRC Final Safety Evaluation Report.
5. Letter dated September 22, 2005, from G. B. Wallis, Chairman, ACRS, to L. A. Reyes, Executive Director for Operations, NRC, Subject: Interim Letter: Exelon Generation Company, LLC, Application for Early Site Permit and the Associated NRC Staff's Draft Safety Evaluation Report.
6. Letter dated December 23, 2005, from G. B. Wallis, Chairman, ACRS, to L. A. Reyes, Executive Director for Operations, NRC, Subject: Early Site Permit Application for the

Grand Gulf Site and the Associated Final Safety Evaluation Report.

7. Report dated March 24, 2006, from G. B. Wallis, Chairman, ACRS, to N. J. Diaz, Chairman, NRC, Subject: Final Review of the Exelon Generation Company, LLC, Application for an Early Site Permit and the Associated NRC Staff's Final Safety Evaluation Report.
8. Report dated May 22, 2006, from G. B. Wallis, Chairman, ACRS, to N. J. Diaz, Chairman, NRC, Subject: Proposed Revisions to 10 CFR Part 52: Licenses, Certifications, and Approvals for Nuclear Power Plants, and Conforming Amendments to Applicable NRC Regulations.

November 8, 2006

MEMORANDUM TO: John T. Larkins  
Executive Director, ACRS

FROM: Annette L. Vietti-Cook, Secretary */RA/*

SUBJECT: STAFF REQUIREMENTS - MEETING WITH ADVISORY  
COMMITTEE ON REACTOR SAFEGUARDS, 2:30 P.M., FRIDAY,  
OCTOBER 20, 2006, COMMISSIONERS' CONFERENCE ROOM,  
ONE WHITE FLINT NORTH, ROCKVILLE, MARYLAND (OPEN  
TO PUBLIC ATTENDANCE)

The Commission met with the Advisory Committee on Reactor Safeguards (ACRS) to discuss the Committee's activities and current focus.

As licensing under Part 52 continues the Committee should advise the Commission on effectiveness and efficiency of staff's implementation of lessons learned in areas it has reviewed, for example, the development of guidance documents for early site permits.

The Committee should provide its views to the Commission on staff's effort related to digital instrumentation and controls. The Committee should consider potential means for providing reasonable backup, if appropriate.

The ACRS should provide its views to the Commission with respect to staff's work on technology neutral licensing framework with a focus on ensuring the value of such an approach versus the development of a licensing framework for specific designs, such as a high temperature gas cooled reactor or a liquid metal cooled reactor.

The ACRS should provide the Commission with its recommendations and basis for areas in which NRC should perform additional long term research.

The Committee should work with the staff and external stakeholders to evaluate the different Human Reliability models in an effort to propose either a single model for the agency to use or guidance on which model(s) should to be used in specific circumstances.

cc: Chairman Klein  
Commissioner McGaffigan  
Commissioner Merrifield  
Commissioner Jaczko  
Commissioner Lyons  
OGC  
CFO  
OCA  
OIG  
OPA  
Office Directors, Regions, ACRS, ACNW, ASLBP (via E-Mail)  
PDR