

RAS 13003

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

DOCKETED 02/07/07

SERVED 02/07/07

Before Administrative Judges:

Alex S. Karlin, Chairman
Dr. Richard F. Cole
Dr. Thomas S. Elleman

In the Matter of

DOMINION NUCLEAR NORTH ANNA, LLC

(Early Site Permit for North Anna ESP Site)

Docket No. 52-008-ESP

ASLBP No. 04-822-02-ESP

February 7, 2007

ORDER

(Issuing Environment-Related Questions)

Pursuant to our January 4, 2007, second revised scheduling order (SRSO), the Board hereby issues its written questions related primarily to environmental issues to Dominion Nuclear North Anna, LLC (Dominion) and the NRC Staff (Staff) concerning Dominion's application for an early site permit for two nuclear reactors proposed to be located adjacent to Lake Anna in Louisa County, Virginia. Our questions are set forth in Attachment A.

As specified in the SRSO, Dominion and the Staff shall each file their answers to the questions set forth in Attachment A on or before March 1, 2007. Each party should input their answer to each question into the appropriate column on the electronic copy of Attachment A. The answer to each question should identify the individual who is attesting to the answer and (separately) identify the subject matter expert(s) or individual(s) who were consulted or involved in preparing the answer.¹ The answer to each question also should identify any document that

¹ Such identification should include the name, title, and employer of the person. The parties do not need to identify lawyers who were consulted for purposes of legal advice.

is relied on as important support for the answer.² In addition, legal questions need not be answered in the electronic copy of Attachment A, but should be answered separately and individually in a single brief or legal memorandum signed by counsel with citations to relevant legal authority.

In order for the answers to be incorporated into the record of this proceeding and relied on by the Board in its decision making, each party's answers (other than the briefs responding to legal questions) should be submitted in exhibit form, under oath or affirmation, so that they are suitable for receipt into evidence without the necessity of the personal appearance of each expert or individual.³ Likewise, if a party wishes a document cited in support of an answer to be included in the record, the document will need to be submitted and admitted as an exhibit. The exhibits can either be provided now, or when party submits its testimony at a later date.⁴

The Board notes that most of its questions can be answered in a relatively straightforward manner. Many questions merely ask for information, data, or analyses that should be known and/or readily available to Dominion and the Staff. Other questions are definitional (the definitions will assist us in writing and supporting our decision), ask for explanation of specific statements in the Final Environmental Impact Statement (FEIS), or raise apparent inconsistencies. Virtually all questions are specific and tied to the FEIS.

² Such identification should include the title, subject, date, relevant page number, and (if applicable) the ADAMS number of the document.

³ See, by analogy, 10 C.F.R. § 2.1207(b)(2), specifying that, in Subpart L proceedings, written testimony is to be received into evidence in exhibit form.

⁴ Except where the Board has specifically requested a document or analysis or where a party deems an exhibit necessary to the understanding of its answer, we encourage each party to submit most of its proposed exhibits later, when it submits its case in its written testimony. This will allow the parties to create and organize their exhibits, testimony, and evidence, and build the record to support their positions, in a more organized and accessible manner. Likewise, the curriculum vitae and any other information supporting the expertise of any person identified as an expert witness may be submitted later, with their written testimony.

The Board encourages Dominion and the Staff, where appropriate, to coordinate their answers and avoid duplication. However, all of the questions on Attachment A, even those relating to the nature and adequacy of the Staff's review, are addressed to both the Staff and Dominion and should be answered by each (even if only to say that you have no responsive information) unless you agree on a joint response.

At the request of the Staff, the Board has scheduled a prehearing conference in this matter on February 14, 2007, at 2:00 PM EST. The purpose of the prehearing conference is to expedite this proceeding by allowing the parties to obtain clarification of the scope or meaning of any of our environmental-related questions so they can answer them fully, fairly, and promptly on March 1, 2007. The parties are encouraged to begin preparing and drafting their answers now, and not wait until after the prehearing conference, as it will not serve as a ground for an extension.

It is so ORDERED.

FOR THE ATOMIC SAFETY
AND LICENSING BOARD⁵

/RA/

Alex S. Karlin, Chairman
ADMINISTRATIVE JUDGE

Rockville, Maryland
February 7, 2007

⁵ Copies of this order were sent this date by Internet e-mail transmission to counsel for the licensee, Dominion Nuclear North Anna, L.L.C. (Dominion) and counsel for the NRC Staff.

ATTACHMENT A: NORTH ANNA ESP ENVIRONMENTAL QUESTIONS

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
1	1-3 to 4	<p>The FEIS states that an ESP “applicant may elect to use a PPE approach instead of supplying specific design information,” and that the PPE “should provide sufficient bounding parameters and characteristics of the reactor or reactors and the associated facilities so that an assessment of the site suitability can be made.” However, the Staff acknowledges that, in numerous instances, Dominion Nuclear North Anna, LLC (Dominion) failed to provide the necessary PPE information or the specific design information. For example, the FEIS states “Dominion did not or was unable to provide information and analysis for certain issues sufficient to allow the NRC staff to complete its analysis. For such issues, Dominion did not offer, nor did the staff identify, bases for assumptions that would allow resolution. The staff was unable to determine a unique significance level for such issues, and therefore, these issues are not resolved for the North Anna ESP site.” P 1-5. Some specific examples are listed on FEIS Appendix J.3. Under these circumstances:</p>	
		<p>A. Please explain why the Staff did not require the applicant to at least provide the PPE information on these matters.</p>	
		<p>B. Legal Question: Given that the applicant has left many gaps in the PPE information, please explain why issuance of an ESP here does not violate the Commission’s prohibition on issuing “partial ESPs” and the Commissions statement that “where adequate information is not available, early site permits will not be issued.” 54 Fed. Reg. 15372, 15378 n.3 (April 18, 1989).</p>	
		<p>C. Legal Question: How should the NRC and this Board distinguish between ESP applications that should be denied because “adequate information is not available” and ESP applications that can still be granted, even though the applicant has failed to provide either the “specific design information” or the “sufficient bounding parameters” (i.e., the PPE)?</p>	
		<p>D. Legal Question: If an applicant fails to provide either specific design information or sufficient PPE information relating to its two proposed gas cooled nuclear reactors, leaving NRC unable to “resolve” numerous environmental and safety issues relating to the site (and given that 10 C.F.R. Part 51 Tables S-3 and S-4 and 10 C.F.R. Part 50 Appendix I do not cover gas cooled nuclear reactors), is it not more appropriate to simply exclude gas cooled reactors from the coverage of the ESP rather than to issue a “partial” ESP with so many unresolved issues?</p>	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
		E. Legal Question: NEPA requires that the EIS be complete and available to the decision-maker <u>before</u> the decision is made, <u>i.e.</u> , the ESP is issued. <u>See</u> 40 C.F.R. § 1500.1; <u>Private Fuel Storage LLC</u> (Independent Spent Fuel Storage Installation), CLI-02-25, 56 NRC 340 (2002). In addition, the EIS must be adequate. Please discuss whether, given the unresolved issues and information gaps in ER and EIS, the FEIS is complete and adequate as required by NEPA.	
2	1-4	The FEIS states that the Staff “adapted the ESRP review guidance to the PPE concept.” The FEIS states at P 3-4 that “In some cases, the design specific information called for in the ESRP was not provided in the Dominion ESP application because it did not exist or was not available. Therefore the NRC Staff could not apply the Environmental Standard Review Plan (ESRP) guidance in those review areas. In such cases, the NRC Staff used its experience and judgment to adapt the review guidance in the ESRP and to develop assumptions necessary to evaluate impacts to certain environmental resources to account for this missing information.” Please identify and explain each instance where the Staff adapted the ESRP (NUREG-1555, Standard Review Plans for Environmental Reviews for Nuclear Power Plants).	
3	1-5	Legal Question: Please provide a regulatory definition of the following two terms: “plant parameter envelope” and “postulated site parameters.” 10 C.F.R. § 52.17(a)(2), states that the environmental report must focus on the effects of “construction and operation of a reactor or reactors which have the characteristics that are within the <u>postulated site parameters</u> ,” implying that the PSP concerns the characteristics of the reactors. Please explain.	
4	1-5	The FEIS states that the Staff relied on the information in the ER and that if the Staff ultimately determines that a representation or an assumption has not been satisfied at the CP/COL stage, “that information would be considered new and potentially significant, and the affected area could be subject to re-examination.” However, 10 C.F.R. § 52.39(a)(i) specifies that, at the CP or COL stage, “a contention that a reactor does not fit within one or more of the site parameters included in the site permit may be litigated.”	
		A. Legal Question: Please discuss how the FEIS statement comports with the regulation. Are you proposing the threshold for admission of a contention at the CP or COL stage also requires that the petitioner show that the failure of the reactor to fit the site parameters is “new and significant?” Please explain.	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
		B. Legal Question: The cited regulation refers to “site parameters <u>included in the site permit.</u> ” Are all ER representations relied on by the Staff included within this category or only those that are specifically listed in FEIS Appendix I (ESP Site Characteristics and Plant Parameter Envelope) and Appendix J (Dominion Nuclear North Anna, LLC Permit Conditions, Commitments, Assumptions and Unresolved Issues). Please explain.	
5	1-5	The FEIS states “Dominion did not or was unable to provide information and analysis for certain issues sufficient to allow the NRC staff to complete its analysis. For such issues, Dominion did not offer, nor did the staff identify, bases for assumptions that would allow resolution. The staff was unable to determine a unique significance level for such issues, and therefore, these issues are not resolved for the North Anna ESP site.”	
		A. Please provide a list of each time the FEIS states that a matter or point is not resolved or unresolved (These may be readily located by a key-word search). The list should identify the matter or point in question and the page number of the FEIS or appendix.	
		B. Appendix J-3 lists eight environmental issues as unresolved. Is this an exhaustive list? Why are these the only ones listed?	
6	1-9	The FEIS states that the proposed ESP is for two “units” and that “each unit represents 4500 MW(t) . . . and would consist of one or more reactors or reactor modules.”	
		A. Please confirm that, for the PBMR option, Dominion is asking for approval to site up to 16 additional nuclear reactors on the North Anna site. If not, how many is it?	
		B. Please confirm that, for the GT-MHR option, Dominion is asking for approval to site up to 12 additional nuclear reactors on the North Anna site. If not, how many is it?	
		C. Please confirm that, for the IRIS option, Dominion is asking for approval to site up to 6 additional nuclear reactors on the North Anna site. If not, how many is it?	
		D. Please confirm that, for the ACR-700 option, Dominion is asking for approval to site up to 4 additional nuclear reactors on the North Anna site. If not, how many is it?	
		E. Define “module.”	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
7	1-9	The FEIS states that “in the absence of an ESP, safety and environmental reviews of applications for OL’s [sic] under 10 C.F.R. part 50 would take place <u>during</u> plant construction.” Please explain and provide a citation to support this. How could construction commence prior to the completion of the safety and environmental reviews? Isn’t this prohibited by the AEA and NEPA?	
8	1-11	What is the status of the Instream Flow Incremental Methodology Study (IFIM)?	
9	2-1	Two other NAPS units (units 3 and 4) received construction permits on July 26, 1974. To whom were they issued? What is the status of the construction permits?	
10	2-1	Virginia Power owns and operates the North Anna Hydroelectric Project, an 855-kW capacity hydroelectric power plant at the base of the North Anna Dam. Does the operation of the hydroelectric facility impact on the level of downstream discharges from the dam? Is there a minimum flow requirement for hydroelectric plant operation?	
11	2-3	Please provide the Board with five copies of a large (e.g., 3' x 3') map of the proposed ESP site and its 50 mile radius, similar to Figure 2-2. If possible, it should include relevant topographical information. Please mark this as a proposed exhibit.	
12	2-4	Please provide the Board with five copies of a large (e.g., 3' x 3') map of the proposed ESP site and its 10 mile radius, similar to Figure 2-3. If possible, it should include relevant topographical information. Please mark this as a proposed exhibit.	
13	2-4	The scale shown on the bottom right of Figure 2-3 appears to be wrong. Please explain.	
14	2-8	The FEIS states that “initial evaluations by Dominion show that any two of the 500-kV transmission lines together with the 230-kV line would have sufficient capacity to carry the total output of the proposed new units in addition to the existing new units. If Dominion were to decide to proceed with the development of the proposed ESP units, a system study (load flow) modeling these lines, including the additional power from the proposed new units, would be performed.”	
		A. Given that transmission line impacts are an important part of an EIS for an ESP, please explain why the possible need for (and environmental impact of) additional transmission lines should not be studied and understood now.	
		B. Recent reports indicate that the Dominion group of companies is planning to build additional transmission lines in the State of Virginia. (<i>Washington Post</i> , P C3, January 28, 2007). Please explain whether the FEIS should include a discussion of the environmental impacts of these proposed new transmission lines.	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
15	2-19	Please describe the radiological environmental monitoring program (REMP) that is being conducted at the NAPS site. Please provide five copies of the latest annual report. Please mark this as a proposed exhibit.	
16	2-19	Please provide five copies of the Offsite Dose Calculation Manual (ODCM)	
17	2-22	The FEIS states that “Dominion records data from 19 groundwater wells.” Please list the frequency and nature of the data recorded, including the chemical and radiological characteristics sampled for, and the detection limits of the analysis performed. Please explain how this statement comports with the statement at page 2-26 that “there are no site-specific data available for the non-radiological chemistry of the groundwater underlying the ESP site.”	
18	2-25	The FEIS states that a “public health advisory has been issued regarding the consumption of certain fish” in Lake Anna because their tissue contain polychlorinated biphenyls (PCBs) and that “the source of the PCBs is unknown at this time.” FEIS Appendix E states, at page 3-35, “the staff did not find a relationship between PCBs in the lake and the existing nuclear facility.” What is the basis for this statement? What monitoring or investigation, if any, has been or is being performed (by the Staff, Dominion, or any other entity) to study or define the PCB concentrations in the lake or to determine whether the NAPS could be the source of such PCB contamination in the lake? Will the proposed facilities involved in the ESP include any facilities or equipment containing PCBs?	
19	2-26	The FEIS states “The applicant is able to consider an ongoing program associated with the existing Units 1 and 2 as part of the pre-application and pre-operational monitoring program at the ESP site.” What does this mean? What significance does it have for the ESP? Are you proposing that the ESP include permit conditions or other assumptions or action items to include and mandate such an “ongoing program?”	
20	2-27	The FEIS states that “community based monitoring of Lake Anna and WHTF water quality has been performed by volunteers from the Lake Anna Citizens Association.” Have the results of this monitoring been provided to the Applicant and Staff? Have you considered it in this FEIS?	
21	2-31	What is the source of the information in Table 2-2? What did the Staff do to verify this information?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
22	2-35	The third dike in the WHTF has a submerged weir regulating outflow allowing water to exit the WHTF into Lake Anna. The FEIS states that fish can move between the two bodies of water at the weir. The discharge velocity is reportedly high so as to rapidly mix the heated water from the WHTF with the cooler water of Lake Anna. Wouldn't the discharge velocity of the almost 2 million gallons per minute prevent all but the strongest swimmers from entering into the WHTF area? What is the average discharge velocity?	
23	2-36	Have Asiatic clams ever created a problem in the water intakes? What was the basis for their decline in Lake Anna?	
24	2-48 to 49	In the FEIS, NRC projects that the annual growth rate of the population in the vicinity of the proposed ESP decreases. However, both Spotsylvania and Louisa Counties are among the fastest growing counties in Virginia. Please explain the reasoning behind these growth rates.	
25	2-76 to 77	NRC Environmental Justice policy specifies that if the percentage of minority or low income population in the impacted area exceeds [by 20%] that of the State or the County percentage . . . then EJ [an Environmental Justice review] will be considered in greater detail." 69 Fed. Reg. 52,040, 52,048 (Aug. 24, 2004).	
		A. Does the minority or low income population in the impacted area exceed by 20% that of the State or County? If so, please explain how this was determined.	
		B. If the answer to A is yes, then is the EJ analysis at pages 2-76 to 2-77 supposed to represent an environmental justice review "in greater detail?"	
		C. Does the FEIS identify, discuss and evaluate whether and how the environmental impacts of the proposed ESP might have a peculiar, different, or special (qualitatively or quantitatively) impact on any such minority or low income population (<u>e.g.</u> greater reliance on fish consumption)? Is so, where?	
26	3-7	The FEIS states that "Because no specific design has been selected, the water treatment systems for the proposed Units 3 and 4 are not specified." Wasn't it possible for Dominion to provide a PPE, in lieu of a "specific design" for the water treatment systems? Why didn't the Staff require this information to be provided?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
27	3-8	Figure 3-2 appears to show that the dry cooling tower can be operated with fans turned off, providing some cooling with less energy consumption. What approximate percentage cooling could be obtained with an external temperature in the 80's with fans off and what would be the energy penalty to plant output for this operational mode?	
28	3-8	Little discussion is provided related to the surface condenser diagramed in Figure 3-2. Is this an evaporative cooler and what approximate percentage contribution does it make to Unit 3 cooling?	
29	3-9	The FEIS states that the "calculated minimum lake level under drought conditions is 74.74 m (243.5 ft) MSL." What does this mean? Are you saying that, even in a drought, the lake will never go below 243.5 ft MSL? What is the significance of the FEIS statement? Is this a proposed permit condition?	
30	3-9	Under the worst thermal efficiency conditions, the dry cooling tower for proposed Unit 3 will be designed to remove a minimum of one-third of the excess heat. Because there is interest in minimizing water consumption and thermal impact on Lake Anna, some interested parties have proposed using the Unit 3 dry towers all the time along with using the wet tower system as a helper system when the dry tower cannot handle the entire heat load. Have any estimates been made of the month to month fraction of heat load that could be handled by the dry tower system under such a scheme? Have any estimates been made of the savings in consumptive water loss? If so, please provide them.	
31	3-9, 3-10	The FEIS states that the plant would primarily use wet towers to cool Unit 3 during periods of relative water surplus (when the water surface elevation of Lake Anna is at or above elevation 250 MSL). This is termed the Energy Conservation (EC) mode.	
		A. Is this exclusive use of the wet towers when the lake is at or above 250' a hard and fast operating rule? Is it to be an express condition in the ESP?	
		B. Would the dry cooling system ever be used when the lake surface elevation is at or above elevation 250?	
		C. Does the Commonwealth of Virginia have any control over the operating mode of the cooling systems for Units 3 and 4 or is its authority limited to water releases to downstream at the dam?	
32	3-10	"Worst conditions" for operation of the dry cooling tower are cited as a "hot and humid atmosphere at tower level." Why is humidity important to dry tower operation?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
33	3-10	<p>It is stated on page 3-10 that when the water level in the Lake drops below elevation 250 for a period of one week or more, the closed -cycle dry cooling towers for Unit 3 would be employed. This is termed the Maximum Water Conservation (MWC) mode. Under favorable meteorological conditions, the entire excess heat load from Unit 3 could be dissipated via the dry cooling towers. Under worst case conditions, the dry towers would handle at least one-third of the excess heat.</p> <p>Is the above described procedure for initiating the MWC mode an operating rule? Does the Commonwealth have any say in the operation of the Unit 3 dry tower system?</p>	
34	3-12	<p>On page 3-12, Dominion estimated that the combination wet and dry cooling system would have an energy efficiency penalty of 1.7 to 4%.</p> <p>What operating conditions were assumed to arrive at these energy efficiency penalty values? Is this based on the premise that only wet cooling will be used when the lake level is at elevation 250 or higher?</p>	
35	3-13	<p>Legal Question: The FEIS states that “These systems would process radioactive liquid, gaseous and solid effluents to maintain releases within regulatory limits.” Please list all of the regulatory limits, with citations, specifying whether they apply on a per reactor, per unit, per facility, per license, or per NAPS and ESP site basis. Please specify which, if any, of these regulatory limits are expressly stated in, or conditions of, the proposed ESP.</p>	
36	3-13	<p>The FEIS states that “Adequate design information to estimate liquid and gaseous radioactive effluents was available for four of the seven reactor designs considered in establishing PPE values” and that “limited information was available [with regard to] gas-cooled reactor designs.” Is the Staff saying that it did <u>not have adequate</u> design information relating to 3 of the seven reactor designs, including the gas-cooled designs?</p>	
37	3-13	<p>Why is the bounding solid radioactive waste activity from one ABWR reactor or one ESBWR reactor when two reactors are contemplated for the site?</p>	
38	4-13	<p>Has Lake Anna demonstrated a proclivity for the buildup of sediment? Have any measurements of sediment buildup been made? If so, what are the results? Have any estimates of the potential problem of heavy metals from Contrary Creek deposits been made?</p>	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
39	4-33	Of the expected 5,000 workers required for construction, it is assumed that only 1,000 of these will establish new residences within a 50 mi. radius of the plant site. Please elaborate on the data or reasoning that supports this conclusion.	
40	4-33	Given that Louisa County schools are identified as "currently overcrowded with enrollment growing at 2% a year" what numerical and percentage increase in Louisa County school enrollments would be projected for 1,000 new residents?	
41	4-36	The FEIS states that the Staff identified the pathways which the environmental impacts associated with the construction of Units 3 and at the NAPS site could affect human populations. Where did the Staff identify the pathways?	
42	4-40, 4-42	Section 4.9.1 gives a direct radiation exposure of 13 mrem/yr. from direct radiation exposure while Section 4.9.4 gives 24 mrem/yr. to construction workers, which is the sum of direct plus liquid and airborne exposure pathways. How will construction workers receive a liquid pathway exposure?	
43	4-42	The FEIS states that "Dominion estimated an annual dose to a site preparation <u>worker</u> of 0.24 mSv (24 mrem)" and that this estimate is "well within both the dose limits to individual <u>members of the public</u> found in 10 C.F.R. 20.1301 and occupational dose limits to workers found in 10 C.F.R. 20.1201." (emphasis added). But the 24 mrem annual dose to the worker is <u>very close</u> to the 25 mrem annual dose for members of the public set by EPA at 40 C.F.R. Part 190. We recognize that, strictly speaking, the public dose limit does not apply to workers. But it is the Staff that has made this comparison. How can you say that the dose is "well within" this limit? Please discuss.	
44	4-42	The gaseous and liquid pathway exposures to construction workers is based upon measured results from 2001, cited as being "representative of typical releases." For a time interval of at least six years that includes 2001, what would be the highest and lowest annual releases measured?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
45	5-8	<p>Legal Question: In order to maintain the environmental health of the North Anna River, the North Anna Dam is operated to maintain a minimum discharge of 40 cfs. However, when the level of water in Lake Anna drops below 248 MSL the "Lake Level Contingency Plan" (LLCP) is triggered and the dam discharges only 20 cfs. This adversely impacts the river below the dam. The Staff's water budget analysis "assumed the NAPS Units 1 and 2 and the proposed Unit 3 would operate continuously" P 5-8, and that the "existing NAPS units are the largest users of water in the region." P 5-9. The FEIS states that the incremental effect of "operation of Unit 3 would approximately double the duration of periods during drought conditions when the LLCP would be applied. P 5-11. Specifically, the Staff estimated that if Unit 3 were added to Units 1 and 2, then the amount of time that water discharges to the downstream river would be cut to 20 cfs would increase from 5.7% of the time to 11% of the time. P 5-10. Given the cumulative impact of Units 1, 2, 3, and 4, should the EIS alternatives analysis specified in Section 8 of the FEIS include alternatives analysis of Dominion trading more stringent water saving measures on Dominion's existing Units 1 and 2 in mitigation or return for the incremental water losses caused by Unit 3? Why isn't this a "reasonable" alternative or mitigation measure requiring consideration? Please explain.</p>	
46	5-9	<p>With Unit 3 operating, the percentage of time that the water release from the dam would be at minimum allowed flow of 20 cuft./sec would roughly double from 5.7% of the time to 11% of the time. The FEIS is essentially silent on the effects of lowered flow on downstream aquatic species. Please discuss how this issue will be addressed by the environmental study (IFIM) recently announced by Dominion.</p>	
47	5-9	<p>On page 5-9, the FEIS states that the actual procedures controlling the operation of the cooling system will be determined by the Commonwealth of Virginia in the Clean Water Act, National Pollution Discharge Elimination System (NPDES) permit, which is not needed until the CP or COL stage. Please explain the level of control that will likely be exercised by Dominion and by the Commonwealth.</p>	
48	5-10	<p>With Unit 3 running, Dominion and Staff estimated the percentage of time that Lake Anna would drop below 248 ft. to be 7.3% of the time and 11% of the time respectively. In explaining the difference, Staff concluded that two primary causes were: first, that Dominion had used an evaporation rate of 8707 gpm at a capacity factor of 96%, while the Staff had used an evaporation rate of 8707 gpm over any 365 day period; and second, that the Staff had applied the average evaporation rate throughout the period, while Dominion applied an evaporation rate that varied depending on temperature. Which procedure would more accurately assess actual consumptive water use? Please explain.</p>	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
49	5-11	<p>The FEIS identifies at least one “potential conflict over water use” with regard to the North Anna River, but fails to discuss or consider the environmental impacts or implications of this conflict, stating only that the conflict “falls within the regulatory authority of the Commonwealth of Virginia.” Merely because a matter is regulated by another government entity does not mean that its environmental impacts can be ignored by the EIS. Similarly, merely because a matter is not within the direct jurisdiction of NRC does not mean the environmental impacts are to be excluded. See 40 C.F.R. § 1502.14(c) and 10 C.F.R. Part 51, Appendix A, Section 5. Should the FEIS discuss the known potential conflicts over water use? Given the population growth projections for the region and the potential long term of the ESP and subsequent COL (20 + 20 + 40 + 20 years), please explain why the FEIS does not discuss and analyze reasonably foreseeable conflicts over water use resulting from the proposed ESP?</p>	
50	5-12	<p>The percentage of time that water flow from the dam drops to 20 cfs from operation of only Units 1 and 2 is cited in the FEIS as “6 percent” (5-17) and “approximately 6 percent” (5-10). However, the percentage of time that Lake Anna would drop below 248 ft. is cited as “5.7 percent of the time” (5-10). Is the cited 6 percent simply a rounding of 5.7 or is there some period of 20 cfs flow above 248 ft? If the difference is simply rounding, it would be desirable to use consistent numbers throughout, given the importance of this specific number.</p>	
51	5-13	<p>Please explain why Dominion did not provide at least a PPE covering the chemical effluents that would be discharged by the proposed ESP Units. Why should this item be “unresolved” at this time?</p>	
52	5-15	<p>Line 2 of the first paragraph states that “Current noise levels are occasionally as high as 100 decibels (measured at the security fence during outages).” Why are measurements made during outages? Wouldn’t there be higher noise levels during operation?</p>	
53	5-17	<p>Comment. Section 5.4.1.4 states that lake level would drop below 248 feet 5.7% of the time without Unit 3, while in Section 5.4.1.4 the 5.7% has been rounded to 6%. Given that these numbers are important, it would be desirable to use consistent numbers.</p>	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
54	5-29	Striped bass are known to occur in the North Anna River downstream of the dam but these fish are believed to have passed through the dam from Lake Anna. Striped bass are known to occur and spawn successfully in the Pamunkey River but are unlikely to venture above the <u>fall line</u> during their spawning migrations. Please describe the fall line and why it would present an impediment to spawning striped bass. How far downstream of the dam do you find a tidal influence?	
55	5-30	In Section 5.4.2, which deals with "Downstream Impacts" the FEIS states that "the biological impacts of the Unit 3 closed cycle, combination wet and dry cooling system to the general aquatic community of the North Anna River and striped bass spawning and rearing areas in the Pamunkey would be indistinguishable from the effects of operations of NAPS Units 1 and 2." This appears equivalent to saying that the lowered down-stream flow would have no effect.	
		A. What is the basis for this conclusion?	
		B. Isn't this environmental effect one of the questions the pending Dominion study (IFIM) will address?	
		C. Shouldn't this effect be covered in the FEIS?	
56	5-34	The FEIS states that "Overall, the [Lake Anna] fisheries have remained healthy and balanced despite shoreline development, NAPS operations, and increased fishing pressure." How developed is the shoreline of Lake Anna?	
57	5-39	The operation of the Unit 3 wet cooling tower would produce fogging at all times of the year (except for summer) up to a mile from the tower and nearby residents would also be exposed to modest salt deposition from the tower.	
		A. Have similar facilities at other sites produced accelerated vehicle corrosion, window fogging and gardening impacts?	
		B. If effects have been observed, what can be said about the severity of the effects?	
58	5-47	In the second paragraph of 5-47, the FEIS states that raising the lake level (6 to 12 inches) could increase localized flooding potential and downstream flows, and would likely affect use of some residential and marina boat ramps and docks, including those at North Anna State Park. Has the Staff or Applicant evaluated the effect of raising the lake level 6 to 12 inches? How serious is the threat of increasing local flooding by raising the lake level by 6 to 12 inches when the expected high water level is considerably higher?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
59	5-55	What does the term "hourly average values" mean when referring to the highest temperatures recorded at various locations in Lake Anna? Please describe the calculation.	
60	5-57, 5-58	Because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF (extremely low frequency-electromagnetic field), NIEHS recommends that passive regulatory action is warranted, including a continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. Dominion's response is to assure that transmission lines carrying the additional power would not exceed the NESC criteria for electrical shock (Appendix J, Table J-2). Does Dominion have any plans to address any other aspects of NIEHS's recommendations?	
61	5-58	Please explain why there was no consideration of a liquid effluent exposure pathway whereby leaks, releases or discharges to groundwater migrated into the adjacent surface water of the WHTF and lake.	
62	5-59	The FEIS states that "Units 1 and 2 routinely release [radioactive] tritium into Lake Anna," that "tritium has concentrated in Lake Anna," and that the "average tritium concentration in the lake for 2005 was reported as . . . 3,137 pCi/L." The FEIS also states that the proposed Units 3 and 4 will discharge additional tritium into Lake Anna.	
		A. Please describe the basic pathways and mechanisms by which tritium may be released from reactors into groundwater, the UHS, the WHTF and Lake Anna. Current and expected tritium concentrations are quoted for Lake Anna. Please summarize any measured or calculated tritium levels in the other locations. If any values for any location (including any location or strata within Lake Anna) have exceeded the EPA drinking water standard for tritium, identify these locations and the time(s) they have exceeded the standard.	
		B. The FEIS states that Dominion originally estimated that each new unit of the ESP would release 3,100 Ci./yr and later reduced this amount to 850 Ci./yr. Please explain what Dominion will do to effect this large decrease in tritium release. Has NRC evaluated the feasibility of this reduction? How can NRC confirm that this commitment is being met?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
		C. For many periods of the year, the water release rate from the lake will be small enough to produce replacement of only a fraction of the total lake volume, raising the possibility of tritium stratification in the lake. If tritium concentrations have been measured as a function of lake depth and location, please submit representative values of these measurements.	
		D. The quoted average tritium release (from Units 1 & 2 over a six-year period) is 814 Ci/yr. and the average annual lake concentration was 3,049 pCi/liter. (p. H-10). 1. What were the highest and lowest measured values over the six-year interval? 2. How was the tritium release determined?	
		E. The expected tritium level from all four units will be roughly 47% of the EPA drinking water standard of 20,000 pCi/L (p. H-10) Yet Section 5.9.2.1 states that inclusion of tritium in the dose calculations in Table 5-8 “resulted in minor changes to the estimates in Table 5-8 for the drinking water pathway and essentially no change to the estimates for other pathways.” Do you deem Lake Anna average tritium levels at 47% of the EPA drinking water standard to be minor or inconsequential? Please explain.	
		F. What monitoring will NRC require or Dominion carry out to confirm tritium concentrations and releases? Will there be any way to apportion tritium releases among the four units?	
		G. Table H-5 quotes “per unit” tritium release rates of 3,500 Ci/y which is over four times the committed release cited above. What is the difference between the Dominion commitment and the numbers in the Table?	
63	5-61, 5-62	Dominion is the source of all of the liquid pathway doses in Table 5-8. The FEIS states that “the staff determined that all input parameters used in Dominion’s calculations were appropriate.” Please describe what the Staff did to make this determination.	
64	5-62	Are the doses in Table 5-8 for all isotopes or for all isotopes minus tritium? (Better labeling of this table would be helpful.)	
65	5-62	If Table H-8 includes tritium, it would appear that a calculation of dose from fish consumption would have to utilize different biological halflives for the fraction of tritium in water and the fraction organically bound. What assumptions are made for this calculation?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
66	5-62 to 63	Dominion is the source of all of the gaseous pathway doses in Table 5-9. The FEIS states that “the staff performed an independent evaluation of gaseous pathway doses and found similar results.” Please describe the Staff’s independent evaluation and provide the results.	
67	5-62	The FEIS states that the design objectives of 10 C.F.R. Part 50, Appendix I are applicable to “each reactor unit.” As we understand it, Dominion’s IRIS option would include three light water reactors at each Unit, for a total of six additional LWR to be covered by the proposed ESP. <u>See</u> FEIS Table 6-4, Note (h). What is your position as to how the Appendix I objectives apply to the IRIS option and proposal?	
68	5-64	The FEIS states that “the direct radiation dose to the maximally exposed individual at the site boundary was determined to be negligible.” Quantitatively, what is the direct radiation dose to the MEI at the site boundary?	
69	5-64	Legal Question: It would appear possible to meet the general public dose requirements of 10 C.F.R. § 20.1301 while simultaneously exceeding the dose limitations of 40 C.F.R. Part 190. Is it your position that the Part 190 doses are ALARA recommendations or that they are regulatory limits?	
70	5-64 to 65	The FEIS states that Dominion is the source of the data contained in Table 5-11 and that “the staff performed an independent evaluation of the cumulative dose as described in Appendix H and found similar results.” Table 5-11 shows that the cumulative dose to any organ (other than thyroid) from the two existing NAPS units and the proposed units is 12 mrem, which is close to 50% of the limit imposed by the 40 C.F.R. Part 190 standards. Please explain whether there is a required or recommended level of statistical reliability associated with the determination of cumulative dose (<u>i.e.</u> , confidence level) for 40 C.F.R. Part 190? Please explain the statistical reliability or confidence level for the 12 mrem figure from Table 5-11. Does this value have the same statistical reliability level required by Part 190? Please explain.	
71	5-66	The FEIS states that the Staff used the ICRP Publication 60 nominal probability coefficients for a “total detriment” consisting of “730 fatal cancers, nonfatal cancers and severe hereditary effects per 10,000 person Sv (1 million person-rem).” Please provide a breakdown, specifying the number of fatal cancers, non-fatal cancers, and severe hereditary effects that comprise the 730 figure.	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
72	5-66	The FEIS states that “the staff concludes there would be no observable health impacts to the public from the normal operation of the proposed nuclear units and the radiologic health impacts would be small.” Does NRC use epidemiological “observability” as the criterion for whether a health impact is small? How many incremental fatal cancers would need to occur in the 50 mile radius zone around the proposed new reactors in order for such cancers to be deemed “observable” or statistically significant? Would 1,000 additional fatal cancers spread across the population of the 50 mile radius zone over 40 years be “observable?”	
73	5-72 to 73	The FEIS states that the “DBA review focuses on three light-water reactor designs” but indicates that “because the source terms for accident analyses are generally proportional to the power level, for purposes of this site suitability evaluation, the potential <u>consequences</u> of accidents for the other reactor designs are expected to be bounded.” What about the potential probabilities of DBAs for the other reactor designs? For example, the PBMR option seems to involve 16 reactors and the GT-MHR option involves 12 reactors. This factor alone might seem to indicate a 16X or 12X (respectively) greater probability of an accident. The differences in design might also make significant differences in the probabilities of such accidents. Please explain how the ER and FEIS analyze and consider these factors as applicable to the four other options not covered by the three light-water reactor designs.	
74	5-72	The section on design basis accidents does not consider the consequences to construction workers if a design basis accident should occur at Units 1 or 2 while 5,000 construction workers are present on site. In Section 4.9.1, it was assumed that the X/Q for construction workers might be 10 times that for the LPZ. If this same extrapolation is applied to TEDE doses, the AP-1000 results for a loss-of-coolant accident would imply a construction worker TEDE of 1.7 rem. This would give a population exposure to construction workers of 8,500 person-rem which is sufficient to produce health effects. (Assumes Units 1 or 2 would exhibit the same release characteristics as the units under consideration).	
		A. Why has the potential for a DBA at one of the existing units while construction personnel are on site not been addressed?	
		B. What would be exposures to construction personnel on site from the various DBAs considered if they occurred at Units 1 or 2?	
		C. What would be the severe accident impacts for the above scenario?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
75	5-75	Tables 5-15 and 5-16 do not include person-rem values in addition to TEDEs. Please provide them. Tables 5-15 and 5-16 give TEDE values but not general population person-rem exposures. Please give the general population person-rem doses for the events listed.	
76	5-72 to 77	In evaluating the environmental impact of DBAs, the FEIS seems to focus primarily on whether a DBA would result in a short term regulatory violation, <u>i.e.</u> , whether it would cause an exceedance of the "review criteria" which are the regulatory standards of 10 C.F.R. §§ 50.34(a)(1) and 10 C.F.R. 100.11 or would exceed a short term Standard Review Plan criterion. The referenced standards only deal with short term exposures (<u>e.g.</u> , whether an individual located at the EAB would receive more than 25 rem TEDE over any two hour period). How did the FEIS consider any longer term environmental impacts resulting from a DBA? For example, what if a radioactive cloud from a DBA deposited a residue of radioactive materials in the area downwind of the event? What calculations, if any, have been performed to estimate the longer term environmental effects from the depositions and contamination that could result from the various DBAs? Are compliance with these short term "review criteria" the only bases for the statements, at 5-75 and 5-76, that the "environmental risks associated with [ALWR] DBAs . . . would be small?" Please explain.	
77	5-73	Please provide five copies of table 3.1-9 of the PPE and explain why these X/Q values "are not appropriate for environmental reviews."	
78	5-73 to 75	The FEIS refers to "realistic (50 th percentile) X/Q values" used by Dominion. Does Table 5-14, use such 50 th percentile X/Q values? Please provide a table, equivalent to Table 5-14, using more protective 90 th percentile X/Q values.	
79	5-74	The FEIS states that "The staff intends to verify that the X/Q values used in analyzing the reactor design proposed at the CP/COL stage are equal to or greater than the X/Q values specified in the ESP." Shouldn't this sentence read "less than?"	
80	5-75 to 76	Please provide revised versions of tables 5-15, 5-16 and 5-17 using the more protective 90 th percentile X/Q values, if readily available or calculable.	
81	5-76	For Table 5-16, what would be the total cumulative person-rem resulting from the calculated TEDE of 1.4 rem at the EAB for a Loss-of-Coolant Accident? Given that an ESP has a potential future life of 60 years assuming construction delays and license extensions, what would be the estimated person-rem for this accident with the expanded population sixty years in the future?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
82	5-78 to 86	The penultimate paragraph on page 5-78 of the FEIS states that "Risk is the product of the frequency of an accident, also called the core damage frequency, and the consequence of an accident." Risk cannot be estimated without using a value for both frequency and consequence. Table 5-18 provides only one of the variables - the <u>frequency</u> . However, the preparation of Table 5-18 (estimating risk) necessarily required Dominion and/or the Staff to estimate, and use values for the <u>consequences</u> of each of the severe accidents covered. Thus, this information is readily available but was not provided.	
		A. Please provide a table, or revision to Table 5-18, which includes the values used (e.g., person-rem values) as the <u>consequences</u> of each of the events, and each of the types of consequences, for which a risk value is provided. For example, for the "Release Category Description" for event # 7, "LOCA followed by failure of high water pressure coolant makeup water," please provide the consequences (not probability weighted) for each column on Table 5-18, e.g., the cumulative population dose (expressed in person-Sv or person - rem), the number of early fatalities, the number of latent fatalities, the cost, the amount of land that would require decontamination, and the cumulative population dose from water ingestion that would be the consequences of such an event.	
		B. With regard to the "cost" column of Table 5-18, footnote d indicates that this includes condemnation of land. In the requested revised table providing the values you used for consequences (not probability weighted), please include the acres of land condemned.	
		C. Please provide a similar table or revision (covering items A and B above) to Tables 5-19, 5-20, 5-21, and 5-22.	
83	5-80	What is the source of the consequences data used in Tables 5-18 to 5-20? Is this site specific or generic? If generic, how can generic information be reasonable, given that the site of a reactor (population density, prevailing winds, land use patterns) are a critical element of estimating the consequences and risks of a severe accident?	
84	5-80	Tables 5-18 through 5-22 tabulate risk and core damage frequencies in units of probability or dose per reactor-yr. Why isn't it more understandable to tabulate as "per year" rather than per "reactor-year?" If one takes numbers expressed as per reactor year and multiplies by the total US or total world reactor-years, they will obtain numbers that are completely illogical. It would appear that this error is less likely to occur if the numbers are simply expressed as annual probabilities per reactor.	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
85	5-80 to 84	Tables 5-18 to 5-20 provide the “mean” environmental risks associated with severe accidents at the three types of reactors covered. Do you have, or can you readily calculate, the environmental risks based on a more protective 90 th percentile approach? If so, please provide it. If not, please explain why the mean is the only indicator used.	
86	5-80 to 84	Is the “land risk” covered by the column “Land Requiring Decontamination” in Tables 5-18 to 5-20 limited to “farm land requiring decontamination prior to resumption of agricultural usage,” as stated in footnote e of each table? If so, why? Given that the 50 mile radius region includes cities, towns, residential, commercial and industrial use land, please describe why the environmental impacts to such land should be excluded from consideration.	
87	5-80 to 84	What standard or criterion is used in Tables 5-18 to 5-20 to determine whether land or property is condemned? What standard or criterion is used to determine that land has been sufficiently decontaminated?	
88	5-84	In Table 5-21, why does the AP-1000 reactor have a similar core damage frequency to the ABWR but a factor of thirteen higher population dose risk for siting at North Anna?	
89	5-86	Table 5-22 tabulates a "Current Reactor Maximum" Core Damage Frequency of 2.4E(-4) but Table 5-21 shows at least one reactor with a higher core damage frequency (Zion). Please explain.	
90	5-86	The prompt fatality probability for auto accidents is cited as (about) 5E(-4) per year which corresponds to about 150,000 auto fatalities annually for a population of roughly 300 million. This value appears to be roughly three times the auto fatality rate for recent years. Since auto death rates have been one of the factors used to guide the adoption of a 0.1% fatality goal for reactor accidents, haven't we adopted a reactor fatality goal that is higher than what it should be?	
91	5-86	A dose objective for reactors is a cancer risk that is less than 0.1% of the cancer risk from other causes. Table 5-22 states that the person-rem dose for North Anna Units 1 & 2 is 25 person-rem per year. On page 5-87, it is calculated that the individual cancer risk from a nuclear power plant should be limited to 2E(-6) per year per person. If the Unit 1 and 2 person-rem dose is distributed among approximately 5000 persons and the probability of cancer is 4E(-4) per rem, aren't the Unit 1 & 2 cancer probabilities at or above the cancer probability goal? If true, does this have regulatory implications?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
92	5-86 to 87	The FEIS states that “the following quantitative health objectives are used in determining achievement of the safety goals.” Please provide citations and explanation of the source of these objectives. Please explain why these <u>safety</u> goals are relevant or dispositive when evaluating the <u>environmental</u> impacts (both short and long term) of a severe accident?	
93	5-88	The FEIS states that “Virginia Power controls the land to the high water mark of Lake Anna within the NAPS site. In the event of a large release of radioactive material, Virginia Power and the Commonwealth of Virginia could control access to the lake [and thus] reduce exposures.”	
		A. Is this a realistic response to the problem, given that hundreds of homes, many with piers and boats, line the shores of Lake Anna? Please explain how exposures to these people would be realistically controlled by the fact that Virginia Power has title up to the high water mark.	
		B. At what elevation is the “high water mark?”	
94	5-88	The surface water pathway doesn't appear to consider the uptake of radioactivity through consumption of fish that have ingested radioactive materials. Could this pathway increase the projected exposure?	
95	5-89	The FEIS “assumes a 1×10^{-4} Ryr probability of occurrence of a severe accident with a basemat melt-through leading to potential groundwater contamination.” The FEIS goes on to state that “the groundwater pathway is more tortuous and affords a greater time for implementing protective actions” and therefore the staff concluded that “the risks associated with releases to groundwater are small for the North Anna ESP site.” It appears that this discussion focuses solely on the human health effects of drinking radioactively contaminated groundwater. However, the proposed ESP site is located above a “sole source aquifer,” a type of aquifer designated by EPA as needing special protection. Once contaminated, such an aquifer might be very difficult to remediate and might result in it becoming unuseable for an extended period of time. Did you evaluate the adverse impacts that might result to water use and need patterns if this sole source aquifer were contaminated and unuseable? Please explain.	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
96	5-89	Radioactivity release to the groundwater pathway is believed to be greater than the airborne pathway during a severe accident for the surrogate reactors considered. However, the groundwater pathway is presumed to present a lower risk because the transport path is tortuous and a longer time period is available for protective actions. Is this conclusion based just on the slow movement of groundwater or is absorption/desorption on solid substrates a consideration? If the slow transport is influenced by absorption, how were distribution coefficients for NA soils obtained?	
97	5-89	What is the basis for saying “the environmental risks associated with severe accidents if an ALWR were to be located at the North Anna ESP site would be <u>small compared to risks</u> associated with operation <u>of the current generation reactors at the North Anna site.</u> ” Is this based solely on the estimated lower probability of core damage frequency of the ALWRs as indicated on Table 5-22? Please explain.	
98	5-90 to 91	The FEIS states that the Staff relied upon the “feasible and adequate measures/controls” specified in Table 5.10-1 in the ER. Do these constitute “terms of the ESP” and/or “acceptance criteria” within the meaning of 10 C.F.R. § 52.39(a)(2)? If not, how do they relate to this regulation?	
99	6-1	Why wasn't the PPE approach used for evaluating gas cooled reactors?	
100	6-3	In Table 6-1 the water discharged to air from Unit 3 is quoted as 160 million gallons or 2% of a model 1000 MW(e) reactor with (evaporative) cooling tower. Since 2/3 of the Unit 3 cooling can be through the wet cooling tower, how is it possible that the averaged value for the two units can be as low as 2%? (This table contains data on tritium and Kr-85 release so it presumably does include reactor operation as a part of the fuel cycle.)	
101	6-3	Shouldn't the numbers for radioactive wastes specify a BWR or PWR in Table 6-1 since BWRs typically dispose of larger volumes of contaminated ion exchange resins than PWRs?	
102	6-3	Why do the tritium release numbers in Table 6-1 bound CANDU type reactors which typically produce larger quantities of tritium than LWR's?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
103	6-8 to 9	<p>The FEIS states that, with regard to fuel cycle, transportation and decommissioning, the 1000 MW(e) LWR scaled model would cause the permanent commitment of 52 acres of land per year and the temporary commitment of 400 acres of land per year. This represents the permanent commitment of 4,160 acres of land over a 40 year life span for two Units. The FEIS states “[i]n comparison, a coal-fired power plant with the same MW(e) output and that uses strip-mined coal requires the disturbance of about 324 ha (800 ac) per year for fuel alone. The staff concludes that the impacts on land use to support the 1000-MW(e) LWR scaled model would be SMALL.” The FEIS uses such relativistic comparisons at numerous points.</p>	
		<p>A. Isn't this relativistic approach contrary to the CEQ standards of significance found at 40 C.F.R. § 1508.27, which the Staff stated it was using in this FEIS. Please explain.</p>	
		<p>B. The CEQ and the Staff define “MODERATE” as “Environmental effects are sufficient to alter noticeably, but not destabilize, important attributes of the resource.” FEIS P 1-8. Under this definition, doesn't the permanent commitment of 4160 acres of land at least qualify as “large” or “moderate?” Please explain.</p>	
		<p>C. By selecting other activities with obviously larger environmental impacts for any given type of impact, doesn't this necessarily result in the impact of the proposed ESP being (relatively) smaller? Is this the appropriate way to address such matters in an EIS?</p>	
		<p>D. Why weren't the definitions provided at the beginning of the FEIS used when the Staff reached and articulated its conclusions (at numerous places) as to whether an impact was small, moderate, or large? Please explain.</p>	
104	6-11	<p>Why are 100 year committed doses given for those isotopes with low health consequences but not for Rn-222, which could have a significant health impact?</p>	
105	6-12	<p>A calculation of 4.8 health effects per year from mining and milling radiation releases is presented. Is this number for a single 1,000 MW(e) reactor or for both proposed North Anna units? Does this consequence derive almost exclusively from Rn-222 release?</p>	
106	6-17	<p>What is the basis for the information contained in Table 6-3? Was this provided by Dominion? What, if anything, did the Staff do to verify the data or the calculations? Does Table 6-3 represent the Staff's professional opinion as to the fuel cycle environmental impacts from gas cooled reactor designs for the North Anna ESP site? Please explain.</p>	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
107	6-18 to 19	The FEIS states that fuel cycle, transportation, and decommissioning environmental impacts of “other-than LWR designs are not resolved because of lack of information to validate values and impacts.” P 6-15. However, the Staff also states at various places that it “expects that the environmental impacts [from fuel fabrication for gas cooled reactors] would be small” (P 6-18) and that it “expects that, on balance, the environmental impacts of enriching gas cooled fuels by comparison . . . would likely be small.” P 6-19. Please clarify - has the Staff performed an environmental impact assessment with regard to the fuel cycle, transportation, and decommissioning impacts of “other-than LWR designs” or not?	
108	6-20	The FEIS states that “Gas-cooled reactor technologies are projected to generate 4.8×10^{12} Bq to 1.2×10^{14} Bq (131 to 3300 Ci) of low level waste scaled annually.” Is this the Staff’s projection? Please explain the source and basis for this projection.	
109	6-26	Why is a cancer probability of $7.3E(-4)$ per rem used here when, elsewhere in the FEIS, $4E(-4)$ was used as the individual cancer probability per rem?	
110	6-28	The focus of the transportation section is on radiological impacts with little or no information on accidents associated with spent fuel, LLW and fresh fuel transport. Appendix G to the FEIS is referenced as a source of this type of information but it addresses exclusively radiological impacts. What accident frequencies would be associated with the activities related to the construction and operation of Units 3 and 4?	
111	6-42	The FEIS states that “At the ESP stage, applicants are not required to submit information regarding the <u>process</u> of decommissioning, such as the <u>method</u> chosen for decommissioning.” Is it your position that the FEIS for an ESP does not need to cover the decommissioning environmental impacts of the proposed federal action? Or are you merely saying that these matters must be covered in the FEIS, even if the precise process or method of decommissioning need not? Please explain.	
112	7-3	In the section on “Cumulative Impacts” the FEIS states “There are three basic approaches considered by the staff to mitigate water conflicts including (1) alternative design of the Unit 3 cooling system, (2) alternative operation of the proposed Unit 3, and (3) alternative operating procedures for the North Anna Dam.”	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
		A. Given that the Dominion group of companies owns existing Units 1 and 2, as well as proposed Units 3 and 4, and that these four units will certainly have cumulative impacts, please explain why the Staff did not consider the possibility of additional equipment or operating procedures on existing Units 1 and 2 which could compensate or mitigate against the incremental adverse environmental impacts of proposed Units 3 and 4. Please discuss whether this alternative was considered, and if not, why not.	
		B. Legal Question: Even if the imposition of such modifications related to Units 1 and 2 might be considered beyond the Commission's jurisdiction, if it is a reasonable alternative, shouldn't the NRC consider it? <u>See NRDC v. Morton</u> , 458 F.2d 827, 834-36 (D.C. Cir. 1972) and 10 C.F.R., Part 51, Appendix A, Section 5 ("An otherwise reasonable alternative will not be excluded from discussion solely on the ground that it is not within the jurisdiction of the NRC.").	
		C. As noted above, NRC considered three approaches to lowering water usage by Unit 3 - alternative design, alternative operation and alternative operation of the dam. The first and third approaches were briefly discussed in the FEIS; the second was not. What were the assumptions and conclusions of this option?	
113	7-3	In concluding that a combination wet and dry cooling system design for Unit 3 is preferable to a wet cooling tower design, why wasn't the energy penalty inherent in dry cooling towers one of the factors given consideration?	
114	7-7	In the FEIS the Staff includes discussions of certain socioeconomic benefits of the proposed ESP. Is it permissible for the Staff to consider the benefits (or lack thereof)? If so, is it permissible for the Board to consider benefits (or the lack thereof) in its NEPA decision - making on this proposed ESP?	
115	8-1	A reduction in plant efficiency as a result of a dry cooling or mixed cooling requirement could be viewed as an environmental impact in that some replacement power source is required to produce the missing MW-hrs and this source would have clear impacts on the environment. Alternative sites that could employ more efficient cooling methods could therefore have an advantage over the North Anna site, other factors being equal. Why wasn't this considered in the assessment?	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
116	8-2	<p>The FEIS states that the “[T]he no action alternative would not achieve the <u>benefits</u> intended by the ESP process, which would include (1) early resolution of siting issues prior to large investments of financial capital and human resources in new plant design and construction (2) early resolution of issues on the environmental impacts of construction and operation of reactors that fall within the site parameters, (3) the ability to bank sites on which nuclear power plants may be located and (4) facilitation of future decisions on whether to build new nuclear power plants.” Has the Staff considered the considerable costs, time, and effort, both by the applicant and by the NRC, devoted to applying for and processing an early site permit that <u>may never be used</u>? For example, in the 1970s, Dominion (or its predecessor) applied for and obtained a permit to construct Units 3 and 4 on the NAPS site, but never used this permit. Should the FEIS include the “lost-opportunity costs” incurred when a company, and more particularly, the NRC, devote its limited and considerable time and resources to processing an ESP application where there is no indication that the applicant will ever use it?</p>	
117	8-2 to 5	<p>In considering alternatives for handling the excess heat load for proposed Unit 3, three alternatives were discussed: once-through cooling; wet cooling; and dry cooling. Dominion estimated that induced evaporation from once-through cooling could result in water loss at an annual rate of 28cfs (12,600 gpm). Dominion also estimated that the combined-cycle wet and dry cooling system proposed in its Environmental Report (ER) would induce evaporative losses of about 20 cfs (9,000 gpm). Please provide the results of any calculations made estimating the evaporative losses associated with:</p>	
		A. The operation of Units 1 and 2 operating alone;	
		B. Each of the Units 1, 2, and 3 (with Unit 3 operating with once-through cooling);	
		C. Each of the Units 1, 2 and 3 (with Unit 3 using a wet cooling tower system).	
118	8-4	<p>The FEIS states that “The use of a dry cooling design versus the proposed combination wet and dry cooling system design for Unit 3 would largely eliminate the impacts on aquatic biota in Lake Anna and the North Anna River downstream. The lake would not be heated by rejected heat from Unit 3, and there would be no additional consumptive water use.” The primary objection to this option seems to be that it would be more expensive to build and would consume approximately 150 MW(e) per year. Dominion is using dry cooling for proposed Unit 4.</p>	
		A. Is it the Staff’s conclusion that dry cooling for Unit 3 is the best environmental alternative (<u>i.e.</u> , the option with the least environmental impact, other than no action)? Please discuss.	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
		B. The FEIS states at P 10-9 that “The Staff concluded in Section 8.2 that the proposed combination of wet and dry cooling for Unit 3 is preferable to the three cooling alternatives.” Where is that statement made in Section 8.2?	
119	8-7 to 10	<u>Numerous</u> nuclear and non-nuclear power plants are located within the “region of interest” (ROI) [the Mid-Atlantic, Northeast, and Midwest regions] defined by Dominion. Did the Staff consider these alternative sites in its alternatives analysis under NEPA? Within this ROI Dominion only evaluated the North Anna site, two DOE sites, and the Dominion Surrey Power Station site. Assuming the validity of the ROI, please explain how the Staff determined these four sites were the <u>only</u> reasonable alternative sites within the ROI to be considered. Note that Dominion’s “45 site suitability/screening criteria” were only used by it to select <u>between</u> these <u>four sites</u> , not as criteria for eliminating all other suitable sites located within the ROI.	
120	8-8 to 9	Under NEPA, the Staff, not the applicant, is obliged to consider all reasonable alternatives to the proposed action. Is the Staff’s alternatives analysis limited by Dominion’s 45 “site suitability criteria?” Is it appropriate for the Staff to consider Dominion’s numerous “economic” and “engineering” criteria, such as “electricity projections” and “site development costs” in performing its alternatives analysis? Please explain.	
121	8-10	The FEIS states that “Dominion also considered <u>other existing nuclear power plant, greenfield, and brownfield sites</u> within the ROI. In as much as sites of current nuclear facilities have space for additional units, <u>the greenfield and brownfield sites were determined not to be environmentally preferable</u> because of the large land area that would need to be disturbed to build a new plant and to support necessary transmission line rights of way.” What about the many “other existing nuclear power plant sites” within the ROI? They suffer from none of the mentioned detriments of the greenfield and brownfield sites and have the same benefits as the three alternatives considered by Dominion. Aren’t many of them located in areas of significantly lower population density? Are these not reasonable alternative sites that warrant inclusion in the NEPA alternatives analysis? The FEIS fails to even discuss this. Did you dismiss these sites solely because Dominion does not own them? Is this a legitimate basis under NEPA? (Note that Dominion does not own the proposed North Anna ESP site.) Please explain.	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
122	8-10	<p>The FEIS refers to “Generic Issues Consistent Among Alternative Sites” and states that “In evaluating the alternative sites, the NRC staff found that <u>certain impact areas would not vary significantly among sites</u> and as a result would not affect the evaluation of whether an alternative site is environmentally preferable to the proposed site. These impact areas include . . . <u>radiological health during . . . operation</u> for members of the public . . . [and] <u>postulated accidents.</u>” (emphasis added). This is surprising. Do you agree that the radiological health consequences of a severe accident that resulted in the release of a substantial amount of radioactive material from a site could be substantially different depending on the number of people living and working downwind of the site (e.g., New York City vs. Nevada)? Are you ignoring these different consequences because you deem the possibility of such an accident to be so remote as to make the location of a new reactor near large populations to be environmentally irrelevant for purposes of severe accident considerations? Please explain.</p>	
123	8-17	<p>Please provide an estimate of the total population living within a 50 mile radius of the proposed ESP site and the three other alternative sites evaluated in the FEIS. Please advise, if you know, whether the populations in the similar 50 mile radius areas around any of the other existing nuclear reactor sites in the ROI are 25% (or more) lower.</p>	
124	8-17	<p>In the analysis of the Surry Power Station Site, why was closed-cycle cooling assumed? If once-through cooling at this site were possible, would the NRC analysis of alternative sites have found the Surry site to be superior to the North Anna site? Why or why not?</p>	
125	D-9	<p>A public comment identified impacts that would need to be considered in the EIS, including "All impacts arising from the increase in the routine discharge of chemicals, heavy metals, cleaning solvents, biocides and radioactive isotopes into Lake Anna arising from the operation of additional nuclear power units." The NRC response stated "Surface water impacts of the types described in the comments will be evaluated by the NRC staff in Chapter 5 of the EIS." Aside from radiological impacts, it appears that this has not been done. Why haven't the above issues been addressed in the FEIS?</p>	
126	H-10	<p>Dominion elected to lower the released tritium levels to 850 Ci/yr. to ensure that tritium in the water would not exceed EPA standards. This value contrasts with a projected value in the applications prior to Rev. 9 of 3,100 Ci./yr. (Based on ACR-700 design). How can Dominion arbitrarily designate the tritium release rate?</p>	

No.	EIS Page	Inquiry	Answer (Including Author, sme, and key documents)
127	H-10	Section H 3.3 states "the average annual tritium release (from Units 1 & 2 over a six-year period) was 814 Ci/yr. and the average annual concentration (in the Lake) was 3,049 pCi/L. Assuming this same relationship for the two units, the estimated tritium concentration in the lake from the new units would be 6,368 pCi/L."	
		A. How was the average release rate from Units 1 & 2 determined?	
		B. What were the highest and lowest measured tritium concentrations in the six year interval chosen?	
		C. Since the lake volume appears to be larger than the volume of water exiting the lake in an average year, it could take a long time for the tritium in the lake to reach equilibrium. Does Dominion believe that the measured tritium concentrations are at equilibrium?	
		D. Since water from the heat exchanger and water exiting the dam are near the lake surface, there could be significant tritium stratification with depth. Have tritium samples been taken at different lake depths and if so, what do they show?	
128	H-10	Table H-5 quotes "per unit" tritium release rates of 3,500 Ci/y which is over four times the committed release cited above. What is the difference between the Dominion commitment and the numbers in the Table?	
129	K-6	Table K-1 provides surface areas and water volumes for various regions of the Lake Anna cooling lake. Dividing the volume by the surface area for selected areas should yield the average water depth for the feature cited but this calculation produces puzzling results. For example, a decrease of thirty feet in water elevation at the dam from 250' to 220' produces a change in average water depth for Lake Anna of 13.2' (from 31.47' to 18.28' average depth), but a similar calculation for the reservoir produces a depth change of only 8.7' (from 23.88' to 15.17').	
		A. Why doesn't a 30' drop at the dam produce essentially the same drop elsewhere?	
		B. Are there any lake contours that could produce the above result?	
		C. How were the reservoir volumes determined?	
130	K-14	This section states an equivalence between an evaporation rate of 47,462 cubic meters per day and 8,707 gpm. Given that one U.S. gallon is 4.405E(-3) cubic meters and there are 1,440 minutes per day, why isn't 8,707 gpm equal to 55,230 cubic meters per day?	

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131	K-14	The Staff calculates that lake level would fall below 248 feet 11% of the time with Unit 3 operating while the comparable calculation by Dominion was 7.3%, a twenty percent variance from a mean value. A following discussion implies that the Staff calculation presumed PPE values while the Dominion calculation used numbers more representative of actual conditions. Please comment.	
131	K-15	In Appendix K at page K-15, Dominion stated that the condenser heat load would be serviced by the dry tower if the air temperature was below 67 degrees Fahrenheit.	
		A. Does this mean that Dominion will operate the Unit 3 dry tower system whenever the temperature is below 67 degrees F?	
		B. Has continuous operation of the Unit 3 dry cooling towers been considered?	
		C. Has any estimate been made of the energy efficiency penalty associated with continuous use of the Unit 3 dry towers?	
		D. Has any estimate been made of the difference in water consumption when the Unit 3 dry towers are in continuous use?	
132	General	At the winter ANS meeting, the following remarks were attributed to Eugene Grecheck, vice president of nuclear support services for Dominion Generation: "Dominion officials have stated that the company would not decide whether to apply for a COL until just before the scheduled submission date in November... He noted, however, that to be ready to build new nuclear capacity at North Anna, Dominion will have to order the large forgings necessary for fabrication of ESBWR hardware before it decides whether to submit. These forgings would be generic enough that they could, if necessary, be resold later to someone else who might need them, so such an order would not be a firm commitment to build." <u>Nuclear News</u> , Jan 2007, P 50. It would appear that Dominion has made the decision to adopt an ESBWR steam supply system if it elects to request a COL. Why should not approval of the ESP be withheld pending the submission of all of the missing reactor specific information in the current ESP?	

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)
)
DOMINION NUCLEAR) Docket No. 52-008-ESP
NORTH ANNA, LLC)
)
(Early Site Permit for North Anna ESP Site))

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing LB ORDER (ISSUING ENVIRONMENT-RELATED QUESTIONS) have been served upon the following persons by U.S. mail, first class, or through NRC internal distribution.

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Docket No. 52-008-ESP
LB ORDER (ISSUING ENVIRONMENT-RELATED
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Dated at Rockville, Maryland,
this 7th day of February 2007