

May 12, 2004

Mr. David A. Christian  
Senior Vice President and Chief Nuclear Officer  
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

May 12, 2004

Mr. David A. Christian  
Senior Vice President and Chief Nuclear Officer  
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

DOCUMENT NAME: C:\ORPCheckout\FileNET\ML041190447.wpd

ACCESSION NO. **ML041190447**

OFFICE	RNRP/PM	EMEB/SC	SPSB/SC	SPSB/SC
NAME	MScott	KManoly	RDennig	MRubin
DATE	5/6/04	5/5/04	4/29/04	5/4/04
OFFICE	IPSB/SC	NSIR/SC	OGC (NLO)	RNRP/SC
NAME	DHatcher	SMorris	RWeismann	LDudes
DATE	4/29/04	4/29/04	5/11/04	5/12/04

**OFFICIAL RECORD COPY**

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

---

Hard Copy  
PUBLIC  
RNRP R/F  
MScott  
JLyons  
LDudes

E-Mail

JDyer/RBorchardt  
DMatthews  
FGillespie  
ACRS  
KCampe  
MRubin  
RDennig  
DThatcher  
SMorris  
RWeisman, OGC  
BHarvey  
GBagchi  
KManoly  
ATardiff  
Lance.vail@pnl.gov  
chris.cook@pnl.gov

**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

Mr. David A. Christian  
Senior Vice President and Chief Nuclear  
Officer  
Dominion Resources Services, Inc.  
Innsbrook Technical Center  
5000 Dominion Blvd.  
Glen Allen, VA 23060-6711

Ms. Lillian M. Cuoco, Esq.  
Senior Counsel  
Dominion Resources Services, Inc.  
Rope Ferry Road  
Building 475, 5<sup>th</sup> Floor  
Waterford, CT 06385

Mr. C. Lee Lintecum  
County Administrator  
Louisa County  
P.O. Box 160  
Louisa, Virginia 23093

Mr. David R. Lewis  
Shaw Pittman  
2300 N Street, N.W.  
Washington, D.C. 20037

Dr. W. T. Lough  
Virginia State Corporation Commission  
Division of Energy Regulation  
P. O. Box 1197  
Richmond, Virginia 23209

Office of the Attorney General  
Commonwealth of Virginia  
900 East Main Street  
Richmond, Virginia 23219

Senior Resident Inspector  
North Anna Power Station  
U. S. Nuclear Regulatory Commission  
1024 Haley Drive  
Mineral, Virginia 23117

Mr. Robert B. Strobe, M.D., M.P.H.  
State Health Commissioner  
Office of the Commissioner  
Virginia Department of Health  
P. O. Box 2448  
Richmond, Virginia 23218

Mr. David Lochbaum  
Union of Concerned Scientists  
1707 H Street, NW  
Suite 600  
Washington, DC 20006-3919

Mr. Paul Gunter  
Director of the Reactor Watchdog Project  
Nuclear Information & Resource Service  
1424 16<sup>th</sup> Street, NW, Suite 404  
Washington, DC 20036

Mr. Ron Simard  
Nuclear Energy Institute  
Suite 400  
1776 I Street, NW  
Washington, DC 20006-3708

Mr. Russell Bell  
Nuclear Energy Institute  
Suite 400  
1776 I Street, NW  
Washington, DC 20006-3708

Mr. Thomas P. Miller  
U.S. Department of Energy  
Headquarters - Germantown  
19901 Germantown Road  
Germantown, MD 20874-1290

Mr. James Riccio  
Greenpeace  
702 H Street, NW, Suite 300  
Washington, DC 20001

Ms. Patricia Campbell  
Winston & Strawn  
1400 L Street, NW  
Washington, DC 20005

Mr. James F. Mallay, Director  
Regulatory Affairs  
FRAMATOME, ANP  
3315 Old Forest Road  
Lynchburg, VA 24501

Mr. Ernie H. Kennedy  
Vice President New Plants  
Nuclear Plant Projects  
Westinghouse Electric Company  
2000 Day Hill Road  
Windsor, CT 06095-0500

Dr. Regis A. Matzie  
Senior Vice President and  
Chief Technology Officer  
Westinghouse Electric Company  
2000 Day Hill Road  
Windsor, CT 06095-0500

## NORTH ANNA EARLY SITE PERMIT SERVICE LIST

Mr. Gary Wright, Manager  
Division of Nuclear Safety  
Illinois Emergency Management Agency  
1035 Outer Park Drive  
Springfield, IL 62704

Mr. Vince Langman  
Licensing Manager  
Atomic Energy of Canada Limited  
2251 Speakman Drive  
Mississauga, Ontario  
Canada L5K 1B2

Mr. Ed Wallace, General Manager  
Projects  
PBMR Pty LTD  
PO Box 9396  
Centurion 0046  
Republic of South Africa

Mr. David Ritter  
Research Associate on Nuclear Energy  
Public Citizens Critical Mass Energy  
and Environmental Program  
215 Pennsylvania Avenue, SE  
Washington, DC 20003

Mr. Tom Clements  
6703 Guide Avenue  
Takoma Park, MD 20912

Mr. Paul Leventhal  
Nuclear Control Institute  
1000 Connecticut Avenue, NW  
Suite 410  
Washington, DC 20036

Mr. Jack W. Roe  
SCIENTECH, INC.  
910 Clopper Road  
Gaithersburg, MD 20878

Dr. Gail H. Marcus  
U.S. Department of Energy  
Room 5A-143  
1000 Independence Ave., SW  
Washington, DC 20585

Mr. Charles Brinkman  
Westinghouse Electric Co.  
Washington Operations  
12300 Twinbrook Pkwy., Suite 330  
Rockville, MD 20852

Mr. Marvin Fertel  
Senior Vice President  
and Chief Nuclear Officer  
Nuclear Energy Institute  
Suite 400  
1776 I Street, NW  
Washington, DC 20006-3708

Dr. Glenn R. George  
PA Consulting Group  
130 Potter Street  
Haddonfield, NJ 08033

Mr. Arthur R. Woods  
Enercon Services, Inc.  
500 TownPark Lane  
Kennesaw, GA 30144

Ms. Vanessa E. Quinn, Chief  
Radiological Emergency Preparedness  
Branch  
Department of Homeland Security/FEMA  
500 C Street, SW  
Washington, DC 20472

Mr. Michael M. Cline, State Coordinator  
Virginia Department of Emergency  
Management  
10501 Trade Court  
Richmond, Virginia 23236-3713

Mr. Jim Debiec  
Director - Power Production  
Old Dominion Electric Cooperative  
4201 Dominion Blvd  
Glen Allen, VA 23060

Mr. Thomas Mundy  
Director, Project Development  
Exelon Generation  
200 Exelon Way, KSA3-N  
Kennett Square, PA 19348

Ms. Joanne Tetrault  
Librarian  
Louisa County Public Library  
881 Davis Highway  
Mineral, VA 23117

Ms. Abhaya Thiele  
406 Key West Drive  
Charlottesville, VA 22911

## NORTH ANNA EARLY SITE PERMIT SERVICE LIST

### External E-mail

David\_Christian@dom.com  
Eugene\_Grecheck@dom.com  
Jack\_Davis@dom.com  
Marvin\_Smith@dom.com  
Joseph\_Hegner@dom.com  
Lillian\_Cuoco@dom.com  
David\_Sommers@dom.com  
Maggie\_McClure@dom.com  
david.lewis@shawpittman.com  
gzinke@entergy.com  
eddie.grant@exeloncorp.com