From: Michael Scott
To: Joseph_Hegner@dom.com
Date: Tue, Jan 13, 2004 10:55 AM
Subject: DRAFT REQUESTS FOR ADDITIONAL INFORMATION

Please find attached the NRC staff's first package of preliminary questions, in the form of draft requests for additional information (RAIs) for the North Anna ESP review. The process for handling these draft RAIs, as well as other draft RAIs that will be provided in subsequent packages, is as follows:

1. The NRC staff provides draft RAIs (preliminary questions) by e-mail (e.g., this memo).

2. The applicant looks over the draft RAIs and has the opportunity to request a phone con or meeting with the cognizant staff if the applicant needs clarification of the RAIs or believes the information requested in them has already been provided or is not needed.

3. If additional information is needed from the applicant, the applicant informs the staff of expected date(s) of response to the RAIs.

4. After the phone con or meeting occurs (if requested) and planned response dates are determined (if applicable), the staff sends the RAIs under cover letter with copy to the docket. The letter will also note that the phone con or meeting occurred (if it did) and the mutually agreed upon response date(s) to the RAIs.

The RAIs in this package address the areas of meteorology and emergency planning. Additional RAIs will likely be developed in these areas and will be forwarded to you on or before 6/3/04 in accordance with the planned North Anna review schedule. We are providing these RAIs at this time to facilitate the review and to support meeting the review schedule. Your timely response to them will also support meeting the review schedule milestones. Partial submittals would be welcome to minimize delays.

Please contact me if you have questions.

Sincerely,

Michael L (Mike) Scott
Senior Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Phone (301) 415-1421

CC: Andrew Kugler; Bruce Musico; Daniel Barss; Eric Weiss; Jay Lee; Laura Dudes; Laura Zaccari; Leta Brown; Nanette Gilles; R. Brad Harvey; Robert Dennig; Robert Weisman; Stephen Koenick

Mail Envelope Properties (400414FB.882 : 4 : 19783)

Subject: DRAFT REQUESTS FOR ADDITIONAL INFORMATION
Creation Date: Tue, Jan 13, 2004 10:55 AM
From: Michael Scott

Created By: MLS3@nrc.gov

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DRAFT

North Anna ESP Application
Site Safety Analysis Report (SSAR)
Requests for Additional Information (RAI)
RAI LETTER NO. 1

RAI 2.3.1-1

SSAR Section 2.3.1, Regional Climatology

SSAR Section 2.3.1 provides climatological information. However, the section does not provide information sufficient for the staff to reach the conclusion that Dominion has provided, in compliance with 10 CFR 100.20(c) and 10 CFR 100.21(d), adequate site meteorological information to determine whether potential threats from site meteorological characteristics pose any undue risk to the type of facility proposed to be located at the site. Specifically, additional information is needed regarding extreme weather phenomena important to design of structures, systems, and components of a nuclear power plant or plants that might be constructed on the site.

Sections 2.3.1 of Regulatory Guide 1.70 and Review Standard RS-002 describe methods and approaches acceptable to the staff for addressing the regulations. Consistent with the guidance in these documents, please provide maximum wind speed, maximum and minimum temperature, maximum dew point, maximum precipitation rates (1 hr, 6 hr, 12 hr, 24 hr), maximum ice thickness (water equivalent), and maximum snow depth. The information should include estimates of values with 10, 20, 50, 100, 200, 500, and 1000-year recurrence intervals based on available data. For maximum winds, all available data should be evaluated, including fastest mile, fastest minute, 3-second gusts, and peak gusts. The information in the SSAR is based only on fastest mile data. Other available data should be considered and included if they significantly increase the period of record upon which the extreme values are based.

For each climatological variable, please provide the source of the observational data that forms the basis of the extreme values estimates (and the data itself, if available), identify the method used to estimate the extreme values [e.g. log-normal, Weibul, Fisher-Tippett Type 1 (Gumbel) distribution], and identify the method used to estimate the values of the parameters of the distribution (e.g. method of moments, maximum likelihood, order statistics).

For tornadoes, please provide estimates of the wind speed with a probability of occurrence of 10^{-7} per year. The existing table in the SSAR only gives the upper limit of the F3 class. It does not address the probability of occurrence.

Based on the information provided above, please identify the following site characteristics for the North Anna ESP site:

a) The maximum ground snow and ice load (water equivalent) that the roofs of safety-related structures must be capable of withstanding during plant operation. While a plant parameter envelope (PPE) value is provided for assumed snow and ice loading for a

reactor that might be sited at North Anna, the corresponding site characteristic is not provided in the SSAR.

b) The ultimate heat sink (UHS) meteorological conditions resulting in the maximum evaporation and drift loss of water from the UHS and minimum cooling by the UHS.

c) The maximum and minimum ambient temperatures and humidity (wet bulb or dew point) to serve as design bases of plant systems important to safety.

Alternative approaches to evaluating extreme weather phenomena important to design of structures, systems, and components of a nuclear power plant or plants that might be constructed on the site may be used if appropriately justified.

RAI 2.3.3-1

SSAR Section 2.3.3, Onsite Meteorological Measurements Program

SSAR Section 2.3.3 discusses Dominion's onsite meteorological measurements program. However, additional information is needed for the staff to reach the conclusion that Dominion has, in compliance with the regulations in 10 CFR 100.21(c), evaluated site atmospheric dispersion characteristics and established dispersion parameters. This conclusion is necessary to support the determination of whether radiological effluent releases associated with normal operation and radiological dose consequences of postulated accidents meet regulatory requirements. Specifically, the staff needs to review the 1996-1998 onsite meteorological data base used to generate the SSAR Section 2.3.4 short-term diffusion estimates and the SSAR Section 2.3.5 long-term diffusion estimates.

Sections 2.3.3 of Regulatory Guide 1.70 and Review Standard RS-002 describe methods and approaches acceptable to the staff for onsite meteorological measurement programs. Consistent with these documents, please provide a joint frequency distribution of wind speed and wind direction by atmospheric stability class in the format described in Regulatory Guide 1.23 for the 1996-1998 onsite meteorological data base used to generate the SSAR Section 2.3.4 short-term diffusion estimates and the SSAR Section 2.3.5 long-term diffusion estimates. Also, please provide an hourly listing of this data base on electronic media in the format described in Appendix A to Section 2.3.3 of RS-002. whether site meteorological characteristics pose any undue risk to the type of facility proposed to be located at the site.

RAI No. 13.3-1

SSAR Section 13.3, Emergency Planning

SSAR section 13.3.1 states that "[t]his chapter provides the emergency planning information required by NRC regulations necessary to support an ESP application. That includes information required by 10 CFR 52.17(b)(1) regarding identification of potential impediments to emergency planning, and information required by 10 CFR 52.17(b)(3) regarding descriptions of contacts and arrangements made with local, state and federal governmental agencies with emergency planning responsibilities."

In addition, Section 13.3.2.2.2.a.6 implies that the existing contacts and arrangements in support of North Anna Units 1 & 2 are applicable to prospective new reactors for the site under

Dominion's ESP project. In Section 13.3.4, the cross-reference to Sections V.A.3 and V.B.2 states that the "[l]etters of agreement with supporting agencies are the existing letters of agreement in the NAEP [North Anna Emergency Plan]." The [19] referenced letters of agreement (LOAs)–which are located in section 10.1 of the NAEP, Rev. 28, and were executed in January, February, and April of 2002–do not, however, address the ESP concept, the extent to which existing arrangements would apply to prospective additional reactors at the North Anna site, or whether agencies would have different or expanded responsibilities associated with new reactors. Section 13.3.2.2.2.a.6 also provides the following statement:

> Dominion provided an overview of the Dominion ESP project to DEM [Commonwealth of Virginia Department of Emergency Management] Management staff members on February 20, 2003 and to risk jurisdiction coordinators of emergency management on March 24, 2003. The NRC licensing process, emergency preparedness requirements for ESP applicants, and Dominion's schedule for preparing and submitting this ESP application were described. No impediment to pursuing an ESP has been identified by Commonwealth of Virginia or risk jurisdiction response organizations.

A similar statement is contained in section 13.3.3. The overview presentations, and statement that "[n]o impediment to pursuing an ESP was identified," do not provide evidence of an understanding, acknowledgment and agreement by offsite emergency response organizations of their specific responsibilities, in relation to construction and operation of additional reactors at the North Anna site under an ESP.

In the NRC's May 30, 2003, letter to NEI [developed jointly with the Federal Emergency Management Agency (FEMA)], the staff response to NEI Item 2 indicated that letters of agreement should be developed, and included in the ESP application. In addition, for an existing reactor site, the presence of an additional reactor (or reactors) at the site should be clearly addressed, including any impact that would have on government agency emergency planning responsibilities, and acknowledgment by the agencies of the proposed expanded responsibilities (if any). This acknowledgment is needed for the NRC and FEMA to reach finality in their conclusions regarding emergency planning for an ESP. Such acknowledgment may be in either a letter of agreement or in separate correspondence. A separate correspondence might be sufficient in a case where an existing letter of agreement is written in a way that is broad enough to cover an expanded site use, and does not need to be revised. The correspondence would identify this fact. Finally, as indicated in evaluation criterion A.3 of Supplement 2 to NUREG-0654/FEMA-REP-1, a signature page in the ESP application may be appropriate for some organizations to signify their agreement with the concept of operations associated with the ESP application.

Consistent with the above discussion, please provide documentation of new arrangements with local, state and federal governmental agencies–with emergency planning responsibilities–that specifically address the impacts of additional reactors at the North Anna site. This information is needed for the NRC, in consultation with FEMA, to reach the conclusion that Dominion has provided an adequate description of contacts and arrangements made with local, state, and federal governmental agencies with emergency planning responsibilities in compliance with the regulations in 10 CFR 52.17(b)(3). The information is also needed for the NRC, in consultation with FEMA, to reach conclusions in accordance with 10 CFR 52.18 regarding whether Dominion's information shows there is no significant impediment to the development of emergency plans.

RAI No. 13.3-2

SSAR Section 13.3, Emergency Planning

SSAR Section 13.3.2.2 states that "[t]he ESP site is one with pre-existing nuclear facilities that has existing state and local emergency plans. The ESP application, therefore, relies on and refers to information contained in these existing plans. No significant differences have been identified between major features proposed in the ESP application and the major features discussed in existing plans and relied on in the ESP application." Section 13.3.2.2.2.a.5 states that "[t]he Virginia RERP [Radiological Emergency Response Plans] and the risk jurisdiction RERPs apply to the radiological emergencies caused by events at the existing units and would also apply to events at the new units."

Please provide a copy of the current Commonwealth of Virginia RERP, referenced in section 13.3.3.2.2.2.a.2. In addition, please provide a copy of the current risk jurisdiction RERPs; including the Louisa, Caroline, Hanover, Orange, and Spotsylvania County RERPs, referenced in section 13.3.3.2.2.2.a.1. This information is needed for the NRC staff, in consultation with FEMA, to reach the conclusion that Dominion has provided an adequate description of major features of emergency plans in compliance with the regulations in 10 CFR 52.17(b)(2)(i). The information is also needed for the NRC, in consultation with FEMA, to reach conclusions in accordance with 10 CFR 52.18 regarding whether Dominion's information shows there is no significant impediment to the development of emergency plans and whether major features of Dominion's emergency plans are acceptable.

From: Michael Scott
To: Joseph_Hegner@dom.com
Date: Mon, Feb 2, 2004 4:23 PM
Subject: PRELIMINARY QUESTIONS - PACKAGE #2

Please find attached the NRC staff's second package of preliminary questions, in the form of draft requests for additional information (RAIs).

The RAIs in this package address the areas of seismology and emergency planning. Additional RAIs will likely be developed in these areas and will be forwarded to you on or before 6/3/04 in accordance with the planned North Anna review schedule. We are providing these RAIs at this time to facilitate the review and to support meeting the review schedule. Your timely response to them will also support meeting the review schedule milestones. Partial submittals would be welcome to minimize delays.

Please contact me if you have questions.

Sincerely,

Michael L (Mike) Scott
Senior Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Phone (301) 415-1421

CC: Bruce Musico; Clifford Munson; Daniel Barss; Eric Weiss; Gene Imbro; Goutam Bagchi; James Lyons; Kamal Manoly; Laura Dudes; Nanette Gilles; Raman Pichumani; Robert Weisman; Stephen Koenick

Mail Envelope Properties (401EBFC7.B6C : 4 : 19783)

Subject: PRELIMINARY QUESTIONS - PACKAGE #2
Creation Date: Mon, Feb 2, 2004 4:23 PM
From: Michael Scott

Created By: MLS3@nrc.gov

Recipients
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CGM1 CC (Clifford Munson)
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Expiration Date:	None
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DRAFT

North Anna ESP Application
Site Safety Analysis Report (SSAR)
Requests for Additional Information (RAI)
RAI LETTER NO. 2

RAI 2.5.2-1

SSAR Section 2.5.2, Vibratory Ground Motion

SSAR Section 2.5.2 describes the results of Dominion's determination of ground motion at the ESP site from possible earthquakes. Regulatory Guide 1.165 (RG 1.165) provides a method acceptable to the NRC staff with respect to the probabilistic evaluations that can be conducted to address the uncertainties associated with the Safe Shutdown Earthquake (SSE) determination. RG 1.165 specifies a target or reference probability (median 10^{-5} per year) that is used to determine the controlling earthquakes and subsequent site ground motion.

Please provide the following information related to the approach used to obtain the results in Section 2.5.2:

1. The approach described in SSAR Section 2.5.2 uses a Uniform Hazard Spectrum (UHS) at the mean 10^{-4} per year probability level as its starting point. Please justify the selection of mean 10^{-4} per year as the appropriate starting point.

2. Please provide site-specific response spectra from the controlling earthquakes at the reference probability level or justify why this information is not needed. Please also demonstrate that the SSE envelopes the site response spectra computed from the controlling earthquakes at the reference probability level.

3. The approach described in SSAR Section 2.5.2 incorporates component capacity or performance parameters into a scale factor used to compute the final SSE. Please justify the incorporation of equipment performance into determination of the final SSE.

RAI 13.3-3

SSAR Section 13.3, Emergency Planning

Section 13.3.2 of the Dominion ESP application states, in part, "[t]he Major Features Emergency Plan takes advantage of the emergency planning resources, capabilities, and organization that Virginia Power has already established and currently maintains at the NAPS [North Anna Power Station] site."

Please confirm whether you wish to incorporate applicable sections of the existing North Anna Emergency Plan (NAEP) into the ESP application, to the extent that it supports the emergency planning description in the ESP application. Dominion may either take credit for this information by providing the confirmation stated, or it may provide the information separately in response to individual RAIs.

From: Michael Scott
To: Joseph_Hegner@dom.com
Date: Thu, Mar 18, 2004 12:18 PM
Subject: REVISED DRAFT REQUESTS FOR ADDITIONAL INFORMATION

Please find attached a revision to the NRC staff's second package of preliminary questions, in the form of draft requests for additional information (RAIs) for the North Anna ESP review. These questions have been revised based on the audit of aspects of Dominion's application conducted by the staff on March 2-4, 2004. Because the questions have been revised since our discussion of the original draft questions on February 12, 2004, Dominion may request another phone call to seek clarification on the revised questions before they are issued by letter.

Please contact me if you have questions.

Sincerely,

Michael L (Mike) Scott
Senior Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Phone (301) 415-1421

CC: Clifford Munson; Gene Imbro; James Lyons; Kamal Manoly; Laura Dudes; Nanette Gilles; Robert Weisman; Stephen Koenick

Mail Envelope Properties (4059D9F2.7E9 : 4 : 19783)

Subject: REVISED DRAFT REQUESTS FOR ADDITIONAL INFORMATION
Creation Date: Thu, Mar 18, 2004 12:18 PM
From: Michael Scott

Created By: MLS3@nrc.gov

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DRAFT 3/18/04

North Anna Early Site Permit Application
Site Safety Analysis Report (SSAR)
Requests for Additional Information (RAI)
RAI LETTER NO. 2

RAI 2.5.2-1

SSAR Section 2.5.2, Vibratory Ground Motion

SSAR Section 2.5.2 describes the results of Dominion's determination of ground motion at the ESP site from possible earthquakes. Regulatory Guide 1.165 (RG 1.165) provides a method acceptable to the NRC staff with respect to the probabilistic evaluations that can be conducted to address the uncertainties associated with the Safe Shutdown Earthquake (SSE) determination. RG 1.165 specifies a target or reference probability (median 10^{-5} per year) that is used to determine the controlling earthquakes, subsequent site ground motion, and the SSE.

Please provide the following information related to the approach used to obtain the SSE in SSAR Section 2.5.2:

a) The approach described in SSAR Section 2.5.2 incorporates component capacity or performance parameters into a scale factor used to compute the SSE. Please justify the incorporation of equipment performance into determination of the SSE.

b) Please explain how the SSE derived in SSAR Section 2.5.2 is characterized by both horizontal and vertical free-field ground motion response spectra at the free ground surface.

c) Please describe how the performance-based approach incorporates the site-specific geology of the ESP site into the determination of the SSE.

d) Please provide site-specific response spectra from the controlling earthquakes at the reference probability level (median 10^{-5} per year) and demonstrate that the SSE envelopes the response spectra from the controlling earthquakes at the reference probability level, or justify why this information is not needed in determining the SSE. Please also justify any reference probability level used other than median 10^{-5} per year. Appendix B to RG 1.165 discusses situations in which an alternative reference probability level may be appropriate.

RAI 13.3-3

SSAR Section 13.3, Emergency Planning

SSAR Section 13.3.2 states, in part, "[t]he Major Features Emergency Plan takes advantage of the emergency planning resources, capabilities, and organization that Virginia Power has already established and currently maintains at the NAPS [North Anna Power Station] site."

Please confirm whether you wish to incorporate applicable sections of the existing North Anna Emergency Plan (NAEP) into the ESP application, to the extent that it supports the emergency

planning description in the ESP application. Dominion may either take credit for this information by providing the confirmation stated, or it may provide the information separately in response to individual RAIs.

From: Michael Scott
To: Joseph_Hegner@dom.com
Date: Thu, Feb 26, 2004 8:04 AM
Subject: PRELIMINARY QUESTIONS - PACKAGE #3

Please find attached the NRC staff's third package of preliminary questions for the site safety analysis report in the North Anna ESP application, in the form of draft requests for additional information (RAIs).

The RAIs in this package address the seismology area. Additional RAIs will likely be developed in this area and will be forwarded to you on or before 6/3/04 in accordance with the planned North Anna review schedule. We are providing these RAIs at this time to facilitate the review and to support meeting the review schedule. Your timely response to them will also support meeting the review schedule milestones. Partial submittals would be welcome to minimize delays.

Please contact me if you have questions.

Sincerely,

Michael L (Mike) Scott
Senior Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Phone (301) 415-1421

CC: Clifford Munson; Goutam Bagchi; Kamal Manoly; Laura Dudes; Nanette Gilles; Robert Weisman; Stephen Koenick

Mail Envelope Properties (403DEEB6.B6E : 4 : 19783)

Subject: PRELIMINARY QUESTIONS - PACKAGE #3
Creation Date: Thu, Feb 26, 2004 8:03 AM
From: Michael Scott

Created By: MLS3@nrc.gov

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dom.com
Joseph_Hegner (Joseph_Hegner@dom.com)

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GXB1 CC (Goutam Bagchi)
KAM CC (Kamal Manoly)

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RMW CC (Robert Weisman)

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Return Notification:	None
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Security: Standard

DRAFT

North Anna Early Site Permit Application
Site Safety Analysis Report (SSAR)
Requests for Additional Information (RAI)
RAI LETTER NO. 3

Section 2.5.1 - Basic Geologic and Seismic Information

RAI 2.5.1-1
Section 2.5.2 of the site safety analysis report (SSAR) concludes that the Central Virginia seismic zone (CVSZ) is the largest contributor to the seismic hazard for the ESP site. SSAR Section 2.5.1.1.4 (pg 2-2-194 and 195) summarizes the findings of Obermeier and McNulty (Reference 71), who conducted reconnaissance studies in search of paleoliquefaction features associated with the CVSZ.

1. The Obermeier and McNulty study (Reference 71) regarding paleoliquefaction was limited in time interval (mid- to late-Holocene) and geographic coverage. Therefore, please provide additional justification for the SSAR statement:

> "The near-total lack of widespread paleoliquefaction features in the 300 km of stream exposures searched within the Piedmont, has led some researchers (Reference 71) to conclude that it is unlikely that any earthquakes have occurred in central Virginia in excess of M~7."

1. The findings of Obermeier and McNulty (Reference 71) indicate the presence of two Holocene paleoliquefaction features in the CVSZ. According to SSAR Section 2.5.1.1.4, these two paleoliquefaction features are located along the James and Rivanna Rivers, about 25-30 miles from the ESP site. Please provide justification for concluding that, in spite of the occurrence of recent earthquake(s) that produced paleoliquefaction features in the CVSZ, such earthquakes are not abundant in the seismic zone, and for concluding that the earthquakes that produced these liquefaction features are "local shallow moderate magnitude earthquakes of M 5 to 6." In addition, please describe the impact of these liquefaction-producing earthquake events on the recurrence model used for the CVSZ.

   Considering that the CVSZ is the major contributor to the hazard at the ESP site, please provide the following additional information:

   a. a map showing the locations of the paleoliquefaction features relative to the ESP site,

   a. evidence that supports the stated ages of the liquefied sediments,

   a. specific locations, dimensions, and characteristics of the liquefaction features, and

b. extent of the CVSZ covered by the study.

RAI 2.5.1-2
In SSAR Section 2.5.1.1.4, Dominion concludes on the basis of several lines of evidence, including aerial reconnaissance, that the northern segment of the East Coast Fault System (ECFS) "probably does not exist or has a very low probability of activity if it does exist." Please provide additional information on the nature of the aerial reconnaissance for the ECFS, including the area covered and the type of evidence used to conclude that the northern segment of the ECFS does not exist or has low probability of activity. Please explain how information gathered during the aerial reconnaissance and from other sources supports conclusions in the SSAR that appear to be inconsistent with those made in the detailed geomorphic analysis of Marple and Talwani (Reference 74).

RAI 2.5.1-3
In SSAR Section 2.5.1.1.4, Dominion concludes that the seven fall lines defined by Weems (Reference 70) do not "represent a capable tectonic source." Weems (Reference 70) favors a neotectonic origin for the seven fall lines. Please provide additional justification to confirm or disprove the seven fall lines defined by Weems (Reference 70) as a capable tectonic source. Also, please explain how the absence of these features in the compilation of Crone and Wheeler (Reference 59) demonstrates that the fall lines are not capable tectonic sources.

RAI 2.5.1-4
In SSAR Section 2.5.1.1.4, Dominion concludes, citing Crone and Wheeler (Reference 59), that neither the Hylas shear zone nor the Lake of the Woods thrust fault are capable tectonic sources stating, "there is no geomorphic expression, historical seismicity, or Quaternary deformation along either the Hylas shear zone or Lake of the Woods thrust fault (Reference 59)." Please provide an explanation of how the information in Crone and Wheeler (Reference 59) forms a basis for this conclusion.

Section 2.5.2 - Vibratory Ground Motion

RAI 2.5.2-2
SSAR Section 2.5.2.6.6 states that new ground motion models were used to characterize the seismic hazard and determine the Safe Shutdown Earthquake (SSE) spectrum for the ESP site. According to the SAR, the new ground motions are based on the 2003 EPRI-sponsored study (Reference 116), which considers 13 different ground motion relations. As stated in SSAR Section 2.5.2.6.6, differences between the ground motions from the 2003 EPRI study and the 1989 EPRI report are substantial, with the new ground motions as much as 55% higher for spectral accelerations at 10 Hz. To allow the NRC staff to fully assess the new ground motion modeling presented in the 2003 EPRI study, the following information is needed.

1. Please provide hazard curves for 2.5 and 5 Hz spectral acceleration similar to those provided in the SSAR for 1 Hz (Figure 2.5-45) and 10 Hz (Figure 2.5-44).

ATTACHMENT

1. Please provide a copy of the following two documents: Silva et al. (1997) "Description and validation of the stochastic ground motion model", submitted to Brookhaven National Laboratory (BNL) and Silva et al. (2002) "Development of regional hard rock attenuation relations for Central and Eastern North America."

1. Chapter 2, "Ground Motion Model Development," of the 2003 EPRI study (Reference 116) describes the development of the ground motion models, and Table 2-2 in Chapter 2 shows the placement of each of the 13 ground motion relationships into 4 groups. Page 2-6 of the 2003 EPRI study states that "the model weight was based on the variance between a model's predictions and the available ground motion database." Please describe the data (i.e., earthquake dates, magnitudes, source-receiver distances, frequencies, site conditions) used to determine the weighting of the models within each group or cluster. Also, please provide the weight assigned to each of the 13 ground-motion relationships within their respective group or cluster.

1. Table 2-7 in Chapter 2 shows the relative weights for each of the 4 groupings of ground motion models. Please describe the seismological principles used to determine the importance weights given for each of the model clusters.

1. Chapter 3, "Ground Motion Model Results," of the 2003 EPRI study (Reference 116) describes the ground motion attenuation model for sites located in the Central and Eastern U.S. Table 3-2 in Chapter 3 provides the ground motion attenuation model functional forms for 5 groups or clusters. Please explain why some of the attenuation relationships in cluster 1 contain terms accounting for Moho reflections or losses from the effective Q in the crust, whereas the functional form for cluster 1 does not contain either of these two terms.

RAI 2.5.2-3

Regarding new seismic source characterizations, SSAR Section 2.5.2.6.3 states that, for the Charleston seismic source, the USGS source parameters (Reference 127) were adopted. SSAR Section 2.5.2.2.9 states that "the most significant impact of the 2002 USGS model (Reference 127) on seismic hazard for the ESP site is the updated Charleston sources parameters." Figures 2.5-40 and 2.5-41 show 1 Hz spectral acceleration seismic hazard curves (median and mean, respectively) at the ESP site for the northern and southern segments of the East Coast Fault System (ECFS). As shown in both of these figures, the southern segment of the ECFS (ECFS-S), which includes the Charleston seismic source, makes a significant contribution to the overall hazard at 1 Hz spectral acceleration. In spite of the significant contribution of the ECFS-S for low frequency ground motion, the controlling earthquake for the 1 and 2.5 Hz frequency range is a magnitude 5.5 earthquake at a distance of 30 km from the ESP site (Table 2.5-26). Neither this magnitude or distance correspond to an event occurring in the ECFS-S (i.e, Charleston source zone). Please explain this result in view of the statement quoted above and Figures 2.5-40 and 41 in the application.

RAI 2.5.2-4

SSAR Tables 2.5-5 through 2.5-11 summarize the parameters developed by the six Earth Science Teams (ESTs) as part of the 1989 EPRI Project (Reference 115) for the seismic source zones surrounding the ESP site. The source parameters shown in Tables 2.5-5 through 2.5-11

are maximum magnitudes, distances from the ESP site, activity probabilities, and smoothing options. In addition, Tables 2.5-5 through 2.5-10 provide information on whether the source parameters have been updated for the probabilistic seismic hazard analysis (PSHA) presented in the ESP application.

1. Please provide the actual *a* and *b* values for the recurrence model used for each of the seismic source zones and the weights assigned to these values. In addition, please provide the recurrence intervals and their weights associated with the M_{max} values for each seismic source zone.

1. With regard to the seismic source zones surrounding the ESP site, in particular the Central Virginia Seismic Zone (CVSZ), and considering the 1994 EPRI study of Arch Johnston, "Seismotectonic Interpretations and Conclusions from the Stable Continental Region Seismicity Database," please provide updated information on the following or explain why updated information is not needed: 1) maximum magnitudes and weights, 2) probabilities of activity, 3) recurrence model values and weights, and 4) source zone geometries for the PSHA recently completed for the ESP site.

Section 2.5.3 -Surface Faulting

RAI 2.5.3-1
SSAR Section 2.5.3 states that, in addition to compiling and reviewing existing data, Dominion interpreted aerial photography and conducted field and aerial reconnaissance of all faults within a five-mile radius of the site to assess the potential for surface fault rupture. Dominion focused on seven bedrock faults, as listed in Section 2.5.3.2, and concluded that "the Chopawamsic and Spotsylvania thrust faults are not associated with seismicity and do not exhibit geomorphic evidence of potential Quaternary activity." The SSAR indicates that Dominion conducted similar aerial photographic and reconnaissance studies for the other faults within five miles of the site, and draws similar conclusions. Please provide the following details about each of the reconnaissance studies:

1. A general description of the flight conditions (i.e., weather, lighting conditions and the time of year).

1. The extent of the coverage for each fault and the criteria for the locations chosen along the fault.

1. The geomorphic setting (i.e., valleys, hills, bedrock exposures, ...) for each of the sites visited along the faults.

1. A description of the criteria used for concluding that there is no evidence of Quaternary activity on the fault.

1. The vintage and scale of the photographs used for the aerial photographic study.

From: Michael Scott
To: Joseph_Hegner@dom.com
Date: 4/13/04 3:01PM
Subject: DRAFT REQUEST FOR ADDITIONAL INFORMATION PACKAGE 4

Please find attached the NRC staff's fourth package of preliminary questions, in the form of draft requests for additional information (RAIs) for the North Anna ESP review.

As for previous transmittals of preliminary questions, Dominion may request a phone con or meeting with the cognizant staff if Dominion needs clarification of the RAIs or believes the information requested in them has already been provided or is not needed. Please let me know if you desire such a phone con or meeting.

After the phone con or meeting occurs (if requested) and planned response dates are determined (if applicable), the staff will send the RAIs under cover letter with copy to the docket. The letter will also note that the phone con or meeting occurred (if it did) and the mutually agreed upon response date(s) to the RAIs.

The RAIs in this package address the areas of hydrology, climatology, site hazards, physical security, and quality assurance. There is also an RAI regarding the plant parameter envelope table in SSAR Section 1.3. Additional RAIs will likely be developed in these areas and will be forwarded to you on or before 6/3/04 in accordance with the planned North Anna review schedule. We are providing these RAIs at this time to facilitate the review and to support meeting the review schedule. Your timely response to them will also support meeting the review schedule milestones. Partial submittals would be welcome to minimize delays.

Please contact me if you have questions.

Sincerely,

Michael L (Mike) Scott
Senior Project Manager
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Phone (301) 415-1421

CC: Al Tardiff; Clifford Munson; Goutam Bagchi; Jay Lee; Kazimieras Campe; Kevin Coyne; Laura Dudes; Nanette Gilles; Paul Prescott; R. Brad Harvey; Raj Anand; Robert Weisman; Stephen Koenick

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Subject:	DRAFT REQUEST FOR ADDITIONAL INFORMATION PACKAGE 4
Creation Date:	4/13/04 3:01PM
From:	Michael Scott
Created By:	MLS3@nrc.gov

Recipients	**Action**	**Date & Time**
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CGM1 CC (Clifford Munson)	Opened	04/13/04 03:19PM
GXB1 CC (Goutam Bagchi)		
JYL1 CC (Jay Lee)	Opened	04/15/04 07:37AM
KMC1 CC (Kazimieras Campe)	Opened	04/14/04 07:43AM
KXC CC (Kevin Coyne)	Opened	04/15/04 07:17AM
RBH CC (R. Brad Harvey)	Opened	04/15/04 07:23AM
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AXT1 CC (Al Tardiff)	Opened	04/14/04 07:34AM
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NVG CC (Nanette Gilles)	Opened	04/13/04 03:11PM
PFP CC (Paul Prescott)	Opened	04/13/04 03:01PM
RKA CC (Raj Anand)	Opened	04/15/04 08:31AM
SSK2 CC (Stephen Koenick)	Opened	04/15/04 10:47AM
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DRAFT

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 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 ordnance 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 10 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 snowstorms, 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 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 as a result of the presence and operation of a nuclear plant or plants falling within the plant parameter envelope (PPE) specified in the SSAR. 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 resulting from plant construction and operation. 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) Locations of any existing aquifers in the proposed site area

c) Layout of intake tunnels and piping from North Anna Reservoir to the proposed units

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, 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 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 calculate both onsite drainage potential and 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. Please provide a description of likely upstream land use changes and changes in downstream water demand that would alter either flood risk or the intensity and frequency of low-flow conditions. 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.

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 storage capacity, 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 ice anchor thickness 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 floe accumulation. Please identify the minimum volume of the UHS, 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.

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 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 state whether the plant parameter envelope and surrounding terrain features will or will not limit the establishment of the 360-foot distance specified in Regulatory Guide 4.7 (Revision 2, April 1988) from vital equipment/structures to physical protection components such as protected area barriers/isolation zones, or identify those special measures or analyses that have been or will be accomplished to show that adequate security plans can be developed. Response may be considered proprietary per 10 CFR 2.390(d) or safeguards information per 10 CFR 73.21.

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.