**From:** Michael Scott
**To:** Joseph_Hegner@dom.com
**Date:** 5/3/04 4:28PM
**Subject:** DRAFT REQUESTS FOR ADDITIONAL INFORMATION PACKAGE 5

Please find attached the NRC staff's fifth 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 conference or meeting with the cognizant NRC 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, 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 geology, seismology, and quality assurance. Your timely response to these RAIs will support meeting the review schedule milestones. Partial submittals would be welcome to minimize delays.

Please contact me if you have questions.

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

**CC:** Clifford Munson; Dale Thatcher; Goutam Bagchi; Kamal Manoly; Kevin Coyne; Laura Dudes; Michael Dudek; Nanette Gilles; Paul Prescott; Raj Anand; Raman Pichumani; Robert Weisman

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| **From:** | Michael Scott |
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| KXC CC (Kevin Coyne) | Opened | 05/03/04 04:29PM |
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# DRAFT

## North Anna Early Site Permit Application
## Site Safety Analysis Report (SSAR)
## Requests for Additional Information (RAI)
## RAI LETTER NO. 5

SSAR Section 2.5.1, Basic Geologic and Seismic Information

RAI 2.5.1-5

SSAR Subsection 2.5.1.1.4 describes the Mountain Run and Kelly's Ford scarps along the Mountain Run fault zone and states that field and aerial reconnaissance did not reveal any geologic or geomorphic features indicative of potential Quaternary activity along the Mountain Run fault zone. Please describe the relevant physiographic features associated with these two scarps and the evidence that led to the conclusion that "the scarp most likely formed due to erosion, as southeastward-migrating streams impinge against more resistant rocks of the Mountain Run fault zone."

RAI 2.5.1-6

SSAR Subsection 2.5.1.1.4 states that the Stafford fault system is not a capable tectonic source. Please elaborate on the evidence gathered from field observations and aerial reconnaissance that support this conclusion with regard to the Dumfries, Fall Hill, Hazel Run, and Brooke faults.

SSAR Section 2.5.2, Vibratory Ground Motion

RAI 2.5.2-5

SSAR Subsection 2.5.2.6.3 summarizes the use of new data to revise the recurrence interval and source geometry for the Charleston seismic source zone. Page 2-2-248 of the application states:

> The southern segment of the ECFS [East Coast Fault System] was used as an alternative source geometry for the sensitivity analysis. In this approach, the southern segment was assumed to be active with a characteristic magnitude with a mean recurrence interval of 550 years.

a) Please explain the rationale for the designation of the southern segment of the ECFS as an "alternative" source geometry for the Charleston seismic source zone.

b) Please provide a logic tree, similar to SSAR Figure 2.5-35, that covers all of the source models for the Charleston seismic source, including the weights for maximum magnitudes and recurrence intervals as well as the probabilities of activity for each of the models.

c) Please provide the contribution of the Charleston seismic source zone to the total mean and median hazard at the ESP site for the 1-2.5 Hz case. Use the three reference probability levels discussed in SSAR 2.5.2 (mean $10^{-4}$, mean $5x10^{-5}$, and median $10^{-5}$) and show in each magnitude and distance bin the fraction of the total hazard that is from the Charleston source. Provide a table for each of the three hazard levels similar to those shown in Appendix C of RG 1.165.

RAI 2.5.2-6

SSAR Figures 2.5-44 and 2.5-45 provide mean and median hazard curves for 1 Hz and 10 Hz spectral acceleration. Please provide the 15th and 85th percentile hazard curves for both 1 and 10 Hz spectral acceleration. In addition, please provide the mean, median, 15th, and 85th percentile hazard curves for both 2.5 and 5 Hz spectral acceleration.

RAI 2.5.2-7

Table 2.5-11 in SSAR Section 2.5.2 shows that several of the Electric Power Research Institute (EPRI) teams used a probability of activity less than 1.0 for the Central Virginia Seismic Zone (CVSZ). For each of the EPRI teams, please describe how the modern and historical seismicity of the CVSZ is distributed among either a specific source zone or a background source zone, including the probabilities of activity, recurrence and maximum magnitude information.

RAI 2.5.2-8

SSAR Subsection 2.5.2.5 provides a list of the subsurface materials at the ESP site. Please describe how these site-specific materials were factored into the determination of the SSE ground motion spectrum. Please describe the subsurface model in terms of layer thicknesses and engineering properties (e.g., density, shear wave velocity, damping ratio) and describe how the variability of each of these properties was accounted for in the site characterization of the ground motion.

RAI 2.5.2-9

SSAR Subsection 2.5.2.6 describes an alternative approach to that recommended in Regulatory Guide 1.165 for determining the Safe Shutdown Earthquake (SSE) ground motion spectrum. Please provide the following information regarding this approach:

a) 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.

b) The approach described in SSAR Section 2.5.2 targets a performance goal of mean $10^{-5}$ per year of "unacceptable performance of nuclear structures, systems and components as a result of seismically initiated events." Please justify the selection of mean $10^{-5}$ per year as an appropriate performance goal and describe in detail what this probability represents.

c) The performance-based approach described in SSAR Section 2.5.2 starts with the risk equation and ends with a scale factor multiplier that is used to achieve the target performance goal. Please provide the details of the derivation of this approach and describe how the use of the scale factor achieves the target performance goal. In

addition, please provide the details (beyond those provided in NUREG/CR-6728 and the ASCE Draft Standard, SSAR References 118 and 119) of the assumptions made for each of the key parameters such as the seismic margin ratio, combined standard deviation, amplitude ratio, and hazard curve slope.

SSAR Section 2.5.3, Surface Faulting

RAI 2.5.3-2

SSAR Subsection 2.5.3.2.2 states that aerial reconnaissance, field reconnaissance, and air photo interpretation did not reveal evidence for the southwestward continuation of unnamed fault "a" beyond the ESP site as mapped by Pavlides (Reference 36), which was compiled onto the map of Mixon and others (Reference 66). Please provide support for this conclusion by describing (1) the map relations shown by Pavlides and Mixon and others that implied the extension of unnamed fault "a" beyond the ESP site, (2) the field observations that raise questions about the map relations, and (3) information on the adjacent geologic sheet, suggested as an alternative interpretation, that does not call for the extension of unnamed fault "a" beyond the ESP site.

SSAR Section 2.5.4, Stability of Subsurface Materials and Foundations

RAI 2.5.4-1

SSAR Section 2.5.4 states that additional structure-specific exploration and testing would be performed during detailed engineering and would be described in the combined license (COL) application. Regulatory Guide 1.132 recommends borings at 100 ft spacings for major structures. Please provide the basis (especially given the documented presence of severely weathered, fractured and jointed intervals in the Zone III-IV and Zone IV rock) for concluding that the subsurface conditions in the southwest part of the ESP footprint (an area roughly 1000 ft by 500 ft, in which there have apparently been no borings) do not materially differ from conditions in the adjacent areas where borings have been drilled.

RAI 2.5.4-2

SSAR Subsection 2.5.4.1 (Geologic Features) references SSAR Section 2.5.1.2.3 (Site Area Stratigraphy), which states that borings drilled for the ESP application revealed severely weathered, fractured and jointed intervals in the Zone III-IV and Zone IV rock. Section 2.5.1.2.3 further states that these severely weathered fracture zones were encountered in four of the seven borings drilled for the ESP application.

a) Please describe the extent of similar severely weathered fracture zones, if any, that were observed during the site investigation performed for the abandoned units 3 and 4.

b) Please describe the impact of the existence of the severely weathered fracture zones on the suitability of the site to host safety-related structures.

RAI 2.5.4-3

SSAR Section 2.5.4.2 (Properties of Subsurface Materials) provides the results of the extensive field and laboratory tests that were performed earlier for the abandoned Units 3 and 4, the service water reservoir (SWR), and the independent spent fuel storage installation (ISFSI) facilities at North Anna Power Station. Please discuss how the results of the site investigations for the SWR and the ISFSI, which are located away from the abandoned Units 3 and 4, were integrated with those of the ESP borings in characterizing the subsurface materials at the ESP site.

RAI 2.5.4-4

Table 2.5-29 in SSAR Section 2.5.4 compares the total thicknesses of the soil layers sampled at the locations of Units 1 and 2, abandoned Units 3 and 4, the ISFSI, the SWR, and the ESP site. Table 2.5-29 shows that the total thickness of all the soil layers sampled at the ESP site is only 105 ft, whereas the total thicknesses of soil layers sampled at the other sites mentioned range from 451 ft for the ISFSI to 2204 ft for Units 1 and 2. Please explain how the total thickness of soil layers sampled at the ESP site is sufficient to characterize the soil conditions there.

RAI 2.5.4-5

With regard to Table 2.5-45 (Summary of Geotechnical Engineering Properties) in SSAR Section 2.5.4:

a) Please explain why no shear wave velocities are given for Zone IIB saprolite and for Zones III and III-IV weathered rock.

b) Please provide the range of standard penetration test (SPT) values separately for coarse-grained and fine-grained soil zone IIA, along with the depths of the soils at which the N-values were obtained.

RAI 2.5.4-6

With regard toTable 2.5-44 (Summary of ESP Test Rest Results - Rock) in SSAR Section 2.5.4:

a) Please explain why test results were not provided for the materials at several depths, for example, between depths 25 ft and 48 ft in boring B-801, between depths 21 ft and 44 ft, 46 ft to 66 ft, and 67 ft to 85 ft in boring B-802, and several depths in borings B-803 and B-806.

b) Please explain why no test results were provided for boring B-807.

c) Please discuss the significance of the relatively low value (4.43 ksi) of the unconfined compressive strength of the Zone IV rock in Boring B-805, as compared to the values for the Zone IV rock strengths in Borings B-802, 803, and 806 at similar depths, which are much higher (by a factor 2 to 6).

RAI 2.5.4-7

SSAR Subsection 2.5.4.7.1 (Shear Wave Velocity Profile) states (on page 2.2-291) that some safety-related structures (excluding the reactors) may be founded on the Zone III weathered rock, Zone IIB saprolite, or Zone IIA saprolite. However subsection 2.5.1.2.6 (Site Engineering Geology Evaluation) of the SSAR states (on page 2.2-222) that Zone III is not a suitable material for safety-related plant structures. Please reconcile these two statements.

RAI 2.5.4-8

SSAR Subsection 2.5.4.7.2 (Variation of Shear Modulus and Damping with Strain) describes the shear modulus and damping ratio curves for Zone IIA saprolite (improved and unimproved), Zone IIB saprolite, and Zone III rock. With regard to this subsection:

a) Please provide the basis for the selected modulus reduction curves for Zone IIA saprolite, Zone IIB saprolite, and Zone III weathered rock.

b) Please explain the basis for the selected damping ratio curves for Zone IIA saprolite, Zone IIB saprolite and Zone III weathered rock.

c) Please explain the use of a damping ratio of 2% for the Zone III-IV rock.

RAI 2.5.4-9

Please elaborate further on the method used for the development of the site-specific acceleration time histories and the soil column amplification/attenuation analysis, which are briefly described in SSAR Subsections 2.5.4.7.3 and 2.5.4.7.4. Also, please provide a description of the subsurface model, showing layer thicknesses and geotechnical engineering properties for each layer. Please describe how the variability in each of these engineering properties was accounted for in the development of the site-specific ground motion. Finally, please justify the use of the mean $10^{-4}$ Uniform Hazard Spectrum (UHS) ground motion as the input rock motion.

RAI 2.5.4-10

SSAR Section 2.5.4.8 describes the analyses to determine the potential for soil liquefaction at the ESP site.

a) For each of the different methods used, please provide the results of any parametric evaluations of the liquefaction potential performed by varying the input of significant soil properties and the seismic parameters.

b) Please provide a copy of a sample liquefaction analysis of the Zone IIA saprolite material that showed the least factor of safety, stating and justifying all the assumptions made in the analysis.

RAI 2.5.4-11

Please provide a sample set of the calculations to substantiate the bearing capacities of soil and rock beneath major Category I structures, as shown in SSAR Table 2.5-47. Please indicate if and how the local site effects, such as the slope of the rock surface, fracture spacing, variability

in properties, and evidence of shear zones, if any, were considered in determining the allowable bearing capacities of soil and rock for different structures.

RAI 2.5.4-12

SSAR Section 2.5.4.11 (Design Criteria) states that geotechnical-related design criteria that pertain to structural design are not included in the application. Please provide the reasons for not providing the geotechnical-related design criteria that pertain to structural design (such as sliding, and overturning).

SSAR Section 2.5.5, Stability of Slopes

RAI 2.5.5-1

SSAR Section 2.5.5.2 presents an analysis of the stability of the existing slope to the north of the SWR. In view of the results of the liquefaction analysis (SSAR 2.5.4.8), which demonstrated the possibility of isolated zones of liquefaction in unimproved Zone IIA saprolite, please provide the basis for concluding that the existing slope has a "low susceptibility" to liquefaction and therefore concluding that a horizontal acceleration of 0.1g is suitable for the pseudo-static analysis. In addition, please provide the rationale for concluding that the psuedo-static analysis adequately demonstrates that the existing slope would remain stable under SSE conditions.

SSAR Section 17.1, ESP Quality Assurance

RAI 17.1-2

Sections 8 and 9 of Dominion's Early Site Permit Application Development Quality Assurance Manual and Section 4 of Bechtel's Quality Assurance Program Plan state that the safety-related scope of the development of the ESP application would not involve the use of quality assurance measures for the identification and control of materials, parts, and components and for the control of special processes. Please describe why these quality assurance measures were not applicable to the development of the ESP application. Alternatively, if these quality assurance measures were applicable to the ESP application, please describe the quality assurance measures used by Dominion and the primary contractor (Bechtel) for these activities.

**From:** Michael Scott
**To:** Joseph_Hegner@dom.com
**Date:** 5/6/04 4:38PM
**Subject:** DRAFT REQUESTS FOR ADDITIONAL INFORMATION PACKAGE 6

Please find attached the NRC staff's sixth 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 conference or meeting with the cognizant NRC 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, 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 meteorology, demography, emergency planning, radiological consequence evaluation, and quality assurance. There are additional RAIs addressing the plant parameter envelope. Your timely response to these RAIs will support meeting the review schedule milestones. Partial submittals would be welcome to minimize delays.

Please contact me if you have questions.

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

**CC:** Bruce Musico; Dale Thatcher; Daniel Barss; Eric Weiss; Jay Lee; Nanette Gilles; Paul Prescott; Raj Anand; Robert Dennig; Robert Weisman

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| DMB1 CC (Daniel Barss) | Opened | 05/10/04 07:40AM |
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# DRAFT

## North Anna Early Site Permit Application
## Site Safety Analysis Report (SSAR)
## Requests for Additional Information (RAI)
## RAI LETTER NO. 6

SSAR Section 1.3, Plant Parameters Envelope

RAI 1.3-2

Please provide the following information regarding Table 1.3-1, Plant Parameters Envelope:

a) Plant parameters envelope (PPE) Section 9.3.2, "Post-Accident," lists 10 CFR Part 20 and 10 CFR Part 50, Appendix I as "Bounding values." Please describe how these "bounding values" were used in the radiological post-accident dose consequences analyses. Also, please add the dose criteria in 10 CFR 50.34(a)(1) as bounding value references or explain why these references are not needed.

b) PPE Section 9.3.2, "Post-Accident," lists items 1, 3, 4, 5, and 7 of Table 1.3-2 as "Bound Notes." Please explain how data from these notes (which refer to bounding values for the AP-1000, ABWR/ESBWR, PBMR, ACR-700, and IRIS) were used for the accident analyses, and please provide the values to which these notes refer.

c) PPE Section 10.1.2, "Post-Accident," lists 10 CFR Part 100 as a "bounding value." Please explain how this "bounding value" was used for analyses of the liquid radwaste system. Also, please list the accidents to which this bounding value applies.

d) PPE Section 10.1.2, "Post-Accident," lists items 1, 3, 4, and 5 of Table 1.3-2 as "Bound Notes." Please explain how data from these notes were used for the accident analyses, and please provide the values to which these notes refer.

RAI 1.3-3

Tables 1.3-1 through 1.3-8 in SSAR Section 1.3 reference "bounding values" from various advanced reactor design criteria. Please clarify the relationship between the items in the "bounding values" provided in the tables and the references. For example, PPE Section 9.4.3, "Elevation (Post Accident)" in Table 1.3-1 contains an assumption of ground-level release. The "Bound Notes" column refers to five different reactor designs. The design control document for one of the designs, the advanced boiling water reactor, does not assume a ground-level release.

SSAR Section 2.1.2, Exclusion Area Authority and Control

RAI 2.1.2-1

Please provide the following information regarding Dominion's approach to obtaining appropriate regulatory approvals to purchase or lease the ESP site from Virginia Power and Old Dominion Electric Cooperative should a decision be made to seek a combined license:

a) List regulatory agencies (other than the NRC) from which Dominion would need approval to purchase or lease the ESP site.

b) State whether the ESP site incorporates the entire exclusion area boundary as shown in the SSAR.

c) State the duration of a lease that Domninion would seek should it elect to take that approach.

RAI 2.1.2-2

Please describe how an agreement or conveyance document (e.g., a lease or deed) would provide for the use of the North Anna Power Station site as a single exclusion area in the event additional reactors are constructed there.

Section 2.1.3, Population Distribution

RAI 2.1.3-1

SSAR Section 2.1.3 projects population distribution, including transient population, for the low population zone, population center, and population density for the proposed ESP site up to 2040. If the ESP were approved and issued in 2006, and assuming a COL application is submitted near the end of the ESP term with projected start-up of new units in about 2026, and an operational period of 40 years for new units, the projected year for end of plant life is about 2066. Please project population distribution, including transient population, for the low population zone, population center, and population density for the proposed ESP site up to about 2066.

RAI 2.1.3-2

Please describe appropriate protective measures that could be taken on behalf of the populace in the low population zone in the event of a serious reactor accident.

SSAR Section 13.3, Emergency Planning

RAI 13.3-4

SSAR Section 13.3.2.2.2.c.2 (Radiological Laboratories) lists five radiological count laboratory resources, and states that "[i]f required at the time of the event, these additional resources can be obtained through purchase agreements with private institutions" (emphasis added). In North Anna Emergency Plan (NAEP) Section 5.3.2 (Vendor and Contractor Support), the same five radiological count laboratory resources are listed, and the comparable sentence reads "[i]f required at the time of the event, additional resources can be obtained through purchase agreements with private institutions." Please explain the differences in these statements.

In addition, please identify the general capabilities of: (1) the University of Virginia, Charlottesville, VA; (2) the Virginia Commonwealth Laboratories, Richmond, VA; and (3) Newport News Shipbuilding & Drydock, Newport News, VA, to provide radiological monitoring and analyses services during an emergency, in support of the ESP site.

RAI 13.3-5

Please describe the specific provisions (i.e., the "means" referred to in SSAR Section 13.3.2.2.2.f) for communications with contiguous State and local governments within the 10-mile and 50-mile emergency planning zones (EPZs), and with Federal emergency response organizations. In addition, please describe the extent to which existing site communications will be utilized.

RAI 13.3-6

SSAR Section 13.3.2.2.2.j.1 (Evacuation of Onsite Individuals) states that onsite evacuees would use personal vehicles for transportation to emergency assembly areas, and references the North Anna Emergency Plan (NAEP). NAEP Section 6.3.2 (Onsite Criteria for the Exclusion Area) states that evacuees may use personal vehicles. Please explain the differences between these statements. In addition, please describe the transportation to emergency assembly areas for any onsite individuals who might not have their personal vehicle available onsite.

RAI 13.3-7

SSAR Section 13.3.2.2.2.j.2 (Protective Action Recommendations) describes the bases for making protective action recommendations, and SSAR Section 13.3.2.2.2.d (Emergency Classification System) describes the timing for providing the recommendations, and how the emergency action levels would be used in determining the type and timing of protective measures to consider.

Please describe the mechanism for recommending protective actions to the appropriate State and local authorities, including how EALs would be used to determine protective action recommendations (e.g., sheltering, evacuation, use of potassium iodide/KI), consistent with EPA 400-R-92-001 (Manual of Protective Action Guides and Protective Actions for Nuclear Incidents). Describe how those recommendations would be provided to the appropriate State and local authorities. Describe how changes to, or termination of, protective action recommendations would be provided to State and/or local authorities.

RAI 13.3-8

Please discuss the extent to which the North Anna early site permit (ESP) application is intended to address Evaluation Criteria V.H.1 and V.H.2 of Supp. 2 to NUREG-0654/FEMA-REP-1 for the TSC, OSC, and EOF; including addressing NUREG-0696. If the application is intended to address these criteria, please provide additional information to address the applicable NUREG-0696 criteria. Please state whether or not Dominion intends to utilize the existing TSC, OSC, and EOF, which support North Anna Units 1 & 2, for the ESP site. If so, provide information consistent with Evaluation Criteria V.H.1 and V.H.2 of Supp. 2 regarding the impact of the new reactors on these facilities.

RAI 13.3-9

SSAR Section 13.3.2.2.2.I.1 (Arrangements for Hospital Services) states that Virginia Power has made arrangements with the Medical College of Virginia Hospitals/Virginia Commonwealth University (MCVH/VCU) in Richmond, Virginia, to provide medical assistance to personnel injured or exposed to radiation and/or radioactive material.

Please provide a copy of the MCVH/VCU Radiation Emergency Plan that would apply to the ESP site, and is relied upon for purposes of the ESP application.

RAI 13.3-10

SSAR Section 13.3.2.1 (Identification of Physical Characteristics) states that (1) physical characteristics unique to the ESP site have been analyzed to determine whether they could pose a significant impediment to the development of emergency plans; (2) a preliminary analysis of evacuation times has been used to identify these characteristics, including seasonal recreation visitors around the lake, school populations, etc.; and (3) a description of the analysis methods and results is provided in the most recent Evacuation Time Estimate (ETE) for North Anna.

Please state whether any physical characteristics unique to the proposed ESP site were, or were not, identified–from the ETE, or any other source/analysis–that could pose a significant impediment to the development of emergency plans for the ESP site. If such physical characteristics were identified, please provide a discussion and detailed analysis that addresses the physical characteristics of concern, including how they could pose a significant impediment to the development of emergency plans for the ESP site.

SSAR Section 15.4, Radiological Consequences

RAI 15.4-1

SSAR Section 15.4 states that the site-specific doses were calculated by multiplying the design certification doses by the ratio of the site $\chi$/Qs to design certification $\chi$/Qs. The SSAR shows the $\chi$/Qs for the AP-1000 design for the exclusion area boundary (EAB) and low population zone (LPZ). Westinghouse has revised its $\chi$/Qs in the AP-1000 design certification control document since submittal of the North Anna ESP application. Please use the $\chi$/Qs in the most recent Westinghouse AP-1000 Design Control Document (dated April 26, 2004), and, based on the AP-1000 $\chi$/Qs, provide the site-specific doses and fission product releases for all design

basis accidents (DBAs) in SSAR chapter 15. If you elect not to use the updated values in the accident analyses, please so state.

RAI 15.4-2

SSAR Section 15.4 states that, for the ABWR design, an equivalent total effective dose equivalent (TEDE) value is estimated by multiplying the thyroid dose by 0.03 and adding the product to the whole body dose. The results of this calculation are shown in Table 15.4-1. Please explain how this dose compares to that for the General Electric ABWR design, which is certified with the thyroid and whole body doses specified in 10 CFR Part 100.

RAI 15.4-3

Several tables in SSAR Section 15.4 present doses for ABWR design basis accidents in TEDE units (e.g., Table 15.4-12). Since the General Electric ABWR design is certified with thyroid and whole body doses, please provide thyroid and whole body doses for ABWR design basis accidents.

RAI 15.4-4

Several tables in SSAR Section 15.4 present the time-dependent activity releases for each design basis accident (e.g., Table 15.4-13). Please provide the references and the methodology used to determine the time-dependent activity release values in these tables. Also, please ensure the values in these tables appropriately reflect the certified AP-1000 design $\chi$/Qs as discussed in RAI 15.4-1.

RAI 15.4-5

SSAR Table 15.4-1 summarizes the resulting doses at the ESP site for postulated design basis accidents using the AP-1000 and the ABWR as surrogate designs. For each design basis accident, please provide (1) AP-1000 and ABWR doses used for the exclusion area boundary (EAB) and low population zone (LPZ), and (2) the ratios of site-specific $\chi$/Qs to design certification $\chi$/Qs used.

RAI 15.4-6

Several tables in SSAR Section 15.4 present doses for AP-1000 design basis accidents. Please clarify whether the 0- to 2-hour EAB doses are for the 2-hour period with the greatest EAB doses. If they are not, please provide the doses for the 2-hour period with the greatest EAB doses.

SAR Section 17.1, ESP Quality Assurance

RAI 17.1-3

Please provide copies of the following documents:

a) "Quality Assurance Program Plan (QAPP)," Bechtel Document Number: 24830-001-GAQ-00001-001, dated August 5, 2003

b) "Bechtel Nuclear Quality Assurance Manual," Revision 4, dated November 1, 2002

**From:** Michael Scott
**To:** David_batalo@dom.com; Joseph_Hegner@dom.com
**Date:** 5/26/04 3:04PM
**Subject:** DRAFT REQUESTS FOR ADDITIONAL INFORMATION PACKAGE 7

Gentlemen:

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

Dominion may request a phone conference with the cognizant NRC 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. To support the NRC's objective of mailing all the Dominion ESP RAIs by June 3, 2004, the phone con needs to occur by June 1, 2004.

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

The RAIs in this package address various areas. With regard to emergency planning, the Federal Emergency Management Agency (FEMA) has reviewed emergency planning information submitted in the ESP application, including information related to the operating plants at North Anna.

The staff notes that the scope of an ESP application review is different from the NRC's oversight of operating plant emergency planning. The North Anna ESP application includes a "major features emergency plan" pursuant to 10 CFR 52.17(b)(2)(i), which takes into account certain elements of the emergency plan in place at North Anna Units 1 and 2. For Dominion's submittal, the ESP review includes evaluation of information submitted, including the evacuation time estimate, as well as state and local emergency plans, notwithstanding the fact that some of this information may also be part of an ongoing reactor oversight process with respect to Units 1 and 2.

Your timely response to these RAIs will support meeting the review schedule milestones. Partial submittals would be welcome to minimize delays.

Please contact me if you have questions.

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

**CC:** Bruce Musico; Daniel Barss; David Matthews; Eric Weiss; Frank Gillespie; James Lyons; Jay Lee; Kazimieras Campe; Laura Dudes; Mark Rubin; Nader Mamish; Nanette Gilles; R. Brad Harvey; Raj Anand; Robert Dennig; Stephanie Coffin; Stephen Dinsmore; Stephen Raul Monarque

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| **From:** | Michael Scott |
| **Created By:** | MLS3@nrc.gov |

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# DRAFT

# North Anna Early Site Permit Application
# Site Safety Analysis Report (SSAR)
# Requests for Additional Information (RAI)
# RAI LETTER NO. 7

SSAR Section 1.8, Conformance to NRC Regulations and Regulatory Guidance

RAI 1.8-1

Please provide a comprehensive listing of NRC regulations and regulatory guidance applicable to the Dominion early site permit (ESP) SSAR and the affected SSAR sections. For example, please state whether 10 CFR 100.21(f) and Regulatory Guide (RG) 4.7 apply to SSAR Section 13.6, and whether Regulatory Guide 1.183 applies to SSAR Section 15.0.

SSAR Section 2.2.3, Evaluation of Potential Accidents

RAI 2.2.3-1

Please identify hazards, if any, associated with the existing North Anna, Units 1 and 2 that could pose an undue risk to new reactor(s) that might be constructed and operated at the ESP site.

SSAR Section 2.3.1, Regional Climatology

RAI 2.3.1-6

The methodology used to determine site-specific design-basis tornado parameters as discussed in the response to RAI 2.3.1-1(g) is very sensitive to changes in F class of 1 or 2 tornadoes when the total number of tornadoes is small (24). Consequently, the uncertainty in the estimate of the wind speed is large. Please calculate the site tornado parameters using a 2-degree square box and provide the staff a copy of the resulting calculation/analysis.

SSAR Section 2.3.4, Short-Term (Accident) Diffusion Estimates

RAI 2.3.4-1

Please provide the results of executing the PAVAN computer code using the wind speed categories discussed in Section 4.6 of NUREG/CR-2858 (i.e., 0.5, 0.75, 1.0, 1.25, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 8.0, and 10 m/sec). Also, please provide a copy of the input file(s) used to execute PAVAN.

SSAR Section 2.3.5, Long-Term (Routine) Diffusion Estimates

RAI 2.3.5-1

Please provide a copy of the input file(s) used to execute XOQDOQ in support of calculating the long term (routine release) $\chi/Q$ and D/Q values presented in SSAR Section 2.3.5.

RAI 2.3.5-2

SSAR Section 2.3.5 and Table 2.3-16 present bounding maximum annual $\chi$/Q and D/Q values at or beyond the site boundary for routine releases. However, the SSAR Section 1.8.1 discussion on Regulatory Guide 1.70 (top of SSAR Page 2-1-63, Revision 0) states that the maximum annual average $\chi$/Q values at or beyond the site boundary for each venting location will be provided in the COL application. Please explain the difference between these two statements.

SSAR Section 13.3, Emergency Planning

RAI 13.3-10

SSAR Section 13.3.2.2.2.k (Radiological Exposure Control) relies on the existing North Anna units' radiological protection procedures, stating that the procedures would be applicable to the ESP site or would be addressed in future radiological protection procedures. SSAR Section 13.3.2.2.2.k.4 (Authorization of Exposure Above Dose Limits), which substantively repeats a portion of NAEP Section 6.4.1 (Emergency Exposure Limits), states that approval from the "emergency coordinator" is necessary for planned exposures greater than the 10 CFR 20 annual limits. NAEP Section 6.4.1 states that this approval will be from the "Station Emergency Manager." Please explain the difference in the designated approval source.

RAI 13.3-11

Please provide inter-County and State agreements, which reflect an awareness of the ESP application.

RAI 13.3-12

The current evacuation time estimate (ETE) is dated November 2, 2001. Please provide a copy of the prior ETE study, believed to have been conducted by Virginia Tech in 1991.

RAI 13.3-13

Please provide the following information related to the Evacuation Time Estimate (ETE):

(a) Effect on the ETE of extrapolation of population data to future years, including accounting for increases in permanent resident and transient populations (including at the North Anna Power Station) as a result of operation of new reactors at the site.

(b) Capacities of evacuation assembly centers (EACs).

RAI 13.3-14

Please provide a cross-reference to information in State and Local emergency plans that is used to demonstrate compliance with each State and Local evaluation criterion in Supplement 2 to NUREG-0654/FEMA-REP-1.

RAI 13.3-15

Please provide the following information regarding the State and Local emergency plans:

(a) Availability and assistance of laboratories referred to in the plans.

(b) Description of periodic program in Orange County for informing the public of how they will be notified and what actions should be taken during an emergency.

(c) Description of program in Orange County for periodic, non-emergency briefings for the media.

(d) Explanation for differences between assumptions in the SSAR and assumptions in the State emergency plan regarding reliance on the U.S. Department of Energy for airborne radioactive plume tracking.

(e) Clarification of the use of Patrick Henry High School as an evacuation assembly center (EAC) and an alternate remote assembly area (RAA).

(f) Mutually agreed upon onsite assistance, such as traffic control, between the applicant and other agencies such as the State of Virginia and Louisa County.

(g) Description of measures in Orange County and in the Commonwealth of Virginia RERP (COVRERP) for dealing with potential impediments to use of evacuation routes.

(h) Guidance and/or criteria for when sheltering should be considered.

(i) Decision-making guidance for emergency workers to exceed U.S. Environmental Protection Agency exposure limits.

(j) Measures (e.g., pocket dosimeter limits) to ensure that the use of an exposure control ratio, as described in the COVRERP, does not result in emergency workers exceeding exposure limits.

(k) Descriptions in County RERPs of contacts and arrangements made for local and backup hospital and medical services.

(l) Descriptions in State and County RERPs of the training program or qualification method for directors/coordinators of emergency response.

(m) Descriptions in the COVRERP and County RERPs of training programs for personnel performing radiological monitoring.

(n) Descriptions in the COVRERP and County RERPs of training programs for medical support personnel.

(o) Description of training program for the Orange County Emergency Services Coordinator.

(p) Description in the Orange County RERP of criteria or plans for periodic review and update of the plan or agreements.

(q) Cross-references in the Orange County RERP to the criteria in Supplement 2 to NUREG-0654/FEMA-REP-1.