



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

ACRSR-2117

March 11, 2005

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

SUBJECT: INTERIM LETTER: DRAFT SAFETY EVALUATION REPORT ON
NORTH ANNA EARLY SITE PERMIT APPLICATION

Dear Mr. Reyes:

During the 520th meeting of the Advisory Committee on Reactor Safeguards (ACRS), March 3-5, 2005, we met with representatives of the NRC staff and Dominion Nuclear North Anna, LLC (Dominion) and discussed the NRC staff's draft safety evaluation report and the application related to North Anna early site permit (ESP). This matter was also discussed during our ESP Subcommittee meeting on March 2, 2005. We are conducting such reviews to fulfill the requirement of 10 CFR 52.23, which states that the ACRS shall report on those portions of an early site permit application that concern safety. We also had the benefit of the documents referenced.

CONCLUSIONS

Staff is preparing a quality safety evaluation of a first-of-a-kind application for an early site permit.

DISCUSSION

Dominion has submitted a first-of-a-kind application for an early site permit. Dominion seeks to locate up to two nuclear power units, each with a thermal power of up to 4300 MW, entirely within the current North Anna power station site about 40 miles north-northwest of Richmond, Virginia. Years ago, this site was approved for four units, but only two units (3-loop Westinghouse pressurized water reactors) were constructed. Both of these units are now operating on the site.

The application by Dominion and the safety evaluation report are lengthy, but nevertheless very readable documents that have been well prepared by their respective authors and represent significant amounts of effort.

At the time of our review, several open items remained under discussion between Dominion and the staff. We determined that none of these open items precluded our review of the application and the safety evaluation report and the preparation of this interim letter.

Applications for early site permits are subject to the requirements of 10 CFR 52.17. Staff's review of these applications is guided by the Review Standard (RS-002) "Processing Applications for Early Site Permits," which we previously reviewed. Major elements required in an early site permit application and staff's findings concerning these elements are discussed below:

- Nature of the Proposed Site

The vicinity of the proposed site is rural in nature. There are no significant industrial, transportation, or military facilities within five miles of the site center. The major water sources available to the site are the North Anna river and the artificial lake adjacent to the site. The dam for this lake is under the control of the applicant. The applicant has recognized that water availability may be insufficient for two water-cooled units and proposes air cooling for one unit on the proposed site.

- Population in the Vicinity of the Site

The permanent population around the site is quite low. The nearest population center, Mineral, Virginia, has a population of less than 500. The nearest significant cities are Fredericksburg (projected Year 2065 population 20,950) at 22 miles and Charlottesville (Year 2000 census population 45,049) at 36 miles. A significant transient population makes use of the recreational opportunities afforded by the lake. The applicant has used methods found acceptable by the staff to show that projected populations in the vicinity of the site through Year 2065 will remain within acceptable limits.

- Geology and Seismicity of the Site

Since construction of the units now on the North Anna site, new methods of seismic hazard analysis have been developed and are recommended by NRC for site characterization. Dominion has undertaken a thorough effort to update geologic and seismic information concerning the site and has made use of the new methods to characterize the site. Staff has approved these analyses as they have been amended in three revisions of the initial application. We are skeptical of accepting categorization of possible quaternary seismic features published in archival documents without scrutinizing the bases for the categorization to ensure these bases are consistent with the needs of safety regulation. The categorization done for this application is not consequential because the applicant has adopted conservative seismic sources.

The proposed North Anna site will have reactors founded on hard rock. Consequently, seismically induced accelerations of interest extend to frequencies in excess of 10 Hz. The applicant has used a "performance based" method described in its application to derive a safe shutdown earthquake spectrum that bounds what was determined by the staff using its own methods. Staff has not endorsed the applicant's methods, but concurs with the conclusion. The safe shutdown earthquake for the site exceeds the design-basis earthquakes for the example plants considered in the development of the early site permit application (the AP1000

pressurized water reactor and the ABWR boiling water reactor). Such discrepancies will have to be addressed when the election is made to actually build nuclear units on the site. The site safe shutdown earthquake also exceeds at frequencies above about 5 Hz the safe shutdown earthquake for the plants currently on the site and it exceeds the limiting earthquake found in the individual plant examination of external events (IPEEE) assessments for these plants at frequencies above about 10 Hz. The staff is pursuing the issues these findings raise. Staff anticipates that displacements associated with the high frequency motions will not pose safety threats to the operating plants.

- Meteorology

The applicant has done a thorough examination of historical meteorological data to set design constraints for such things as maximum rainfall, wind velocities, snowpack, and temperature extremes. Staff has approved these findings. Despite active scientific research and popular interest in the evolution of weather and climate, there is no discussion either in the application or in the safety evaluation report of how weather and climate patterns may be changing. The application and the safety evaluation report should discuss these matters. Indeed, it appears that staff's own guidance (RS-002) indicates that it should do this by stating, "The applicability of these data to represent site conditions during the expected period of reactor operations should be substantiated."

- Potential Radiological Source Terms

For the radiological source term studies, the applicant has selected two advanced reactors as example power plants that could be located on the site. These example plants (AP1000 and the ABWR) have very low predicted core damage frequencies relative to those predicted for the extant plants on the North Anna site. The applicant has used staff-approved methods to deduce that consequences of radionuclide release at the proposed site will be less than considered in the applications for design certification of the example plants. Staff's evaluations verified these conclusions. Neither the application nor the safety evaluation report provides sufficient information for the interested reader to reproduce these analyses or to judge the reasonableness of the conclusions.

- Emergency Plans

The applicant has elected to submit for review just the "major features" of emergency planning for the proposed site, as is allowed by the regulations. Unfortunately, the regulations do not provide a clear definition of what is meant by the term "major features" as it applies to emergency plans. As a result, both the applicant and the staff reviewers have delved into details of emergency plans that will change undoubtedly by the time any decision is made to construct a plant on the site. We question the need for such detailed examinations of emergency plans for proposed sites that are on or adjacent to sites with operating plants having approved emergency plans.

In conclusion, we see a promising start to the first application of the early site permit process both on the part of the applicant and on the part of the staff reviewing the application. We look forward to examining a final version of the staff's safety evaluation report. Furthermore, we hope to work with the staff in the development of "lessons learned" from the review of this and the next few applications for early site permits.

Sincerely,

/RA/

Graham B. Wallis
Chairman

References:

1. U.S. Nuclear Regulatory Commission, Draft Safety Evaluation Report, "Safety Evaluation of Early Site Permit Application in the Matter of Dominion Nuclear North Anna, LLC, for the North Anna Early Site Permit," December 2004.
2. North Anna Early Site Permit Application, Revision 3, September 2004, NRC Docket No. 51-008.
3. U.S. Nuclear Regulatory Commission, Review Standard, RS-002, "Processing Applications for Early Site Permit Applications", May 3, 2004.
4. Report from Mario V. Bonaca, ACRS Chairman, to Richard A. Meserve, NRC Chairman, Subject: Draft Review Standard, RS-002: "Processing Applications For Early Site Permits", dated March 12, 2003.