

March 22, 2006

MEMORANDUM TO: File

FROM: George F. Wunder, Project Manager */RA/*  
New Reactor Licensing Branch  
Division of New Reactor Licensing  
Office of Nuclear Reactor Regulation

SUBJECT: DOMINION NUCLEAR NORTH ANNA, LLC EARLY SITE PERMIT  
APPLICATION - SUMMARY OF TELEPHONE CALL HELD ON  
FEBRUARY 28, 2006, TO DISCUSS QUESTIONS ON APPLICATION  
SUPPLEMENT

This memorandum documents the results of a telephone conference between the NRC staff and Dominion Nuclear North Anna, LLC on February 28, 2006.

A summary of the call is attached.

Attachment: As stated

Docket No. 52-008

MEMORANDUM TO: File

March 22, 2006

FROM: George F. Wunder, Project Manager */RA/*  
New Reactor Licensing Branch  
Division of New Reactor Licensing  
Office of Nuclear Reactor Regulation

SUBJECT: DOMINION NUCLEAR NORTH ANNA, LLC EARLY SITE PERMIT  
APPLICATION - SUMMARY OF TELEPHONE CALL HELD ON  
FEBRUARY 28, 2006, TO DISCUSS QUESTIONS ON APPLICATION  
SUPPLEMENT

This memorandum documents the results of a telephone conference between the NRC staff and Dominion Nuclear North Anna, LLC on February 28, 2006.

A summary of the call is attached.

Attachment: As stated

Docket No. 52-008

Distribution:

NRBA Rdg.

NPatel

LDudes

LRossbach

JSegala

GWunder

ADAMS ACCESSION NO. ML060660457

OFFICE	PM:NRBA
NAME	GWunder
DATE	03/21/2006

OFFICIAL RECORD COPY

## Telephone Call Summary

Subject: Clarification of NRC Questions

Date of Call: February 28, 2006

### Participants

#### NRC

N. Patel  
J. Cushing  
J. Lee  
R. Harvey  
R. Palla  
L. Rossbach  
J. Segala  
G. Wunder  
M. Parkhurst (contractor)  
V. Ramsdell (contractor)

#### Dominion

J. Hegner,  
M. Smith  
T. Banks  
J. Waddill  
S. Routh (Bechtel)  
K. Jha (Bechtel)  
D. Patton (Bechtel)  
Y. Lin (Bechtel)  
R. Baker (Bechtel)  
R. Prunty (Bechtel)  
K. Patterson (Tetra Tech)  
P. Moore (Tetra Tech)

### Actions

#### Topic

#### NRC

#### Applicant

Question on mixed waste	Remove question
-------------------------	-----------------

### Other Discussion

The staff and the applicant discussed the staff's proposed questions regarding the January 16, 2006, supplement to Dominion's early site permit application. The discussion focused on questions 8, 9, 13, 14, 15, and 17 of the attached draft talking points. The discussion was of a general nature and was intended to inform the licensee of the level of detail that the staff expected in the applicants' responses to our questions. The questions were in draft form at the time of this call but were issued formally on March 2, 2006. The staff agreed to remove question 17 g. of the attached draft talking points regarding the amount and character of mixed waste that would be released as a result of the addition of cooling towers. The staff agreed to remove this question because the cooling towers would not result in the release of mixed waste. No regulatory decisions were made during the course of this call.

## **Draft Talking Points Only to Support February 15, 2006 Telcon**

### **Additional Information Needed Regarding Dominion Nuclear North Anna, LLC (Dominion) Supplemental ESP Application For the North Anna Early Site Permit (ESP) Site**

The staff has identified the additional information needed in the revised application due to the changes made by Dominion to the cooling system for Unit 3 and the increase in power level from 4300 Mwt to 4500 Mwt for Units 3 and 4. These changes affected many sections of the environmental report (ER) and the site safety analysis report (SSAR).

The comments are based on the staff's review guidance contained in Review Standard (RS)-002, *Processing Applications for Early Site Permits*. The comments are organized into three general categories: (1) information needed due to the change to the cooling system; (2) information needed due to the power increase; and (3) justification for those sections identified as unaffected. Some comments apply to more than one category or apply to both the SSAR and the ER. The identification of sections affected by the comments is not meant to be exhaustive.

The general areas of the application for which the staff needs additional information include more detail on the operating procedure for the Unit 3 wet and dry cooling system, aquatic impacts, wet cooling tower impacts, power increase (specifically the ESBWR source term), and justification for areas identified as unaffected.

In several instances the supplement states that the detailed information is not available and will be provided in a COL application. While design level information is not required at the ESP stage, sufficient information is required at the ESP stage for the staff to evaluate the impacts of construction and operation. Where the design level information is lacking the applicant should make reasonable assumptions about the potential design and then evaluate the impact based on those assumptions.

#### **Information Needed Due to the Change to the Cooling System**

##### **Wet Cooling tower**

##### **1. Drift**

- a. ER Section 3.1.5 — Provide an evaluation of cooling tower drift and visible plumes.
- b. ER Table 3.1-9 — Include a plant parameter envelope (PPE) value related to cooling tower drift for the Unit 3 wet cooling tower.
- c. ER Table 3.3-1 — Include drift estimates for the cooling towers.
- d. ER Sections 3.4.1.1, 3.6.1 — Drift needs to be evaluated in these sections.
- e. ER Section 5.1.1 — Drift should be included in the list.

## 2. Noise

### ER Section 5.8.1.2

This section concluded that the noise associated with the new cooling design would not cause adverse offsite impacts and that a noise study would be described in the combined license (COL) application.

- a. Please explain why the statement “noise impacts could be significant if dry towers are located near residential areas” is not contradicted by the statement, “Although noise would not cause adverse offsite impacts....”
- b. Will the noise impact be “significant” or “not” to cause adverse offsite impacts?
- c. Describe the low-frequency noise that would be produced by the dry cooling towers.
- d. Describe calculations and assumptions used to estimate noise levels at the exclusion area boundary (EAB) and closest residence. Include initial sound levels (background and cooling towers), the number of sources, distances, and attenuation factors considered in reaching a conclusion but not included in the calculations.
- e. Describe any noise measurements made onsite and their results.
- f. Describe any planned noise measurements and their use.
- g. ER Section 3.1.5 states that operation of the cooling fans would produce noise below 60–65 dbA at the EAB. Table 3.1-9 lists this noise level for the Unit 4 dry towers, but does not provide values for Unit 3 or the ultimate heat sink (UHS) towers. If all of the towers are running (Unit 3 dry and wet, Unit 4 dry, and the UHS towers), would the total noise level still be below 65 dbA at the EAB

## 3. ER Section 3.4.1.1

Explain the statement, “The wet towers would incorporate water savings features to reduce evaporative water losses.”

## 4. Terrestrial Ecosystems

### ER Section 2.4.1.8, Wetlands

Have the wetland delineations performed by Davis Environmental Consultants been confirmed by the Army Corp of Engineers (ACOE) as recommended in the November 14, 2005, wetlands report / letter from Davis to Dominion (Reference 44 of the supplement)? What were the results if this did happen? Are there any areas identified as ACOE jurisdictional wetlands under the Clean Water Act? If so, what protection or mitigation measures have been proposed or agreed to?

5. ER Section 4.3

The public (Letter from Friends of Lake Anna to Jack Cushing, NRC and Ellie Irons, VDEQ, August 31, 2005) identified a couple of potential eagle nests within 2 or 3 miles of the North Anna discharge canal— coordinates are provided in that letter—can Dominion provide information concerning these nests—are they eagle nests, what are the locations, and how may these nests be affected by plant construction or operation?

6. Aesthetic

ER Section 5.8.1.5

Provide an evaluation of the aesthetic impacts of the moisture plumes from the cooling towers. Estimate by season (summer, fall, winter, spring ) the approximate percentage of the time that plume would be visible above the containment building and would extend more than 0.5 miles. Provide this information for two cases: 1) with the wet cooling towers operating 100% of the time in energy Conservation (EC) mode and 2) with the wet cooling towers operating 100% of the time in maximum water conservation (MWC) mode.

7. Human Health

ER Section 5.3.4.1

Recent correspondence with Virginia Department of Health (VDH, September 2005) addressed the health risks associated with exposure to *Naegleria fowleri*. Dominion stated in its supplement that it is working with state agencies to communicate to residents around the waste heat treatment facility (WHTF), information related to risk that was provided in the VDH correspondence.

- a. Provide the status and documentation of the communication regarding the risk from thermophilic organisms to the residents around the WHTF.
- b. Provide an evaluation of the thermophilic micro-organisms in the basins below the wet cooling towers.
- c. In view of the fact that the WHTF, although regulated as an private pond with a point of compliance at Dike 3, is also used for water-based recreation (especially swimming), specifically include a cumulative analysis of any health impacts of swimming in the WHTF. Include in your analysis the fact that the cooling water blowdown from the wet cooling towers will be regulated as an internal source in accordance with 40 CFR 423.10.

- d. ER Section 5.3.2.2.2- Justify the statement that “concentrations of chemicals and solids would be below applicable VPDES permit levels at the point of compliance, the Dike 3 discharge.” In view of the fact that the WHTF, although regulated as an industrial waste heat treatment facility, is also used for water-based recreation (especially swimming), would there be any potential impacts on human health to members of the public from increased concentrations of chemicals and solids within the WHTF?

8. Meteorology

- a. SSAR Section 2.3.2 and ER Section 2.7.4.1

Please describe how potential increases in atmospheric moisture resulting from the operation of a wet cooling tower for proposed Unit 3 would impact onsite humidity data and provide a quantitative analysis for the potential for increased fog formation.

- b. SSAR Section 2.3.2.3

Please describe how potential increases in atmospheric temperature and moisture resulting from the operation of a closed-cycle dry and wet cooling tower system for proposed Unit 3 would impact plant design and operation.

- c. ER Section 5.3.3.1

1. The North Anna WHTF has been in operation for more than 20 years. What is the basis for using meteorological data collected more than 30 miles from the site rather than site data for analyzing steam fog?
2. What is the basis for the statement that “Salt deposition rates would be below the threshold value of 1 kg/ha/month beyond the site boundary at ground levels.” ?
3. The supplement states: “In a COL application, when a specific reactor design is selected, a more detailed evaluation would be made of the fogging and salt deposition, and specific design consideration would be given to mitigate the effects of these phenomena or to eliminate them from occurring.” Provide the detailed evaluation of fogging and salt deposition, so that the staff can reach its conclusion on the impacts of fogging and salt deposition. Include a discussion of mitigation, if necessary.
4. What are the “industry standard techniques for limiting fogging?”
5. What is a “reasonable level” for fogging?

- d. ER Section 5.3.3.2.1

The first sentence Section 5.3.3.2.1 states: “As concluded in Section 5.3.3.1, steam fog formation, drift and steam-fog-induced icing conditions resulting from operation of the WHTF are very localized and infrequent at the NAPS site.” Provide the justification for

the above statement given that a detailed evaluation would not be performed until a COL application is submitted.

**9. Land Use**

- a. SSAR Section 2.3.2.4 and ER Section 2.7.4.1.7

A sentence in the last paragraph of SSAR Section 2.3.2.4 and ER Section 2.7.4.1.7 states "No large-scale cut and fill activities would be needed to accommodate the new units since a large portion of the area to be developed is already relatively level." Given the additional land area that the wet and dry towers for unit 3 will require in comparison to a once through cooling system, please confirm or revise the above statement.

- b. ER Section 4.1

Given the change in cooling system for Unit 3, is the total land requirements shown in Section 4.1.1.4 and Table 4.1-2 of the ESP environmental report still the same? Will the overall footprint of the cooling towers, including areas that will be cleared to support construction and laydown areas, etc. fit within the 55 acres previously identified as the cooling tower area. If not then, please provide updated land use figures.

- c. ER Section 5.3.3.2.2

What is the expected atmospheric temperature rise at the vegetation level 100 meters from the towers and at the NAPS site boundary?

**10. Construction**

ER Table 3.1-1 and Table 3.1-9

The construction of the Unit 3 cooling tower, together with a larger capacity facility (2 units at 4500 MWt rather than at 4300 MWt each), implies a different set of construction requirements than the once-through cooling system originally proposed. Please confirm that the number of construction personnel (combined maximum of 5000 for two units) is the same as originally stated, the number of operating personnel is still 720 for the two new units, and that the number of additional outage personnel is still 700-1000. If these numbers have changed, please provide the new values, and make adjustments to the corresponding values in all of the sections of the ER that depend on these values.

**11. Hydrology/Water Use and Quality**

- a. In PPE Table 3.1-1 Cooling Water Temperature Rise is included. Explain why this value is relevant as a PPE value for a cooling tower design.
- b. In Site Characteristics and Design Parameters Table 3.1-9, a 96% plant capacity factor was used to define the average evaporation rate. Explain the way the average was estimated. What would be the average at 100% load factor? Justify why a load factor



of 96% (and 93% for existing units) would be appropriate during critical periods (e.g. dry summers, droughts, etc.)

- c. Provide a copy of Dominion's response to the Commonwealth of Virginia's questions regarding water use and quality and aquatic impacts.
- d. Provide a water quality analysis in sufficient detail for the staff to meet its obligations under 10 CFR 51.71 footnote 3, to weigh the environmental effects of degradation if any in water quality as a result of the new cooling systems. Include documentation of any consultations with VDEQ that the blowdown constituents and concentrations being discharged will likely be acceptable.
- e. The 250 MSL lake level was established to define the trigger to shift between energy conservation and water conservation modes. Provide documentation of the basis for selecting this trigger and the 7 day lag before the trigger is activated. If any consultation with VDEQ has occurred on establishing this trigger rule, provide a copy of this documentation. If any studies were conducted to assess the impact of increasing or decreasing this trigger, provide a description of the studies.
- f. The volume of water in Lake Anna will be reduced due to the evaporation from Unit 3's wet tower. This reduction in lake volume will mean less volume to disperse the heat from Units 1 and 2 and therefore some increase in lake temperature will result. This indirect increase in lake temperature would cause some increased evaporation. Provide documentation demonstrating that this indirect increase in lake temperature and evaporation is insignificant.
- g. Provide an electronic copy of the analysis spreadsheet used to estimate the lake level and downstream flow impacts.
- h. Quantitatively define the relationship between meteorological conditions and the percent of heat load being dissipated via dry towers during water conservation mode.
- i. SSAR Section 2.4.11.3 discusses consumption of additional water and outflow from the dam. Provide an analysis of the number of additional days reduced flow related to operation of Unit 3.
- j. Giving an example of the time period (e.g. 7 days) is not sufficient for the staff to conduct its analysis. Define the reasonable period of time before below 250 ft msl before entry into the MWC mode.
- k. Provide the maximum amount of water Unit 3 would consume at the following levels: above 250 msl, 248-250 msl, and below 248 msl. Based on the above water use, evaluate the impact on lake level and downstream users.
- l. Given the change in cooling system provide further analysis on Unit 3 alternative 6 (drycooling). Include in your analysis the environmental impacts of the efficiency penalty of drycooling (increased fuel consumption) versus the base case of combination wet and dry cooling towers.

m. With respect to SSAR Section 2.4, the ESP application supplement changed the normal plant cooling system for proposed Unit 3 from a once-through system to a wet and dry hybrid cooling tower system. There is insufficient information in the ESP application supplement for staff to determine how the hybrid cooling tower system interacts with safety-related structures and components. The ESP supplement also does not provide sufficient information for the staff to assess the reliability of the hybrid cooling tower system inasmuch as it affects the reliance of Unit 3 on its emergency cooling system.

1. Please provide a conceptual description of the hybrid cooling tower system, its interaction with safety-related components, and an assessment of the reliability of this system.
2. Please describe how the hybrid cooling towers function for the normal cooling system (NCS) for the plant, whether or not the NCS draws water from the ultimate heat sink (UHS) underground reservoir. If so, show how remaining volume of water in the UHS reservoir will be adequate for 30 day cooling supply for the safety system cooling.
3. In order to show that there is no abrupt or frequent reliance on the UHS, provide estimate of frequency of reliance on the UHS due to various failure modes of the hybrid NCS.
4. Any increase of the required lake water surface elevation above 250 ft MSL will require a staff re-evaluation of the probable maximum flood elevation at the proposed ESP site. If the lake water surface elevation is increased above 250 ft MSL, then please provide an analysis of the probable maximum flood (PMF) for the new and increased lake level.

**12. ER-Aquatic Impacts**

- a. Section 5.2.2.2 states that the frequency low outflow would increase. Provide an analysis of the impact to fish and other aquatic communities in the North Anna River downstream of the dam. Include striped bass in the evaluation.
- b. Dominion's RAI response dated April 12, 2005, stated that Dominion planned to provide assistance to aid the Virginia Department of Game and Inland Fisheries (VDGIF) in development and stocking of a more thermally tolerate species, such as sterile white bass/striped bass hybrid. Given the change to the cooling system, does Dominion still plan to provide this assistance?

**13. ER-State Permits**

Regulatory Guide 4.7, General Site Suitability Criteria for Nuclear Power Stations, Section 7.2, states:

To evaluate the suitability of sites, there should be reasonable assurance that permits for consumptive use of water in the quantities needed for a nuclear power

plant of the stated approximate capacity and type of cooling system can be obtained by the applicant from the appropriate State, local, or regional agency.

- a. Provide documentation from the Commonwealth of Virginia of reasonable assurance that permits for consumptive water use could be obtained.
- b. What is your schedule for obtaining the Coastal Zone Management Act consistency certification?
- c. The Virginia Pollution Discharge Elimination System (VPDES) permits for the existing Units 1 and 2, are undergoing renewal. Because the operating limits in these permits factor into the analysis for Unit 3, as necessary update the analysis to account for any changes in the permit. Provide within 30 days of issuance of the renewed permits the updated analysis to the NRC or justification for why the analysis is not affected.

#### **Information Needed Due to the Power Increase**

14. In your supplement to the North Anna SSAR and ER Section 7.1, please address the following source term related issues for the ESBWR design demonstrating that whether the reactor accident source term PPE values specified in NUREG-1835 and in your North Anna SSAR are still appropriate, and that the radiological consequence doses at the proposed ESP site would meet the requirements of 10 CFR 50.34:
  - a. Please provide ESBWR source terms for 4590 MWt (102% of requested power level to account for uncertainty). The source terms are expressed as the timing and release rate of fission products to the environment from the proposed ESP site.
  - b. Please provide selected design basis accidents based on the proposed version of ESBWR design for evaluating the compliance of the proposed ESP site with the dose consequence evaluation factors specified in 10 CFR 50.34(a)(1).
  - c. Please provide ESBWR design-specific  $\chi/Q$  values used in the ESBWR design and compare them with the site-specific  $\chi/Q$  values at the proposed ESP site.
15. ER Section 7.2 Severe Accidents
  - a. Please include the results of a site-specific assessment of the consequences of severe accidents for air and surface water pathways based on the results of the MACCS2 computer code.
  - b. Provide electronic copies of input and output files for the MACCS2 code for an ESBWR at 4500 MWt.
  - c. For an ESBWR, please provide and justify the accident release categories and the core damage frequency for each release category.

- d. Compare the environmental risks from severe accidents initiated by internal events for an ABWR, an AP1000, and an ESBWR with those for current operating reactors undergoing license renewal.

**16. ER-Fuel Transportation**

Provide an assessment of the impacts of the revised power levels on the numbers of shipments of unirradiated fuel, spent fuel, and radioactive waste and the radionuclide inventories of spent fuel assemblies.

**Justification for Those Sections Identified as Unaffected**

- 17.** The supplement lacks justification concerning why those sections identified as unaffected by the change to the cooling system and the increase in power level are unaffected. For example, why is ER Section 7.2, Severe Accidents, not affected by the increase in power from 4300 - 4500 MWt? Provide justification for why sections identified as unaffected are not affected. Examples are given below.

a. ER Section 1.2

ER Section 1.2 and the associated table state that a Coastal Zone Management Act (CZMA) consistency determination is not applicable. Given that Dominion has submitted its project to the Commonwealth of Virginia for a consistency determination, justify or revise the first sentence of the first paragraph, the next to last sentence of third paragraph, and the entry in Table 1.2-1 which lists the CZMA as N/A.

b. ER Section 2.7.1.4

Because of the addition of a wet cooling tower, include a discussion of humidity on site at the level of the cooling tower exit.

c. ER Section 2.7.4.1.4

Given the change to a wet cooling tower, provide a discussion of the impact on onsite humidity data.

d. ER Section 2.7.4.1.6

Given the change to a wet cooling tower, provide a quantitative analysis of the potential fog increase. The analysis should be based on onsite humidity data.

e. ER Section 3.1.4

This section should discuss the cooling towers.

Figure 3.1-3 — The placement of the callout to note 4 in the center of the ESP cooling tower area is misleading. It would lead one to believe that the minimum distance from the cooling towers to the EAB was 2850 ft, rather than about 300 ft.

f. ER Section 3.6.3.3

Include a discussion of any scale or other waste from the wet cooling tower and potential wastes from cleaning the dry towers

g. ER Section 5.5.2

Would the addition of a wet cooling tower change the amount or character of mixed wastes? If so provide a discussion of the mixed wastes associated with the cooling tower.

h. ER Section 5.8.1.2

Provide an estimate of the maximum height of trees on the site that may help block view of new facilities from offsite locations. The location of the cooling towers needs to be clearly identified in Figure 5.8-1.

i. ER Section 5.8.2.3

For any operations scenario that results in Lake Anna water levels above 250 feet, discuss any impacts on recreation and lakeshore property as a result of changes in lake levels. For any water levels above 250 feet, discuss impacts on the usability of Lake Anna State Park and boat ramps, marina boat ramps and wet slips, and private docks and boathouses.

j. ER Section 6.4.1 and SSAR Section 2.3.3

Section 6.4 of the Environmental Standard Review Plan (NUREG-1555) states that in order to provide an adequate meteorological database for evaluating the effects of plant operation, basic onsite meteorological instrumentation should include atmospheric moisture measurements at height(s) representative of water-vapor release at sites at which large quantities of water vapor are emitted during plant operation. Likewise, SSAR Section 1.8.2 states that the SSAR conforms to Proposed Revision 1 to Regulatory Guide (RG) 1.23, "Onsite Meteorological Programs." Section C.2 of Proposed Revision 1 to RG 1.23 states "ambient moisture should be monitored at approximately 10 meters and also at a height where the measurements will represent the resultant atmospheric moisture content if cooling towers are to be used for heat dissipation." Please provide the additional onsite humidity meteorological information at a height where the measurements will represent the resultant atmospheric moisture content if wet cooling towers are to be used for heat dissipation for Unit 3.

k. ER Sections 7.1.1 and 7.2

Revise these sections of the ER to make them consistent with the response to SSAR/ER RAI on accident analysis.

l. ER Section 7.1.2

The application shows design certification X/Q values (atmospheric dispersion factors) that are a function of time. The site X/Q values should also be a function of time. The DBA calculations should use 50% X/Q values for varying time periods in accordance with NRC guidance rather than time-independent values. The X/Q ratios shown in Table 7.1-1 are not consistent. They should be replaced by ratios where both the site and design X/Q values are functions of time.

m. ER Section 9.3

Justify not re-evaluating the rating of the North Anna site in the light of the changes to the cooling system. Discuss the differences that the cooling system change would have on the North Anna site rating.