

May 12, 2004

Mr. David A. Christian  
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Dominion Resources Services, Inc.  
Innsbrook Technical Center  
5000 Dominion Blvd.  
Glen Allen, VA 23060-6711

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 4 -  
DOMINION NUCLEAR NORTH ANNA, LLC EARLY SITE PERMIT  
APPLICATION FOR THE NORTH ANNA ESP SITE (TAC NO. MC1127)

Dear Mr. Christian:

By letter dated September 25, 2003, Dominion Nuclear North Anna, LLC (Dominion) submitted its application for an early site permit (ESP) for the North Anna ESP site.

The Nuclear Regulatory Commission (NRC) staff is performing a detailed review of the Site Safety Analysis Report in your ESP application. The NRC staff is requesting additional information with respect to the application. Various topics are covered in the requests for additional information (RAIs) contained in Enclosure 1. These RAIs were sent to you via electronic mail on April 13, 2004, and were discussed with your staff by phone on April 27, 2004.

Receipt of requested information within 60 days of the date of this letter will support the NRC's efficient and timely review of Dominion's ESP application. Please note that failure to provide a response in a timely fashion may result in a delay of completion of the staff's safety evaluation report.

If you have any questions or comments concerning this matter, you may contact me at (301) 415-1421 or [mls3@nrc.gov](mailto:mls3@nrc.gov).

Sincerely,

*/RA/*

Michael L. Scott, Dominion ESP Project Manager  
New Reactors Section  
New, Research and Test Reactors Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

Docket No. 52-008

Enclosure: As stated

cc: See next page

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Distribution for Request For Additional Information Letter #4 dated: May 12, 2004  
**ML041190447**

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**North Anna Early Site Permit Application  
Site Safety Analysis Report (SSAR)  
Requests for Additional Information (RAI)  
RAI LETTER NO. 4**

SSAR Section 1.3, Plant Parameters Envelope

RAI 1.3-1

SSAR Section 1.3 states that “This PPE approach provides sufficient design details to support NRC[’s] review of the ESP application while also recognizing that technical developments may result in new reactor technologies becoming available that may not have been envisioned at the time of ESP application submittal.” While Table 1.3-1 provides bounding values of plant design parameters, it also states for some parameters: “A site-specific value is provided for this parameter.” This language appears to imply that a site-specific characteristic is provided elsewhere in the application. Please explain the use, in the application, of the plant parameters in Table 1.3-1 for the cases in which site-specific characteristics are provided. Also, please clearly identify site characteristics and plant design parameters that you propose be included as bases for an ESP, should one be issued.

SSAR Section 2.2.2, Description of Nearby Industrial, Transportation, and Military Facilities

RAI 2.2.2-1

Please provide a scoping description of the nature of the industrial development (e.g., light commercial, heavy industrial) that may occur pursuant to the Louisa County Board of Supervisors zoning ordinance allowing industrial development of approximately 620 acres near the site exclusion area boundary (EAB) and indicate the approximate zoned area boundary location on a map that includes the ESP site.

RAI 2.2.2-2

Please provide separate estimates of the annual flight frequency for each of the three military training routes (IR714, IR760, and VR1754) identified in SSAR Section 2.2.2.6.2. The estimates should represent maximum flight frequencies projected over the proposed term of the ESP. Please indicate the source of the estimated flight frequency data.

RAI 2.2.2-3

Please state whether there are any types of pipelines carrying potentially hazardous materials (e.g., propane, chlorine) within five miles of the ESP site. If any hazardous material pipelines are identified, please provide their location on a map (to be withheld from public disclosure per 10 CFR 2.390(d)) that includes the ESP site.

### SSAR Section 2.3.1, Regional Climatology

#### RAI 2.3.1-2

SSAR Section 2.3.1 states that a total of 7 hurricanes and 2 tropical storms passed within 100 nautical miles of the ESP site from January 1950 through June 2002. Please explain whether the tropical storm and hurricane data presented in the SSAR addresses hurricane data for the period 1950 to 1993 (for example, two hurricanes that brought record rainfall to Richmond during 1955, Connie and Diane, as well as hurricane Camille in 1969). If it does not, please address hurricanes in this period or explain why this information is not needed. Also, please include information on Hurricane Isabel in September 2003, or explain why this information is not needed. Please evaluate the impact of these data on the North Anna site characteristics.

#### RAI 2.3.1-3

SSAR Section 2.3.1 states that a total of 65 hail storms, 19 snow storms, and 10 ice storms were reported for the period between 1950 and 2002. These statistics were apparently based on information listed in the U.S. Storm Events Database on the National Climatic Data Center's web site. However, this database only includes hail data from 1955 through to the present and snow and ice events from 1993 through the present. Please identify the source of data for hail events before 1955, and the source of data for snow and ice events before 1993, or clarify the time periods for which data are available for these events.

#### RAI 2.3.1-4

Please provide an estimate of lightning strike frequencies in the vicinity of the North Anna ESP site.

#### RAI 2.3.1-5

The extreme meteorological values for Charlottesville and Richmond presented in SSAR Section 2.3.1.3.4 and SSAR Table 2.3-5 appear to be based on data recorded through 1987. Please address extreme meteorological values for Charlottesville and Richmond from 1987 to the present, or justify why such information is not needed. Also, please address data from other nearby climatic stations in the same climate division as the North Anna ESP site, such as Louisa and Partlow, to confirm that the Charlottesville and Richmond data presented in the SSAR are representative of the regional climatology.

### SSAR Section 2.3.2, Local Climatology

#### RAI 2.3.2-1

Please discuss and provide an evaluation of the potential modification to local meteorological conditions during the period of operation of a nuclear plant or plants falling within the PPE specified in the SSAR as a result of the construction, presence, and operation of those plant(s). Include a discussion on the potential changes in the normal and extreme local meteorological values presented in SSAR Sections 2.3.1 and 2.3.2. The effects of the following on local meteorological conditions should be included in the evaluation:

- a) Terrain modifications that would be expected to occur as a result of construction of a nuclear power plant or plants falling within the PPE (e.g., removal of trees, leveling of ground, installation of lakes and ponds).
- b) Addition of materials and structures of a nuclear power plant or plants falling within the PPE (e.g., buildings, switchgear, parking lots, roads).
- c) Heat and moisture sources that would be expected to result from the operations of a nuclear power plant or plants falling within the PPE.

RAI 2.3.2-2

Please identify the air quality characteristics of the site that would be design and operating bases for a nuclear plant or plants that might be constructed on the ESP site.

SSAR Section 2.4.1-1, Hydrologic Description

RAI 2.4.1-1

Please provide the following information:

- a) Survey coordinates (and associated datum) for the ESP footprint within which all structures, systems, and components important to safety would be located
- b) A drawing showing locations of any existing aquifers in the proposed site area relative to the ESP site footprint
- c) A description or drawing of the likely location of intake tunnels and piping between Lake Anna and the ESP footprint, and conclusions regarding adequacy of space available for this equipment without interfering with the underground piping and structures of existing North Anna, Units 1 and 2
- d) Maximum total service flow rate for the two existing units, and the combined expected service flow rate when all four (2 existing + 2 proposed) units would be operating
- e) Documentation of the margin in the available water budget, including allowance for uncertainties associated with future water and land use, to support the cooling water needs (safety and non-safety) for all four (2 existing + 2 proposed) units

RAI 2.4.1-2

SSAR Section 2.4.1 states that during critical low-flow periods, makeup water will be obtained from both North Anna Reservoir and an external source to be identified by the combined license (COL) applicant. Please provide the amount of supplemental cooling water needed for this purpose.

RAI 2.4.1-3

SSAR Figure 2.4-10 displays the combined North Anna Reservoir and Waste Heat Treatment Facility stage-storage volume relationship. Please provide a description of the method and the data used to construct this figure. Please include in the figure data for lake volumes down to (at least) stage elevation 219 ft.

RAI 2.4.1-4

SSAR Section 2.4.1 provides cooling water withdrawal rates of 2540 cfs for Unit 3 and 44 cfs for Unit 4. Please state whether these rates are based on annual averages or maximums. If they are based on annual averages, please provide estimates for daily maximums. Also, please provide the basis for consumptive loss associated with Unit 4's cooling tower.

SSAR Section 2.4.2, Floods

RAI 2.4.2-1

Please provide a description of likely upstream land use changes and changes in downstream water demand that would alter flood risk. Also, please address the impact of factors affecting potential runoff (urbanization, forest fire, or change in agricultural use), erosion, and sediment deposition on the determination of flood elevation at the site.

RAI 2.4.2-2

Please describe the methodology for documenting historical hill slope failures in the watershed (interviews, literature reviews, web searches, etc.). Please include, for all documented hill slope failures, both the failure mechanism and hill slope properties (e.g., terrain grade, drainage, and soil type).

RAI 2.4.2-3

Please describe the methodology for documenting seismically induced seiches in the Lake Anna Reservoir (interviews, literature reviews, web searches, etc.). Please address any evidence of historical seismically induced seiche in the area, including a description of the seismic event, land damage, date of occurrence, etc.

RAI 2.4.2-4

Please explain why drainage capacity at the existing grade is sufficient to accommodate local intense precipitation. If capacity is not sufficient, please describe (in sufficient detail to show feasibility) any active safety-related drainage systems proposed for the new units. In addition, please indicate whether or not drainage from the proposed site will be accomplished through a drainage canal under the existing railroad spur.

### SSAR Section 2.4.3, Probable Maximum Flood on Streams and Rivers

#### RAI 2.4.3-1

Please provide a calibrated unit hydrograph definition, expressed in terms of input parameters for the Hydrologic Engineering Center watershed modeling code (HEC-1), for an adjacent unregulated basin of size similar to the one in which the site is located, or explain why such a hydrograph is not necessary or appropriate.

#### RAI 2.4.3-2

SSAR Section 2.4.3 describes use of the HEC-1 computer program for computing runoff from the watershed and routing the PMF. Please provide the supporting input files and the software version information that were used to generate results discussed in these sections.

### SSAR Section 2.4.4, Potential Dam Failures

#### RAI 2.4.4-1

Please document the impounded volumes and the locations of Lake Louisa and Lake Orange relative to those of Lake Anna. Also, please describe the methodology for documenting impacts of failure of dams on these lakes on the proposed units.

#### RAI 2.4.4-2

SSAR Section 2.4.4 describes use of a mechanical draft cooling tower over a buried water storage basin. Please provide design parameters, such as basin depth, for this underground basin.

### SSAR Section 2.4.7, Ice Effects

#### RAI 2.4.7-1

Please provide details, including location, duration, and height, on the occurrence of ice dams and subsequent downstream flood waves in the region.

#### RAI 2.4.7-2

SSAR Section 2.4.7.4 states that formation of anchor ice on the trash racks and screens would be assessed during design of the intake structures by the COL applicant. Please provide site characteristics relevant to such an assessment, including constraints on intake design based on propensity for anchor ice and potential ice depth.

#### RAI 2.4.7-3

SSAR Section 2.4.7.5 states that emergency cooling and service water needed to maintain the proposed units in a safe mode would be supplied by a separate ultimate heat sink (UHS). Please describe the source of the cooling water that would be used for this purpose.

#### RAI 2.4.7-4

SSAR Section 2.4.7.5 states that both emergency and service water will be provided by the UHS, and that safety-related facilities will not be affected by ice flow accumulation. Please identify constraints on the design of the UHS with regard to ice formation, and indicate the maximum depth of ice formation in the water stored in the UHS that will ensure protection from freezing or ice formation.

#### RAI 2.4.7-5

SSAR Section 2.4.7.6 states that the PPE snow load is 50 pounds per square foot. Please explain how the local snow load (site characteristic) was calculated. If it was not calculated via the meteorological attributes discussed in Section 2.3.1.3.4, please justify why not.

#### SSAR Section 2.4.9, Channel Diversions

##### RAI 2.4.9-1

Please provide information regarding whether there is any historical or geological evidence of the North Anna River meandering or being diverted or meandering upstream of the proposed site.

#### SSAR Section 2.4.11, Low Water Considerations

##### RAI 2.4.11-1

Please discuss the critical ambient conditions that might limit operation of the UHS or constrain safety-related cooling tower design. One example might be a specific combination of temperature and relative humidity.

##### RAI 2.4.11-2

Please describe likely upstream land use changes and changes in downstream water demand that would alter the intensity or frequency of low-flow conditions. Also, please calculate the availability of cooling water during critical low-flow periods, including sufficient margins to account for future urbanization of the watershed. These margins should be based upon available county and/or state growth management plans.

#### SSAR Section 2.4.12, Groundwater

##### RAI 2.4.12-1

SSAR Figure 2.4-15 reports data between December 2002 and June 2003. Please update the figure with piezometer data from June 2003 to September 2003, and piezometer data prior to December 2002, if it exists, or explain how this span of data represents the seasonal variation in groundwater and how the ESP subsurface investigation program is appropriately consistent with previous groundwater measurements.

SSAR Section 2.4.13, Accidental Releases of Liquid Effluents to Ground and Surface Waters

RAI 2.4.13-1

Please provide a conceptual model of the subsurface environment, with reference to drill logs, as-built fill, and compaction plans. The subsurface conceptual model should provide estimates (and the basis for these estimates) for the hydraulic conductivity of the soil, surface recharge rates, soil and ambient groundwater chemical properties, and piezometric boundary conditions.

SSAR Section 13.6, Industrial Security

RAI 13.6-1

Please explain how the ESP plant parameter envelope (PPE) and surrounding terrain features will provide at least 360 feet of distance (specified in Regulatory Guide 4.7, Revision 2, April 1998) between vital equipment/structures and physical protection components (such as protected area barriers and isolation zones). Specifically, please describe the relationship between the PPE as depicted on figure 1.2-4 of the application and the planned protected area for the new facilities.

SSAR Section 17.1, ESP Quality Assurance

RAI 17.1-1

Please describe the quality assurance measures used to authenticate and verify data retrieved from internet websites that supports information in the SSAR that would affect the design, construction, or operation of structures, systems, and components important to safety.

## NORTH ANNA EARLY SITE PERMIT SERVICE LIST

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