

STAFF EXHIBIT C
STAFF RESPONSE TO BOARD QUESTION 2

May 16, 2007 (4:05pm)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

March 7, 2007

In its Order of February 7, 2007,¹ the Atomic Safety and Licensing Board ("Board") posed the following question ("Board Question 2"):

The FEIS states that the Staff "adapted the ESRP review guidance to the [plant parameter envelope (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).

U.S. NUCLEAR REGULATORY COMMISSION
In the Matter of Dominion Nuclear North Anna, LLC
Docket No. 52-008-ESP Official Exhibit No. 12
OFFERED by: Applicant/Licensee Intervenor _____
NRC Staff _____
Other _____
IDENTIFIED by: 7/2/07 Witness/Panel _____
Action Taken: ADMITTED REJECTED WITHDRAWN
Registrar/Clerk _____

Order, Attachment A at 2. In its Order dated February 27, 2007,² the Board directed the parties to answer Board Question 2 in accordance with the clarification specified in the NRC Staff motion dated February 20, 2007.³ The Staff Motion proposed that the Staff would respond to Board Question 2 "by describing the general process the Staff applied in treating areas in which information called for by the ESRP was lacking." Staff Motion at 4.

Staff Response:

A. Background

In general, as will be described in more detail below, Dominion Nuclear North Anna, LLC, ("Dominion") proposed PPE values in its Application, and the Staff determined whether the

¹ See *Dominion Nuclear North Anna, LLC* (Early Site Permit for North Anna ESP Site), unpublished Order (Issuing Environment-Related Questions) (Feb. 7, 2007) ("Order").

² See *Dominion Nuclear North Anna, LLC* (Early Site Permit for North Anna ESP Site), unpublished Order (Reconsideration of Two Environmental Questions and Grant of Extension) (Feb. 27, 2007).

³ "NRC Staff Motion for Reconsideration," dated February 20, 2007 ("Staff Motion").

PPE values were not unreasonable as a substitute for the detailed design information called for by the ESRP; however, the PPE values did not address all information needs. For instances in which the PPE values did not address specific design information (e.g., no PPE value was proposed as substitute for the information), Dominion or the Staff formulated reasonable assumptions, based on professional experience and judgment, in place of detailed design information, if this was possible, and the Staff based its conclusions on this information. In general, the Staff estimated the environmental effects of construction and operation of a new reactor or reactors at the proposed North Anna ESP site based on PPE values.

The assumptions set forth in Appendix J to NUREG-1811, "Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site," December 2006 ("FEIS"), however, differ from the assumptions discussed above regarding the design level information called for in the ESRP. Appendix J states assumptions regarding future actions by Dominion and others that the Staff relied on in assessing the environmental impacts associated with construction and operation of new units at the North Anna ESP site. In contrast to assumptions regarding design information, which were necessary in view of the current unavailability of design information, the Appendix J assumptions regarding future actions are based on current information, including the Applicant's commitments or current state and local government development plans. The Staff documented these matters in Appendix J not because current information was unavailable, but because they related to projections of future activity. Should a construction permit ("CP") or combined license ("COL") applicant reference the ESP and the staff ultimately determine that an assumption documented in Appendix J has not been satisfied, then the Staff would consider that information new, and would evaluate its significance. If the Staff determines that the new information is significant, it would re-evaluate the conclusion associated with that information.

The following describes the information called for by the ESRP that was not available for consideration in the environmental review and the Staff's methods for treating areas in which the called-for information was not available.

B. Review Guidance:

The Staff review guidance for ESPs, Review Standard (RS)-002, "Processing Applications for Early Site Permits," recognizes that design-level detail called for by the ESRP will be lacking in an ESP application adopting the PPE approach. As discussed in RS-002:

The ESP application should include sufficient information for the staff to determine what the environmental impacts of constructing and operating nuclear power plant(s) could be. For an ESP application employing the PPE approach, site characteristics, PPE values, and analyses will comprise the ESP bases that will be the focus for comparison during a COL review with the design of the actual plant to be constructed on the site. Site-specific parameters (such as meteorology, demographics, and hydrology) should be provided in any ESP application. However, detailed design information pertaining to structures, systems, and components called for in the ESRP need not be submitted by the applicant in an ESP application employing the PPE approach. If PPE values are used as a surrogate for design-specific values, the ESP applicant need not provide a one-to-one replacement for the design-specific values, but should provide sufficient information for the staff to develop a reasonable independent assessment of potential impacts to specific environmental resources. The design-specific information called for in the ESRP may not exist for applicants using the PPE approach, so the NRC review staff should use their experience and judgment accordingly.

RS-002, Attachment 3 at 1- 2) (emphasis added)(ADAMS Accession No. ML040700772). In reviewing the North Anna ESP application, the Staff applied its professional experience and exercised its judgment, in accordance with RS-002, as discussed below.

C. Staff Process

In its review, the Staff employed the following steps in exercising its professional judgment in regard to design-level information called for by the ESRP:

1. The Staff determined if plant-specific design information listed in the ESRP was provided. If such information was provided, then the Staff evaluated it in accordance with the ESRP.
2. If the specific design-level information called for by the ESRP was lacking, then the Staff determined whether the applicable PPE value⁴ was not unreasonable as a substitute for design-level information. If the applicable PPE value was not unreasonable, the Staff evaluated the matter on the basis of the PPE value.
3. If the PPE did not contain values that the Staff could use as a substitute for the specific design-level information called for by the ESRP, the Staff issued requests for additional information ("RAIs") to Dominion to obtain information sufficient to perform the evaluation, or exercised professional judgment to formulate one or more reasonable assumptions regarding the unavailable design information to employ in evaluating the matter.
4. Finally, the Staff exercised professional judgment to draw conclusions about impact levels, based on the available information and any reasonable assumptions formulated as described above. If design information was lacking and a reasonable assumption could not be formulated, then the available information may not have been sufficient for the Staff to fully evaluate the issue, and the issue remained unresolved.

The Staff did not follow this process in considering one issue, *i.e.*, the chronic effects of electromagnetic fields, because there is no scientific consensus on this matter, and, for that reason, it remains unresolved. In no instance, however, was information insufficient for the Staff to compare the proposed site to the alternative sites identified by Dominion. See "NRC Staff Legal Brief in Response to Licensing Board's Environment-related Questions," dated March 1, 2007, at 2-14; Staff Exhibit B, Response to Board Question 1.

The Staff has identified five examples that illustrate in detail how the Staff employed the above-described process. One example shows how PPE values can substitute for specific design information called for by the ESRP (Step 2, above), and is representative of many matters evaluated in the FEIS. Two examples illustrate how the Staff applied reasonable assumptions to evaluate issues for which design-level information called for by the ESRP was

⁴ PPE values are not limited to numerical values but also include other matters, such as specific locations of facilities.

unavailable (Step 3) to arrive at a final conclusion. The final two examples pertain to matters that remain unresolved (Step 4).

Example 1: Adequate PPE Value (Step 2)

An example in which PPE values were used in place of detailed design information called for by the ESRP involved entrainment and impingement of aquatic organisms in proposed plant intake structures. The Staff's evaluation is set forth in FEIS § 5.4.2.2, 5.4.2.3 - Impingement and Entrainment. The guidance of ESRP § 5.3.1.2 was followed, but because a new facility has not been designed or constructed, the Staff used PPE values to determine entrainment and impingement impacts. To determine impingement and entrainment losses from the operation of proposed Units 3 and 4, the Staff compared estimates of current losses associated with the operation of Units 1 and 2 derived from the study performed in accordance with Section 316(b) of the Clean Water Act with predicted losses from Units 3 and 4. PPE values used to estimate Unit 3 losses included: 1) a maximum intake flow rate of 1723 L/s for Unit 3; 2) no water use for the Unit 4 closed-cycle system; 3) a fish community similar in composition and distribution to that observed during the Section 316(b) study; and 4) an intake configuration and screen system identical to the existing units. The flow rate of 1723 L/s specified in the PPE represented a maximum (worst-case) flow scenario that would represent the highest impingement and entrainment losses. Using this information and the assumptions discussed above, the Staff determined that adding Unit 3 to the existing operation of Units 1 and 2 would increase the overall impingement and entrainment losses observed in Lake Anna by approximately 3 percent. Based on these analyses, the Staff concluded the impacts of impingement and entrainment would be SMALL.

Example 2: Staff assumption involving fogging and icing effects (Step 3)

In the following example, the Staff obtained information on cooling tower operation that was sufficient to evaluate the impact of tower operation on fog and icing. See Dominion

April 13, 2006 RAI Response, Enclosure 1, Response 7b, at 15-16.¹ However, to extend this evaluation to impact on public transportation, the Staff had to make an assumption regarding the distance between the cooling towers and the nearest transportation routes because the exact position of the cooling towers will not be known until the plant design is completed.

The Staff's evaluation is set forth in FEIS § 5.2 - Meteorological and Air Quality Impacts. The Staff performed its evaluation as follows: The Staff followed the guidance set forth in ESRP § 5.3.3.1 (Heat Dissipation to the Atmosphere), except for ESRP § 5.3.3.1 - Part III (Review Procedures). ESRP § 5.3.3.1 - Part III calls for an evaluation of the potential impacts on transportation used by the general public caused by fogging and icing on the basis of predicted additional hours of fogging and icing resulting from the heat dissipation system. Because only the general location of the cooling tower area was identified (see FEIS Figure 3.1), the Staff used the closest distance from that general area to the nearest public transportation routes to evaluate the additional hours of fogging over the level of naturally occurring fogging and icing. This is a reasonable assumption that bounds the impact of fogging and icing. Professional judgment suggests that the additional fog on transportation routes estimated by the SACTI computer code is insignificant. See FEIS § 2.3.

Example 3: Staff assumption involving taxes (Step 3)

The Staff made an assumption to resolve tax impacts. A value (cost) for the proposed unit(s) and schedule of labor requirements and expenditures within the region for materials and services related to the proposed unit(s) was not available because a plant design was not available and the PPE did not address the issue. The Staff determined that there was no basis

¹ Letter from Eugene S. Grecheck, Dominion Vice President-Nuclear Support Services, Response to NRC Questions and Revision 6 to the North Anna ESP Application, dated April 13, 2006 (ADAMS Accession No. ML061180220).

to quantitatively estimate the flow of tax revenues to local jurisdictions during construction and operations.

The Staff's evaluation is set forth in FEIS §§ 4.5.3.3 and 5.5.3.3 - Taxes. Based on previous experience with the costs of nuclear power plant construction and the maximum labor force information provided in the PPE, the Staff assumed that there likely would be an annual tax stream of many millions of dollars, which would be especially concentrated in the host jurisdiction having property taxing powers during plant operations. The Staff assumed further that the tax stream would be larger during operations than during construction because property tax yields would be larger for the completed plant. Based on this qualitative determination, it was possible to resolve tax impacts as generally SMALL BENEFICIAL in the region within a 50-mile radius of the proposed ESP site, but up to MODERATE BENEFICIAL (construction) to LARGE BENEFICIAL (operations) in Louisa County.

Example 4: Unresolved issue involving water quality (Step 4)

In the following example, the Staff followed the process described above and determined that sufficient information was available to determine that the thermal impact to water quality would be small, but sufficient information was not available to determine the impact from waste streams other than the Unit 3 blowdown.

The Staff's evaluation is set forth in FEIS § 5.3.3 - Water Quality Impacts. On March 2, 2006, the Staff requested information from Dominion regarding water quality and received information regarding the chemical concentrations of waste streams for Unit 3 in Revision 6 of the application dated April 13, 2006. See Dominion April 13, 2006 RAI Response, Enclosure 1, Response 6c, at 12 (ADAMS Accession No. ML061180220). As stated in FEIS § 5.3.3, however, concentrations of waste streams other than Unit 3 blowdown to the Waste Heat Treatment Facility ("WHTF") were not defined. The reason these concentrations cannot be defined is that design level information is not available for the water treatment systems. The

Staff could not make a reasonable assumption about the type and quantity of chemicals that would be added to the water treatment systems for Unit 3 and 4 because the range of possibilities is quite broad. In addition, it would be meaningless if the Staff selected a small number of chemicals representative of what might be used for evaluation, as this would amount to speculation. Further, considering all potential chemical additives would be unrealistic. Therefore, the Staff considered the water quality impacts not resolved, but likely to be small. See Staff Response to Board Environment-Related Question 26.

Example 5: Unresolved issue involving gas-cooled reactor fuel cycle (Step 4)

In the following example, the Staff followed the process described above and determined that insufficient information was available to determine the behavior of gas-cooled reactor fuel under transportation accident conditions. The Staff then requested additional information on this subject. The Staff intended to determine if an adequate technical basis existed for assigning release fractions as a function of accident severity in the analysis of transportation accidents.

The Staff's evaluation is set forth in FEIS § 6.2.2.2 - Transportation of Spent Fuel - Accidents." The Staff reviewed the information provided by Dominion (see Dominion May 17, 2004 RAI Response, Enclosure 1, Responses E3.8-1 to E3.8-19, at 7-30²) and determined that there was insufficient basis to reach a final conclusion with respect to advanced gas-cooled reactor fuel performance under transportation accident conditions. Because fuel design options are numerous, the Staff could not formulate reasonable assumptions regarding gas-cooled reactor fuel for evaluation of this issue, and therefore it could not reach a final conclusion regarding the impacts of transportation accidents involving gas-cooled reactor fuel.

² Letter from Eugene S. Grecheck, Dominion Vice President-Nuclear Support Services, Response to Request for Additional Information Regarding Environmental Portion of ESP Application, dated May 17, 2004 (ADAMS Accession No. ML041450041).

Nonetheless, gas-cooled reactor fuels are designed to operate at higher temperatures than light water reactor fuels, and would likely be more resistant to thermally-induced failures and releases due to a transportation accident. In view of the above, the Staff concluded that the transportation accident impacts for advanced gas-cooled reactors are likely to be small but are unresolved due to the lack of verifiable information about gas-cooled reactor fuel performance.

D. Summary

The Staff used the approach described above in the North Anna ESP environmental review. As described above, the Staff determined either that (1) the available information with respect to a particular issue, augmented by reasonable assumptions when necessary, was sufficient for the Staff to reach a final conclusion using professional judgment or (2) there was not sufficient information on a particular issue for the Staff to reach a final conclusion and the issue was unresolved. In most instances, the Staff evaluation reached a conclusion on the impact level. In a few instances (see Staff Response to Board Environment-Related Question 5B), the available information was insufficient for the Staff to make a final determination and these issues remained unresolved. These unresolved issues do not affect the Staff determination regarding alternative sites, as explained in response to Board Environment-Related Question 1, and they will be addressed by an applicant referencing the North Anna ESP, if issued. With respect to the assumptions employed by the Staff in the FEIS, the design detail called for by the ESRP will become available at a later licensing stage. The Staff intends to treat this detailed design information as new information in the context of its environmental review performed in connection with that later licensing stage, and the Staff will consider whether that new information is significant in the course of that later review.

In conclusion, the Staff followed the guidance for ESP reviews in RS-002 in adapting the ESRP guidance calling for design specific information to the review of the North Anna ESP

application. The Staff employed PPE values, where possible, or reasonable assumptions, if necessary (provided such assumptions could be formulated), in performing its review.

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Key Documents: (1) NUREG-1811, "Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site" (Dec. 2006); (2) RS-002, "Processing Applications for Early Site Permit" (May 3, 2004); (3) NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants."