UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

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

NRC STAFF'S RESPONSE TO COMMISSION'S AUGUST 2, 2007, ORDER

Robert M. Weisman
James P. Biggins
Jerry Bonanno
Counsel for the NRC Staff

August 23, 2007

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NRC STAFF'S RESPONSE TO COMMISSION'S AUGUST 2, 2007, ORDER

As requested by the Commission in its Order of August 2, 2007,[1] CLI-07-23, the Nuclear Regulatory Commission staff ("Staff") hereby responds to the following issues, including those raised in the Atomic Safety and Licensing Board's Initial Decision in LBP-07-09[2] and a dissent to LBP-07-09. Specifically, while a majority of the Board decided that the early site permit ("ESP") requested by Dominion Nuclear North Anna, LLC ("Dominion" or "Applicant") should be issued (LBP-07-09 (slip op. at 1)), the Board raised the following three questions:

> (1) Did the Staff's environmental justice analysis in the FEIS follow the "greater detail" guidance set forth in the Commission's Environmental Justice Policy Statement?
>
> (2) How do the NRC's multiple radiation protection standards (and the ALARA [as low as is reasonably achievable] concept) apply to new reactors that are proposed at a site with pre-existing nuclear reactors and radiological effluents?
>
> (3) How should the Commission apply its statement prohibiting partial ESPs and ESPs where adequate information is not available to a situation where significant

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[1] *Dominion Nuclear North Anna, LLC* (Early Site Permit for North Anna ESP Site), CLI-07-23, 66 NRC _ (Aug. 2, 2007) (slip op.).

[2] *Dominion Nuclear North Anna, LLC* (Early Site Permit for North Anna ESP Site), LBP-07-09, 65 NRC _ (June 29, 2007) (slip op).

elements of the plant parameter envelope for the ESP are missing and numerous siting issues are unresolved due to lack of information?

Id. (Slip op. at 91-107). In addition, one member of the panel dissented from the majority with respect to the Staff's consideration of reasonable alternatives to Dominion's proposed ESP. LBP-07-09, Dissent (Slip op. at 1). Specifically, the dissent concluded that the Staff "failed to consider and search for (or demand that Dominion search for) the 'best alternative sites that could be reasonably found,'" and that system design alternatives "should have included the alternative of imposing some form of water saving measures on the two nuclear reactors that already exist on the site, as a form of offset to the impacts of the proposed new reactors." *Id.* The Commission also requested that the parties address certain items the majority of the Board and the dissent identified as deficiencies in the Staff's and Dominion's evidence and arguments. *See* CLI-7-23 at 2 n.4, citing LBP-07-09, (slip op. at 28-36) (hydrology), (slip op. at 45-46) (tritium), and (slip op. at 56-61) (alternative sites); Dissent (slip op. at 2-11) (alternative sites), and (slip op. 11-12) (alternative design criteria).

Further, in response to the Commission's invitation in CLI-07-23 to address any other matter arising from LBP-07-09 that warrants comment, the Staff addresses the suggestion that any early site permit issued in this proceeding should include the representations, assumptions, and unresolved issues set forth in NUREG-1811, "Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site," Appendix J (Dec. 2006) ("FEIS"). The Staff addresses each of the Board's three questions, the dissent, the perceived deficiencies, and the content of the permit *seriatim* below. The Staff addresses the perceived deficiencies in the evidence and argument in regard to alternatives in its discussion of the dissent. For the reasons set forth below, the Staff submits that the Commission need not disturb the majority opinion in LBP-07-09, that the application should be granted, and that the ESP should not include the representations, assumptions, and unresolved issues in Appendix J to the FEIS.

DISCUSSION

A. ISSUES RECOMMENDED BY THE BOARD FOR COMMISSION CONSIDERATION

Before responding to the issues noted by the Board as warranting Commission consideration, the Staff notes that some references used in this response are not in the evidentiary record (*e.g.*, NUREG-0543 and the Commission Policy Statement on Environmental Justice). Pursuant to 10 C.F.R. § 2.344 the Commission will "ordinarily consider the whole record on review, but may limit the issues to be reviewed to those identified in an order taking review." The Board issued LBP-07-09 supporting the issuance of the ESP without these references being in the evidentiary record. Further, the Staff does not believe that incorporation of these references into the record is necessary to support affirmation of the Board's decision. The Staff is providing the extra-record references only to facilitate Commission consideration of the broader policy concerns associated with the novel and important issues raised by the Board, and to respond fully to those issues.

1. Environmental Justice:

The Staff's environmental justice ("EJ") analysis in the FEIS followed the "greater detail" guidance set forth in the Commission's Environmental Justice Policy Statement ("EJ Policy Statement"). Specifically, the EJ analysis was complete once the Staff determined that none of the environmental impacts was large and adverse, and also determined that the identified minority and low-income populations were outside the pathway of each environmental impact, thus making it impossible to have a significant adverse impact on the identified populations.

The Commission's EJ Policy Statement sets forth the "greater detail" guidance where it states:

> If the percentage in the impacted area significantly exceeds that of the State or the County percentage for either the minority or low-income population then EJ will be considered in greater detail. 'Significantly' is defined by staff guidance to be 20 percentage

> points. Alternatively, if either the minority or low-income population percentage in the impacted area exceeds 50 percent, EJ matters are considered in greater detail.

69 Fed. Reg. 52040, 52048 (Aug. 24, 2004). The Commission explained the scope of an EJ review in the EJ Policy Statement stating, "the NRC believes that an analysis of disproportionately high and adverse impacts needs to be done as part of the agency's NEPA [National Environmental Policy Act of 1969] obligations to accurately identify and disclose all significant environmental impacts associated with a proposed action." 69 Fed. Reg. at 52040. In order to follow the mandate of the Commission's EJ Policy Statement, the Staff used the Office of Nuclear Reactor Regulation ("NRR") guidance, Appendix D - Environmental Justice Guidance and Flow Chart.[3] Although the NRR guidance was developed prior to the Commission's approval of the EJ Policy Statement, the Commission affirmed that the NRR guidance was to remain effective, subject to the clarification provided in the EJ Policy Statement. "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions," 69 Fed. Reg. at 52042 (Aug. 24, 2004).

The Staff's review of the North Anna ESP application identified locations and percentages of populations exceeding this threshold trigger, causing EJ to be considered in greater detail in the Staff's analysis. FEIS at 2-77. By following the policy set forth in the EJ Policy Statement and the directions from the NRR guidance, the Staff conducted a "greater detail" analysis. The Staff used the U.S. Census Bureau census data to identify minority and low-income populations within the prescribed 50 mile radius area of potential for all environmental impacts. FEIS at 2-77. In accordance with the NRR guidance, the Staff next

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[3] NRR Office Instruction LIC-203, Rev. 1: Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues; Appendix D - Environmental Justice Guidance and (continued. . .)

"[d]etermine[d] whether there [were] potentially significant environmental impacts to minority or low-income populations." NRR guidance at D-9. The Board stated that the NRR guidance requires the Staff to

> include a determination of the environmental impacts of the proposed action on minority and low-income populations, and of their significance. If there are no 'potentially significant impacts,' or if there are no minority or low-income populations at the location of the existing impacts, then the [greater detail] review is complete at that stage.

LBP-07-09 (slip op. at 94). Although the Staff documented all of the environmental impacts of construction and operation in the FEIS, the Board did not refer to this in its EJ discussion in the Initial Decision. FEIS at 4-48 - 4-51(construction) and 5-92 - 5-94 (operation). The Staff concluded that all of the environmental impacts were small or moderate, identified the pathways through which the environmental impacts could occur, and examined the potentially disproportionate impacts on minority and low-income populations. FEIS at 4-36 and 5-52.

The Staff concluded that there were no location-dependant disproportionately high and adverse impacts on minority or low-income populations. The locations of the minority and low-income populations as shown in Figures 2-6 and 2-7 in the FEIS support the Staff's environmental pathway conclusions. *Id.* at 2-78 - 2-79. Although the Board noted that the identified populations are not located in the immediate vicinity of the proposed plant site, it seemed to overlook the Staff's conclusion that the populations are outside of the expected pathways of the small and moderate environmental impacts.

> More startlingly, … no one from the NRC made any attempt to contact and discuss EJ issues with any officials or representatives from the two jurisdictions with the largest areas of low-income and minority populations (Caroline County, Virginia and Richmond,

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(. . .continued)
Flow Chart, (ADAMS Accession No. ML033550003) ("NRR guidance") (available on the NRC website at: http://www.nrc.gov/reactors/operating/licensing/renewal/introduction/introduction-files/lic-203rev1.pdf) .

> Virginia), within the 50- mile impact area. NRC only contacted officials and representatives of the three counties closest to the facility (Louisa, Spotsylvania, and Orange Counties). Based on the FEIS, these three counties apparently have no low-income populations triggering the EJ analysis, … and only two small minority population tracts, both of which are upstream and upwind of the proposed Units 3 and 4.

LBP-07-09 (slip op. at 96 – 97) (citations omitted). According to the NRR guidance, the environmental impacts are expected to decrease as the distance from the plant increases, and the EJ review should focus on the areas closer to the site. NRR guidance at D-10. The Staff's figures of the geographic locations of the populations show the relative locations of the populations and the proposed units. FEIS at 2-78 - 2-79. As documented in the FEIS, the Staff considered both the environmental pathways and the size of the environmental impacts, and did not identify any health-related or location-dependent disproportionately high and adverse impacts from construction or operation that affected the identified minority and low-income populations. FEIS at 4-36 and 5-52. This meets the NRR guidance that states, "If there are no minority or low-income populations within the impact area(s) or if there are no potentially significant environmental impacts, then these results should be documented and the environmental justice review is complete." *Id.* at D-10. Accordingly, the Staff met the EJ Policy Statement guidance regarding an analysis in "greater detail," as documented in the FEIS, by following the NRR guidance.

2. Radiation Protection Standards and ALARA**:**

The second novel and important issue identified by the Board raised questions about application of the Commission's radiation protection regulations in situations where new reactors would be added to sites where pre-existing reactors are located. LBP-07-09 (slip op. at 98). Specifically, the Board stated that it would be helpful for the Commission to clarify its views on the following four questions:

> (i) How do the per-reactor, per-licensee, and per-site radiological limits apply when there are multiple reactors and multiple licensees being added to a site? Are they additive, increasing the amount of dose and exposure to the public? If not, how should they be applied?
>
> (ii) How is ALARA satisfied under these circumstances?
>
> (iii) How can the gas-cooled reactor designs in the ESP application be deemed to meet the NRC safety regulations, when there are no specific standards for them and most of the standards apply only to light-water-cooled reactors?
>
> (iv) How should the 25 mrem dose limit imposed by 10 C.F.R. § 20.1301(e) and 40 C.F.R. § 190.10 be allocated as between pre-existing reactor effluents and new reactor licensees on the same site?

LBP-07-09 (slip op. at 103).

The Staff submits that the Commission need not resolve these questions in order to make a final determination in this proceeding, since the Board found that Dominion's application met the requirements of Part 100. *Id*. at 72. In response to the Commission's direction to address this important issue, the Staff provides the following answers to the Board's questions. As explained in detail below:

(i) The 0.100 rem limit of § 20.1301(a) applies to each *licensee* at a site, regardless of the number of reactors, but, for light-water cooled reactors ("LWRs"), the 0.025 rem limit of 40 C.F.R. Part 190, which is incorporated into § 20.1301(e) and which applies on a *per site* basis, is limiting. For four or fewer LWRs on a site, the ALARA guidelines in Part 50, Appendix I are limiting even with respect to the 40 C.F.R. Part 190 limit. The Part 190 limit would not allow an additive dose for multiple LWRs or LWR licensees at a site, but the ALARA guidelines would allow an added dose on a *per reactor* basis, up to the Part 190 limit, and the § 20.1301(a) limit would allow an additive dose on a *per licensee* basis at a site of multiple reactors that are not LWRs.

(ii) Section 50.34a requires each licensee to maintain doses ALARA at each reactor it operates, without regard to reactor location or type.

(iii) Section 20.1301(a) applies, *inter alia*, to gas-cooled reactors, and while the ALARA guidelines in Appendix I do not apply to such reactors, § 50.34a requires doses at all reactors to be ALARA. Programs to maintain doses ALARA at gas-cooled reactors (or any type of reactor that is not an LWR) would be reviewed on a case-by-case basis.

(iv) The Staff does not allocate doses among reactors or licensees at a site to determine compliance with 10 C.F.R. § 20.1301(e) and 40 C.F.R. Part 190, nor is there any need to do so.

Before explaining the detailed reasons for these answers, the Staff summarizes the requirements of the applicable NRC regulations, namely, 10 C.F.R. §§ 20.1301(a)(1) and (e) and the numerical guidelines in Section II of Appendix I to 10 C.F.R. Part 50.

a. Legal Standards

(i) 10 C.F.R. § 20.1301(a)(1)

This subparagraph places a limit on the radiation dose to members of the general public by requiring that "[e]ach licensee conduct operations so that . . . the total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 mSv) in a year [.]" 10 C.F.R. § 20.1301(a)(1).[4]

The plain language of § 20.1301(a) indicates that the limits contained in that paragraph apply to "licensees" generally. In addition, the Supplementary Information contained in the NRC's 1991 final rule, which added the dose limits for members of the general public contained in § 20.1301(a), indicates that the 0.100 rem dose limit in § 20.1301(a)(1) is applicable to

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[4] This radiation protection standard was promulgated by final rule in 1991. *See* 56 Fed. Reg. 23360 (May 21, 1991).

reactor licensees. Specifically, the Commission explained the relationship between §§ 20.1301(a), (e), and Appendix I to Part 50 stating:

> Demonstration of compliance with the limits in 40 C.F.R. Part 190 or with the design objectives of appendix I to 10 C.F.R. Part 50 will be deemed to demonstrate compliance with the 0.1-rem dose limit for most licensed facilities. Power reactor licensees that comply with appendix I may also have to demonstrate that they are within the 0.025-rem limit in 40 CFR 190. Demonstration of compliance with the limits of 40 CFR 190 will be considered to demonstrate compliance with the 0.1-rem limit.

"Standards for Protection Against Radiation," 56 Fed. Reg. 23360, 23374 (May 21, 1991).

The Board, however, referred to the Staff Environmental Brief dated February 8, 2007,[5] and stated that "the NRC Staff says that [§ 20.1301(a)] is not applicable to nuclear reactors at all[.]"[6] LBP-07-09 (slip op. at 99 n.110, 101). The Staff acknowledges that the statement in the Staff Environmental Brief is unclear. The Staff, however, did not intend to imply that § 20.1301(a) "is not applicable to nuclear reactors at all," as understood by the Board. *Id*. To the contrary, in its testimony before the Board, the Staff explained the 0.100 rem dose limit in § 20.1301(a)(1) as applying to power reactor facilities. The Staff testified as follows:

> MR. DEHMEL: Thank you. My name is Jean-.Claude Dehmel. I'm a Health Physicist with the U.S. NRC and I am responsible for preparing the section, Section 11 of the SER addressing liquid and gaseous [effluents and] associated doses.
>
> This portion of this presentation provides an overview of regulation[s] addressing the presence of radioactive materials and liquid and gaseous [effluents]. The important regulations are 10 C.F.R. Part 20, Standards for Protection Against Radiation, and 10 C.F.R. Part 50, Appendix I, entitled Numerical Guides for

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[5] NRC Staff Legal Brief in Response to Licensing Board's Environment-Related Questions, at 23 n.15 (Feb. 8, 2007) ("Staff Environmental Brief").

[6] The quoted sentence reads as follows: "Section 20.1301(a) applies to NRC licensees other than those who operate power reactors, such as persons administering nuclear materials for medical reasons, who are not subject to § 20.1301(e) and 40 C.F.R. Part 190," Staff Environmental Brief at 23 n.15.

> Design Objectives under the Limiting Conditions for Operation to Meet the Criterion as low as is reasonably achievable for radioactive material in light water, cool[ed] nuclear power [reactor effluents].
>
> Of these slides, five merit specific . . . attention. *The first one is Section 20.1301 and 20.1302 which require nuclear power reactors to comply with the annual dose limit of 1 millisievert or 100 millirem to members of the public, an[d] effluent concentration limit[s] in Table 2 of Appendix B to 10 C.F.R. Part 20.*

EH Tr. at 458:25 (emphasis added).[7] Whatever confusion the Staff Environmental Brief may have caused, the Staff's testimony at the hearing should have clarified for the Board that the 0.100 rem annual dose limit in § 20.1301(a)(1) applies to all reactor licensees.

Further, the Board described the annual dose limit in § 20.1301(a)(1) as being applicable on a "per-license basis." LBP-07-09 (slip op. at 99). The Board also described Dominion's position that the 0.100 rem dose limit in § 20.1301(a)(1) would apply on a per-licensee basis at a site where multiple licensees operate multiple units. *Id*. (slip op. at 99, n.110). The Staff submits that the Supplemental Information in the 1991 final rule clarifies this matter. There, the Commission stated: "The new lower dose limit for members of the general public [the 0.100 rem limit imposed in § 20.1301(a)(1)]. . . applies only to doses from the radiation and radioactive materials *under the licensee's control.*" 56 Fed. Reg. at 23374 (emphasis added). This Commission statement indicates that the 0.100 rem dose limit in § 20.1301(a)(1) would apply on a per-licensee basis.[8] Specifically, if one licensee had multiple licenses to operate multiple units at a single site, the 0.100 rem dose limit would apply to doses from all of the radioactive

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[7] Mr. Dehmel's testimony was not directed to the question of whether § 20.1301(a) applies on a per-reactor, per-license, or per-licensee basis. That issue is addressed in the first full paragraph immediately following this footnote.

[8] This is consistent with the position taken by Dominion in its response to the Board's safety-related questions. *See* Applicant Exhibit 1, Dominion Responses to Safety Questions, at 12 n.5.

materials at the site under the licensee's control. Accordingly, the doses resulting from multiple units operated by a single licensee at a single site would be aggregated to determine compliance with § 20.1301(a), regardless of the number of licenses that the licensee possesses. As will be explained more fully below, however, the 0.025 rem dose limit imposed by § 20.1301(e)[9] will be limiting with respect to § 20.1301(a)(1) for light-water-cooled reactors ("LWRs").

(ii) 10 C.F.R. § 20.1301(e).

This paragraph makes the Environmental Protection Agency's (EPA) generally applicable environmental radiation standards in 40 C.F.R. Part 190 an NRC radiation protection standard that applies "[i]n addition to the requirements of [Part 20]."[10] 10 C.F.R. § 20.1301(e). In turn, 40 C.F.R. § 190.10 requires, in part, that the annual dose equivalent to any member of the public resulting from exposure to planned discharges of radioactive materials from uranium fuel cycle operations not exceed 0.025 rem to the whole body. 40 C.F.R. § 190.10.[11] The "uranium fuel cycle" is defined in § 190.02 and includes "generation of electricity by a light-water-cooled nuclear power plant using uranium fuel." 40 C.F.R. § 190.02. Accordingly, in contrast to § 20.1301(a), the § 190.10 limits apply only to light-water-cooled reactors. The Commission has interpreted the 0.025 rem limit as applying to the total dose from *all sources* within the uranium fuel cycle on a given site regardless of who holds each license. *See* 56 Fed. Reg. at 23374. This is in contrast to the 0.100 rem dose limit imposed by § 20.1301(a)(1),

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[9] 10 C.F.R. § 20.1301(e) makes the dose limits in 40 C.F.R. Part 190 directly applicable to NRC licensees.

[10] 10 C.F.R. § 20.1301(e) was added to Part 20 in the same final rule that added § 20.1301(a)(1). *See* 56 Fed. Reg. 23360 (May 21, 1991).

[11] The EPA promulgated 40 C.F.R. Part 190 in 1977. *See* "Part 190--Environmental Radiation Protection Standards for Nuclear Power Operations," 42 Fed. Reg. 2858 (Jan. 13, 1977).

which has been interpreted by the Commission as applying *only to sources under the licensee's control*. 56 Fed. Reg. at 23374.

(iii) Section II of Appendix I to Part 50.

Unlike § 20.1301, Appendix I to Part 50 does not impose radiation protection standards on NRC licensees. Rather, Appendix I provides "numerical guidance on design objectives for light-water-cooled nuclear power reactors to meet the requirements that radioactive material in effluents released to unrestricted areas be kept as low as reasonably achievable." 10 C.F.R. § 50.34a(a). In its LBP-07-09, the Board focused on the guidance in Section II.A of Appendix I *See* LBP-07-09 (slip op. at 99). Section II.A of Appendix I states that releases "from each light-water-cooled nuclear power reactor to unrestricted areas will not result in an estimated annual dose or dose commitment from liquid effluents for any individual in an unrestricted area from all pathways of exposure in excess of [0.003 rem] to the total body. . . ." 10 C.F.R. Part 50, Appendix I, Section II.A.[12] Section II of Appendix I also contains numerical guidelines for limiting doses from releases of gaseous effluents, numerical guidelines for limiting doses from releases of radioactive iodine and particulates, and guidance on performing a cost-benefit analysis for radwaste systems. *See* 10 C.F.R. Part 50, Appendix I, Sections II.B., II.C. and II.D.[13]

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[12] The NRC promulgated Appendix I to 10 C.F.R. Part 50 in 1975. *See* "Part 50--Licensing of Production and Utilization Facilities: Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," 40 Fed. Reg. 19439 (May 5, 1975).

[13] Only Sections II.A., II.B., and II.C. of Appendix I relate directly to an ESP review. Specifically, 10 C.F.R. § 52.17 requires that site characteristics comply with 10 C.F.R. Part 100. In turn, 10 C.F.R. § 100.21(c) requires that "[r]adiological effluent release limits associated with normal operation from the type of facility proposed to be located at the site can be met for any individual located offsite[.]" Sections II.A., II.B., and II.C. of Appendix I include dose objectives for individuals in unrestricted areas (the "individual located offsite" of Part 100) resulting from different types of effluents, including liquid, gaseous, radioactive iodine, and radioactive particulate effluents and are applied in an ESP review. By contrast, Section II.D of Appendix I includes guidance for performing a cost/benefit analysis on radioactive waste systems, but does not provide specific guidance on radioactive effluents.

b. Staff Response to Board Questions:

(i) **How do the per-reactor, per-license, and per-site radiological limits apply when there are multiple reactors and multiple licensees being added to a site? Are they additive, increasing the amount of dose and exposure to the public? If not, how should they be applied?**

Application of standards to light-water-cooled nuclear power reactors

The 0.100 rem radiation protection standard in § 20.1301(a)(1) would not be additive at a site containing multiple light-water-cooled nuclear power reactors. The standards in §§ 20.1301(a)(1) and (e), as well as the guides provided in Section II of Appendix I to 10 C.F.R. Part 50, are applicable to light-water-cooled nuclear power reactors. As explained above, the 0.100 rem dose limit in § 20.1301(a)(1) applies to doses from the radiation and radioactive materials under a licensee's control (*i.e.*, on a per-licensee basis). In contrast, the 0.025 rem dose limit in § 20.1301(e) applies more broadly to the total dose from all sources within the uranium fuel cycle at a given site. *See* Staff Exhibit 2, Safety Evaluation Report for an ESP at the North Anna ESP Site: Supplement 1 ("Staff Exhibit 2"), at Table 11.1-1 ("40 C.F.R. part 190 dose limits are for the entire site and apply to all operating units."). Because the 0.025 rem dose limit applicable to LWRs in § 20.1301(e) allows less dose than the 0.100 rem limit, and includes dose resulting from more sources of radiation than the 0.100 rem limit, § 20.1301(e) is more restrictive than § 20.1301(a) for LWRs. Therefore, in the case of a site containing multiple LWRs operated by multiple licensees, the 0.025 rem per-site dose limit set by § 20.1301(e) is limiting, with regard to the 0.100 rem per-licensee dose limit in § 20.1301(a)(1). As the Commission made clear in its 1991 final rule, demonstration of compliance with the 0.025 rem per-site dose limit by licensees of LWRs at a single site demonstrates compliance with the 0.100 rem per-licensee dose limit of § 20.1301(a)(1). 56 Fed. Reg. at 23374.

In most cases, as EPA recognized, demonstrating conformance with the Appendix I dose objectives will also serve as a demonstration of compliance with the 0.025 rem dose limit

of 40 C.F.R. Part 190 incorporated into § 20.1301(e). *See* "Environmental Protection Agency's Part 190 – Environmental Radiation Protection Standards for Nuclear Power Operations," Final Rule, 42 Fed. Reg. 2857, 2858 (Jan. 13, 1977). Specifically, upon promulgating 40 C.F.R. Part 190, EPA stated:

> EPA has examined Appendix I and the accompanying regulatory guides and agrees that they provide the basis for realistic implementation of these standards for single reactor units. . . . The agency [EPA] has also concluded that, except under highly improbable circumstances, conformance to [Appendix I] should provide reasonable assurance of compliance with these standards for up to five units on a site. This conclusion is based, among other considerations, upon the realistic consideration of anticipated site sizes and the relative location of individual units, as well as the stochastic nature of effluent releases.

Id. As the Commission has recognized, however, a licensee must sometimes independently demonstrate conformance with Appendix I and compliance with 40 C.F.R. Part 190. *See* 56 Fed. Reg. 23360, 23374 ("Power reactor licensees that comply with appendix I may also have to demonstrate that they are within the 0.025-rem limit in 40 C.F.R. Part 190."). In any event, while in most cases the Appendix I dose objectives will be limiting with respect to 40 C.F.R. Part 190 requirements, the dose objectives in Appendix I could be additive at a multi-reactor site, but only up to the dose limits imposed by 40 C.F.R. Part 190.

Application of Standards to Non-Light-Water-Cooled Nuclear Power Reactors

As the Board stated in its Initial Decision, the guidance in Appendix I and the radiation protection standard in § 20.1301(e) apply only to light-water-cooled nuclear power reactors. *See* 10 C.F.R. § 50.34a(a) ("[t]he guides set out in appendix I to this part provide numerical guidance on design objectives for *light-water-cooled nuclear power reactors* to meet the requirements that radioactive material in effluents released to unrestricted areas be kept

[ALARA])."[14] Likewise, as used in 40 C.F.R. Part 190, the term "uranium fuel cycle means the . . . generation of electricity by a *light-water-cooled nuclear power plant* using uranium fuel[.]" 40 C.F.R. § 190.02 (emphasis added).

As explained above, however, the per-licensee dose limit in § 20.1301(a)(1) applies to licensees generally – including non-light-water-cooled reactors. Therefore, the 0.100 rem dose limit imposed by § 20.1301(a)(1) represents the regulatory maximum for such reactors. In addition, while the specific numerical guidelines in Appendix I would not be directly applicable to non-light-water-cooled reactors under the current regulatory scheme, applicants proposing to build such reactors would still be required to "identify the design objectives, and the means to be employed, for keeping levels of radioactive material in effluents to unrestricted areas [ALARA]." 10 C.F.R. § 50.34a(a). In addition, 10 C.F.R. § 20.1101(b) requires each licensee to "use, to the extent practical, procedures and engineering controls . . . to achieve . . . doses to members of the public that are [ALARA]," and 10 C.F.R. § 50.36a(a) requires each nuclear power reactor licensee to include technical specifications in its license that will ensure releases of radioactive materials to unrestricted areas are ALARA. Accordingly, an applicant proposing to build a non-light-water-cooled reactor would also be required to demonstrate that releases of radioactive

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[14] The Commission explained why it limited the Appendix I guidance to light-water-cooled reactors in the *Federal Register* notice for the 1971 proposed rule, stating:

> The proposed guides for design objectives and limitations on operations set forth below would be specifically applicable to light-water-cooled nuclear power reactors. Light-water-cooled nuclear power reactors are the only type of power reactors that are being installed in relatively large numbers and on which there is substantial operating experience in the United States. The guides would not necessarily be appropriate for controlling levels of radioactivity in effluents from other types of nuclear power reactors. On the basis of present information on the technology of these other types of reactors, it is expected that releases of radioactivity in effluents can generally be kept within the proposed guides for light-water-cooled nuclear power reactors.

"Licensing of Production and Utilization Facilities: Light-Water-Cooled Nuclear Power Reactors," 36 Fed. Reg. 11113, 11114 (June 9, 1971).

materials from such reactors are ALARA. The ALARA requirement will likely require a licensee of a gas-cooled reactor to limit doses to the general public to levels less than the 0.100 rem per year regulatory maximum set by § 20.1301(a)(1).

(ii) **How is ALARA satisfied under these circumstances?**

For light-water-cooled reactors, Appendix I to Part 50 provides numerical guidance for meeting the ALARA requirement in § 50.34a(a). In addition, as discussed above, at sites containing multiple reactors the 0.025 rem standard imposed by 40 C.F.R. Part 190 may limit the extent to which the Appendix I dose objectives are additive, depending on factors such as the number and location of the new reactors on a site. In these cases, compliance with the 0.025 rem limit in Part 190 could provide additional conservatism.

As explained above, specific numerical guidance for keeping effluent releases ALARA at non-light-water-cooled reactors has not been developed. The Staff could either address the lack of numerical ALARA dose objectives for non-light-water-cooled nuclear reactors on a case-by-case basis through the licensing process, or develop specific numerical guidance, like the guidance currently provided in Appendix I.

In any case, Part 52 does not require an applicant for an ESP to show that doses will be ALARA. *See* 10 C.F.R. § 52.17(a)(1) (requiring an ESP applicant to show compliance with Part 100 and to describe, *inter alia*, the maximum levels of radiological effluents each facility will produce). Rather, as pertinent here, an ESP applicant need only show that "[r]adiological effluent release limits associated with normal operation from the type of facility proposed to be located at the site *can be met* for any individual located offsite." 10 C.F.R. § 100.21(c)(1). As the Board determined, the Applicant met this requirement. LBP-07-09 (slip op. at 69-72).

In addition, as the Staff explained in its testimony before the Board, it is not possible to make a complete and definitive ALARA determination based on the information available at the ESP stage of the licensing process. Specifically, at the hearing the Board asked whether

releases of radioactivity in the amount of the source terms provided in the ESP application would be ALARA. EH Tr. at 475:1. In response, the Staff testified that the source terms were simply best estimates for releases and that information on specific radwaste systems to be implemented at the site would be necessary in order to evaluate whether such systems would conform to the ALARA guidance in section II.D. of Appendix I.[15] EH Tr. 475:22. Therefore, while it was possible for the Staff to compare dose estimates derived from the generic source terms to the existing numerical ALARA guidance in Appendix I, this comparison does not represent a complete ALARA evaluation of any specific plant at the North Anna ESP site for which a license may some day be requested. The Staff would perform such an evaluation if a combined license ("COL") applicant proposed to build a specific plant, and the necessary design information was available.

In exploring the ALARA question, the Board stated: "[f]or example, the ESP would authorize the amount of tritium in Lake Anna to triple . . . and would authorize a twenty-fold increase in the estimated annual dose to the reasonably maximally exposed individual[.]" LBP-07-09 (slip op. at 99). In its testimony, the Staff attempted to clarify that this statement is not a completely accurate characterization of the effect of an ESP. *See* EH Tr. 474:15.

Specifically, the Staff concluded that two new units at the North Anna ESP site – emitting quantities of radioactivity bounded by the postulated source terms – could comply with the radiation protection standards in 10 C.F.R. Part 20 and the numerical ALARA guidelines in

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[15] Section II.D. of Appendix I states, in part:

> In addition to the provisions of paragraphs A, B, and C above, the applicant shall include in the radwaste system all items of reasonably demonstrated technology that, when added to the system sequentially and in order to diminishing cost-benefit return, can for a favorable cost-benefit ratio effect reductions in dose to the population reasonably expected to be within 50 miles of the reactor. As an interim measure and until establishment and adoption of better values . . . the values $1000 per total body man-rem and $1000 per man-thyroid-rem . . . shall be used in this cost-benefit analysis.

Appendix I. *See* Staff Exhibit 2, FSER Supplement at 5-63 – 5-64. This conclusion, however, does not approve the construction and operation of any specific design on the site, nor does it somehow authorize a future licensee to triple the amount of tritium in Lake Anna or to effect a twenty-fold increase in the estimated annual dose to the maximally exposed individual. While satisfaction of Part 20 requirements in isolation might seem to permit the increase in dose posited by the Board, and while the specific design features and operational practices at a new plant are not now known and cannot now be evaluated, an applicant referencing the ESP *must* demonstrate compliance with the ALARA requirements. *See* 10 C.F.R. §§ 50.34a(a), 50.36a(a), and 20.1101(b). Compliance with ALARA requirements will be limiting with respect to dose, as explained above. Whether a specified design proposed for the site complies with ALARA requirements will be determined if and when a COL or construction permit ("CP") applicant who references the North Anna ESP provides complete design information and fully describes operational programs in its application.

(iii) **How can the gas-cooled reactor designs in the ESP application be deemed to meet the NRC safety regulations, when there are no specific standards for them and most of the standards apply only to light-water-cooled reactors?**

As explained above, the 0.100 rem radiation protection standard imposed by § 20.1301(a)(1) applies to gas-cooled reactors. In addition, while no specific, numerical ALARA guidance is directly applicable to gas-cooled reactors, the general ALARA requirements in §§ 50.34a**,** 50.36a, and 20.1101 apply to any applicant seeking to construct such a reactor.

(iv) **How should the 25 mrem dose limit imposed by 10 C.F.R. § 20.1301(e) and 40 C.F.R. § 190.10 be allocated as between pre-existing reactor effluents and new reactor licensees on the same site?**

In response to a written question from the Board, the Staff stated that it would consider the dose contribution of all existing reactors on a site together with the dose contribution of any proposed reactors in assessing compliance with the 0.025 rem dose limit of 40 C.F.R Part 190. NRC Staff Legal Brief in Response to Licensing Board's Safety-Related Questions at 8-9 (Feb.

8, 2007) ("Staff Safety Brief"). The Staff indicated further that it would not apportion the 0.025 rem dose limit between multiple reactors at a given site. Staff Safety Brief at 8-9. As the Staff explained in response to the Board's safety-related question 80, 40 C.F.R. Part 190 (as incorporated by § 20.1301(e)) is implemented through the operational programs and procedures required by §§ 50.36a, 50.34a, and recommended in Part 50, Appendix I, Section IV. Staff Exhibit 6, Staff Safety Brief, Attachment A at 72-73.

Specifically, in the past, compliance with 40 C.F.R. Part 190 at sites with four or fewer units has been ensured through compliance with the Appendix I dose objectives.[16] *See* NUREG-0543 "Methods for Demonstrating LWR Compliance with the EPA Uranium Fuel Cycle Standard (40 CFR 190)"(Feb. 1980). As explained in NUREG-0543, the Staff determined that the Appendix I dose objectives would be limiting with respect to the 0.025 rem dose limit imposed by 40 C.F.R. Part 190 at most sites with up to four light-water-cooled reactors. *Id*. at 11. The Staff came to this conclusion after considering, *inter alia*, (1) the conservative assumptions made when calculating offsite dose estimates for specific effluent categories to determine whether the Appendix I objectives have been met (*e.g*., the assumption that the individual with the highest dose potential is the receptor for each effluent category); (2) that it is unlikely or impossible that any one, real individual would simultaneously receive the highest dose via all three effluent categories; and (3) that the 0.025 rem limit imposed by 40 C.F.R. Part 190 applies to dose received by a real individual, while the Appendix I objectives apply to potential dose received by a hypothetical maximally exposed individual. *Id*. at 5-8. The technical specifications for each LWR require a specific demonstration of compliance with

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[16] The Staff recognizes that the use of conformance with the Appendix I dose objectives to demonstrate compliance with 40 C.F.R. Part 190 requirements may need to be reevaluated for proposed sites that will host more than four units.

40 C.F.R. Part 190 when the Appendix I reporting levels, which are also contained in the technical specifications, are exceeded. *Id*. at 8-11.

3. Partial ESPs and Incomplete Information

Citing 10 C.F.R. § 52.39(a)(1) to the effect that the Commission may not impose new requirements on the site once an ESP is issued, the Board inquired into whether the Staff's recommendation to issue an ESP to Dominion for the North Anna ESP site amounts to a "partial" ESP, based on limited information. As described below, this question should be treated in two parts: safety and environmental. For the reasons set forth below, the Staff submits that a North Anna ESP issued on the basis of the record before the Board would not amount to a partial ESP.

a. Legal Standards:

The Commission regulations governing ESPs require that an applicant for an ESP submit information sufficient to show*, inter alia*, that the radiological consequence evaluation factors in 10 C.F.R. § 50.34(a)(1) and the requirements of 10 C.F.R. Part 100 have been satisfied. 10 C.F.R. § 52.17(a)(1). In particular, the presiding officer must determine whether, taking into consideration the site criteria in Part 100, a reactor or reactors having characteristics that fall within the site characteristics can be constructed and operated without undue risk to the health and safety of the public. 10 C.F.R. § 52.18. An applicant for an ESP must also submit a certain minimum set of emergency planning ("EP") information for NRC review, and has the option of providing more EP information up to and including complete and integrated emergency plans. 10 C.F.R. § 52.17(b). Finally, an ESP applicant must submit a complete environmental report, but need not include an assessment of the benefits of the proposed action, which includes the need for power. 10 C.F.R. § 52.17(a)(2). Section 52.17(a)(2) explicitly requires that the application include an evaluation of alternative sites to determine whether there is any obviously superior alternative to the site proposed.

In the final rule promulgating Part 52, the Commission further elaborated on the type of information it expected to be submitted in an application for an ESP. *See* "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Reactors," 54 Fed. Reg. 15372, Final Rule (Apr. 18, 1989)("Part 52 Final SOC"). Specifically, the SOC states that:

> [t]he Commission believes that early site permits can usefully serve as vehicles for resolving most site issues before large commitments of resources are made. . . . Where adequate information is not available early site permits will not be issued.
>
> The Commission is also confident that enough information on reactor design will be available in an early site permit proceeding to permit sound judgments about environmental impacts[.] . . . [For state and local agencies] to meaningfully participate in a decision on an application for an early site permit, the application would have to contain "projected emission, discharges, site impacts, safety factors and exact operation parameters . . . proposed for a site." It is just such information which both the proposed rule and the final rule would require of applicants for early site permits.

Part 52 Final SOC at 15378.[17]

b. The Board's Concerns:

After identifying the prohibition on "partial" ESPs stated above, the Board described the use of a plant parameter envelope ("PPE")[18] in lieu of a specific plant design for site evaluation,

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[17] The Commission also compared ESPs to requests for early site review under 10 C.F.R. § 2.101(a-1):

> Moreover, the Commission believes that a term of ten to twenty years for early site permits will make [them] more useful for early resolution of site issues than would the five-year term in 10 C.F.R. § 2.606 [for an early site review under 10 C.F.R. Part 2, Subpart F]. The five-year term is a function not of the reliability of the information available to make the decisions, but rather of the fact that the decisions made under [Subpart F] may only resolve isolated site issues and anticipate site utilization in the very near term.

Part 52 Final SOC at 15378.

and questioned how to treat a situation in which significant PPE values are missing. LBP-07-09 (slip op. at 104-105). The Board described five specific matters that were not resolved in the FEIS. *Id*. (slip op. at 105-106). The first of these related to the impacts of the chemicals used in water treatment systems (LBP-07-09 (slip op. at 105), citing FEIS at 1-3), while the rest related to evaluations involving gas-cooled reactors (*id*. (slip op. at 105-106)). With respect to the water treatment systems, the Board asked why Dominion was not required to provide a bounding PPE value. *Id*. (slip op. at 105). The Board noted that the Staff listed more than thirty-five instances in which the FEIS specified matters that remained unresolved, and that "PPE gaps were most prevalent for the two gas-cooled reactor designs."[19] *Id*. (slip op. at 106). Having discussed these unresolved issues and the Board's written questions and Staff answers regarding such issues,[20] the Board stated its understanding of the Staff answers to be that if a significant PPE component is missing, the NRC will treat the matter as unresolved, and that the matter will be addressed in the environmental review performed in connection with a construction permit or combined license application. *Id*. (slip op. at 107).

The Board did not identify any regulatory prohibition to this approach. *Id*. The Board, nonetheless, questioned whether the approach comported with the Commission policy expressed in the Part 52 Final SOC against "partial" ESPs. *Id*. The Board further questioned

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(. . .continued)

[18] "A PPE is a set of values of plant design parameters that an ESP applicant expects will bound the design characteristics of the reactor or reactors that might be constructed at a given site. The PPE values are a bounding surrogate for actual reactor design information." FEIS at 1-3.

[19] While the Staff listed 37 instances in which the FEIS mentions unresolved issues, there are only 9 such unresolved issues, each of which is mentioned more than once in the FEIS. *See* Staff Response to Board Question 5A .

[20] *See* "Order (Issuing Environment-Related Questions)" dated February 7, 2007 (ADAMS Accession No. ML070380420); "NRC Staff Legal Brief in Response to Licensing Board's Environment—Related Questions," with attachments, dated March 1, 2007 (ADAMS Accession No. ML070610445) ("Staff Environmental Brief").

the extent to which "holes" or unresolved issues could exist before an application would run afoul of the Commission policy. *Id*. Accordingly, the Board raised this issue for Commission consideration.

c. The North Anna ESP Would not be a "Partial" ESP:

The Staff submits that the approach described by the Board comports with Commission policy. As set forth below, the Staff believes that the safety component of the Dominion application and the Staff evaluation of that application is, in fact, complete, and a North Anna ESP would not be "partial" or incomplete. With respect to the environmental component of the application and review, the Staff believes that, as a practical matter, "complete" information may, in some instances be lacking even when a requested action is decided. As set forth below, NRC regulations and those of the Council on Environmental Quality ("CEQ") recognize that complete information may not be available. In any case, the Commission's recently-approved rule revising the Part 52 licensing procedures, including environmental review under 10 C.F.R. Part 51, explicitly requires an ESP applicant to submit information to address the environmental effects of construction and operation necessary to determine whether there is any obviously superior alternative to the proposed site, which is the bare minimum of information that an ESP applicant must include in its ER.[21] This quantum of information does not rise to the level of detail described by the Board.

With respect to site safety matters, the Board did not identify a single issue as unresolved.[22] *See* LBP-07-09 (slip op. at 103-107). Although the Board refers to "unresolved"

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[21] *See* Staff Requirements Memorandum on "SECY-06-0220 – Final Rule to Update 10 CFR Part 52, 'Licenses, Certifications, and Approvals for Nuclear Power Plants,'" dated April 11, 2007. The text of the final rule is available in ADAMS at Accession No. ML063060337, at about page 569 (page numbers may vary with printer drivers on the computer used to retrieve the ADAMS document).

[22] The Board identified distribution coefficients and other hydrologic information that must be obtained from on-site measurements pursuant to 10 C.F.R. § 100.20(c)(3) that Dominion did not provide. LBP-07-09 (slip op. at 71). The Board acknowledged that the Commission had approved treating this (continued. . .)

matters (*id*. (slip op. at 69)), these matters all relate to design, and not site safety requirements, and the Board decided that the Applicant had met all site safety requirements. *Id*. (slip op. at 69, 71). Accordingly, the North Anna ESP is not a "partial" ESP.[23]

With respect to the environmental component of the application and review, however, the Staff agrees with the Board that the Applicant did not provide enough information for the Staff to evaluate all the impacts of construction and operation of a reactor or reactors on the North Anna ESP site. NRC and CEQ regulations nonetheless address situations in which information is lacking. *See* 10 C.F.R. §§ 51.45(c), 51.71(d) ("To the extent that there are important qualitative considerations or factors that cannot be quantified, these considerations or factors will be discussed in qualitative terms"); 40 C.F.R. § 1502.22 (EIS is to contain a statement that information is lacking; a statement of the information's relevance to the action; a summary of existing relevant evidence; and an evaluation based on theoretical or generally accepted research methods). In addition, a future EIS prepared in connection with a CP or COL will tier off the ESP EIS, and CEQ regulations on tiering recognize that some issues may not be ripe for decision at an early stage of a project. *See* 40 C.F.R. § 1508.28 (an EIS at an early stage such as site selection, in which the agency excludes issues that are not yet ripe). The Staff submits that the FEIS prepared in connection with the Dominion ESP application complies with these regulations, and the Board did not find otherwise.

(. . .continued)
requirement as resolved by imposing a design requirement through a condition to be included in the ESP, and allowed the Staff to do so in the North Anna ESP proceeding. *Id*., citing *System Energy Resources, Inc.* (Early Site Permit for Grand Gulf ESP site), CLI-07-14, 65 NRC ___ (Mar.27 2007) (slip op at 2). Should a COL applicant referencing an ESP with such a condition seek to remove the restriction on the design, it could seek a variance from the ESP, and supply the Part 100 on-site measurements described above as a basis for the variance. Such measurements, however, would not be the only basis for such a variance.

[23] The Staff agrees with the Board that an applicant who seeks to resolve only certain site safety issues should proceed under 10 C.F.R. § 2.101(a-1) and Subpart F. LBP-07-09 (slip op. at 104).

In answer to the Board's question, the minimum information that an ESP applicant must submit on environmental effects is that needed to perform the comparison of the alternative sites to the proposed site. The Commission recently approved a revision to Part 51 in connection with the Part 52 rulemaking that explicitly adopted this standard. *See* "Staff Requirements Memorandum on SECY-06-0220 - Final Rule to Update 10 CFR Part 52, 'Licenses, Certifications, and Approvals for Nuclear Power Plants,'" April 11 2007 (ADAMS Accession No. ML071010363). The new rule approved by the Commission states:

> *Early site permit stage.*
>
> The environmental report may address one or more of the environmental effects of construction and operation of a reactor, or reactors, which have design characteristics that fall within the site characteristics and design parameters for the early site permit application *provided however*, that the environmental report must address all environmental effects of construction and operation necessary to determine whether there is any obviously superior alternative to the site proposed.

SECY-06-0220, Enclosure 1 at 641 (new 10 C.F.R. § 51.50(b)). While notice of this new final rule has not been published in the *Federal Register* and it is not yet effective, it is clear that the Commission has already addressed the Board's concern.

B. THE DISSENT TO LBP-07-09

The dissent to LBP-07-09 raises two environmental issues: (1) the adequacy of the Staff's consideration of alternative sites, and (2) the possibility of imposing new cooling system requirements for existing North Anna Power Station ("NAPS") Units 1 and 2 in connection with the Staff evaluation of cooling system design alternatives for new units on the North Anna ESP site. The Staff addresses each of these topics in turn by describing the dissent, discussing the reasons supporting the majority opinion and why it should not be disturbed, and discussing the evidence and arguments made before the Board. First, however, the Staff sets forth the governing legal standards and applicable regulatory framework.

1. Legal Standards:

a. Generally applicable standards

Sections 102(2)(C)(iii) and 102(2)(E) of NEPA require consideration of alternatives to major Federal actions significantly affecting the environment. Specifically, NEPA § 102(2) requires that:

> all agencies of the Federal Government shall
> . . . .
> (C) include in every recommendation or report on proposals for . . . major Federal actions significantly affecting the quality of the human environment; a detailed statement by the responsible official—
> . . . .
> (iii) alternatives to the proposed action, [and]
> (E) study, develop, and describe appropriate alternatives to recommend[ed] courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources[.]

Part 51 of the Commission's regulations implements NEPA. Part 51 requires that a draft EIS include an analysis that considers and weighs, *inter alia*, "the environmental impacts of alternatives to the proposed action[] and alternatives available for reducing or avoiding adverse environmental effects." 10 C.F.R. § 51.71(d). Each applicant for an early site permit must submit an environmental report ("ER") that includes an analysis that considers and balances, *inter alia*, "the environmental impacts of alternatives to the proposed action, and alternatives available for reducing or avoiding adverse environmental effects." 10 C.F.R. §§ 51.45(c), 51.50, 52.17(a)(2).

The concept of alternatives must be bounded by some notion of feasibility. *See Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 551 (1978). Under the "rule of reason" that governs the acceptability of the range of alternatives considered, the agency "need not consider an infinite range of alternatives, only reasonable or feasible ones." *Westlands Water District v. U.S. Dep't of Interior*, 376 F.3d 853, 868 (9th Cir. 2004). A government agency must

consider such alternatives to the proposed action as may partially or completely meet the proposal's goal. *See City of New York v. U.S. Dep't of Transportation*, 715 F.2d 732, 742 (2d Cir. 1983). An agency, however, need not consider alternatives which could only be implemented after significant changes in government policy or legislation. *Id*.

The applicant determines the project's goals, and an agency cannot redefine the goals of the proposal. *See Citizens Against Burlington, Inc. v Busey*, 938 F.2d 190, 199 (D.C. Cir.) *cert. denied*, 502 U.S. 994 (1991) [hereinafter *Burlington*]. "When the purpose is to accomplish one thing, it makes no sense to consider the alternative ways by which another thing might be achieved." *City of Angoon v. Hodel*, 803 F.2d 1016, 1021 (9th Cir. 1986), *cert. denied*, 484 U.S. 870 (1987). Conversely, "[t]he stated goal of a project dictates the range of reasonable alternatives, and an agency cannot define those objectives in unreasonably narrow terms." *City of Carmel-By-The-Sea v. U.S. Dep't of Transp.*, 123 F.3d 1142, 1155 (9th Cir. 1997).

"Where reviewing a discrete license application filed by a private applicant, a federal agency may appropriately 'accord substantial weight to the preferences of the applicant and/or sponsor in the siting and design of the project.'" *Hydro Resources, Inc.* (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-4, 53 NRC 31, 55 (2001), quoting *Burlington*, 938 F.2d at 197. The agency may take into account the "economic goals of the project's sponsor." *Hydro Resources*, CLI-01-4, 53 NRC at 55 (2001), quoting *City of Grapevine v. U.S. Dep't of Transp.*, 17 F.3d 1502, 1506 (D.C. Cir.), *cert. denied*, 513 U.S. 1043 (1994). Further, an agency need not "undertake a 'separate analysis of alternatives which are not significantly distinguishable from alternatives [already] considered, or which have substantially similar consequences.'" *Westlands Water Dist. v. United States Dept. of the Interior,* 376 F.3d 853, 871-72 (9th Cir. 2004), *quoting Headwaters, Inc. v. Bureau of Land Mgmt.,* 914 F.2d 1174 (9th Cir. 1990).

b. Standards Applicable to Alternative Sites

With respect to alternatives to a proposed ESP site, the test for assessing whether a proposed site should be rejected in favor of one of the alternative sites is whether any of the alternative sites is "obviously superior" to the proposed site. *Exelon Generation Co., LLC,* (Early Site Permit for Clinton ESP Site), *Dominion Nuclear North Anna, LLC,* (Early Site Permit for North Anna ESP Site), *System Energy Resources, Inc.,* (Early Site Permit for Grand Gulf ESP Site), *Louisiana Energy Services, L.P.* (National Enrichment Facility), *USEC Inc.*, (American Centrifuge Plant), CLI-05-17, 62 NRC 5, 48 (2005); *Public Service Co. of New Hampshire* (Seabrook Station, Units 1& 2), CLI-77-8, 5 NRC 503, 526 (1977), *aff'd*, *New England Coalition on Nuclear Pollution v. NRC*, 582 F.2d 87 (1st Cir. 1978). If reasons exist to rule out sites generically, an applicant may do so by putting forth adequate evidence. *Public Service Co. of New Hampshire* (Seabrook Station, Units 1& 2), ALAB-471, 7 NRC 477, 498 (1978). In particular, it is appropriate, in applying the rule of reason applicable to consideration of environmental matters, to consider the "possible institutional and legal obstacles associated with construction at an alternate site[.]" *Seabrook*, CLI-77-8, 5 NRC at 540 (1977).

Because "the number of potential locations for any project is infinite . . . the agency is only required to consider 'all alternatives which were feasible and reasonably apparent at the time of drafting the EIS.'" LBP-07-09 (slip op. at 79), quoting *Dubois v. U.S. Dep't of Agriculture*, 102 F.3d 1273, 1290 (1st Cir. 1996). Moreover, "[a]n agency 'is not a business consulting firm. It is in no position to conduct a feasibility study of alternative sites.'" LBP-07-09 (slip op. at 81), quoting *River Road Alliance, Inc. v. Corps of Engineers of U.S. Army*, 764 F.2d 445, 452-53 (7th Cir. 1985.) An agency is not required to conduct a further study of alternatives or to independently find possible sites overlooked by an applicant. *See Friends of the Earth v. Hintz*, 800 F.2d 822, 835 (9th Cir. 1986).

2. Applicable Guidance

a. Guidance on alternative site consideration

Guidance for the Staff's preparation of an EIS is drawn primarily from NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" ("ESRP"). The Staff review of alternative sites consists of four steps, as follows: (i) The alternative site evaluation begins with the selection of a geographic area, called a region of interest ("ROI"), considered in searching for candidate sites. ESRP § 9.3 at 9.3-1; (ii) Potential sites within the ROI are then identified. *Id*. at 9.3-6; (iii) The potential sites are then narrowed to "candidate" sites, which are the proposed site and the alternative sites that are compared to the proposed site. *Id*.; (iv) The environmental impacts of the proposed action at the proposed and alternative sites are then compared. *Id*. at 9.3-7 and 9.3-8. If the Staff, based on the site comparison performed pursuant to item (iv), determines that there are "environmentally preferred" sites among the alternative sites, as compared to the proposed site, it then conducts a cost-benefit balance and comparison of the estimated costs (environmental, economic, and time) of completing construction of the proposed plant at the proposed site and at the environmentally preferable site. ESRP § 9.3 at 9.3.11. This last step provides the basis on which the Staff determines whether an environmentally preferable alternative site is "obviously superior" to the proposed site.[24] *Id*.

The step in the above-described process of interest in this proceeding is the selection of candidate sites (step iii). The guidance states that the Staff reviewer should determine if the applicant has employed a practicable site-selection process with the principal objective of identifying candidate sites that would be among the best that could reasonably be found for the

[24] An alternative site that is not environmentally preferable to the proposed site, *a fortiori*, cannot be obviously superior to the proposed site.

proposed plant. *Id*. at 9.3-11. This standard implies that all such candidate sites should be licensable. *Id*. Candidate sites may be selected on the basis of a screening process to identify unacceptable areas (*e.g*., based on population density) or on the basis of positive attributes. *Id*. at 9.3-9. The guidance states that the Staff reviewer should determine if the selection process used to identify candidate sites was adequate. *Id*. The guidance does not suggest that the Staff should develop its own process or methodology for identifying and evaluating candidate sites.

b. Guidance on Cooling System Design Alternatives:

The ESRP provides that the Staff evaluate alternatives to the proposed heat dissipation system to identify those alternatives that are (i) environmentally preferable to the proposed system, (ii) environmentally equivalent to the proposed system, and (iii) environmentally inferior to the proposed system. ESRP § 9.4.1 at 9.4.1-9. Environmentally inferior or equivalent alternatives and those alternatives that do not meet Federal Water Pollution Control Act (Clean Water Act, or "CWA") requirements or other Federal , State, regional, local, and affected Native American tribal requirements need not receive further consideration. *Id*. at 9.4.1-9, 9.4.1-10. If the Staff identifies an alternative cooling system that is environmentally preferable to the proposed system, the Staff performs a cost-benefit analysis to determine if the alternative system should be considered preferable to the proposed system. *Id*. at 9.4.1-1.

In implementing the process described above, the Staff should consider once-through systems and closed-cycle systems, including mechanical draft wet cooling towers, natural draft cooling towers, wet/dry cooling towers, dry cooling towers, cooling ponds, and spray ponds. *Id*. at 9.4.1-5. Additional systems, *e.g.*, a combined tower/pond system, may be considered if site-specific conditions suggest that such a system would be environmentally preferable to the proposed system. *Id*. In comparing the environmental effects of the proposed system with those of each alternative, the Staff should consider land use, water use, atmospheric effects,

thermal and physical effects, noise levels, aesthetics and recreational benefits, operating and maintenance experience, generating efficiency, costs, and other considerations (such as an alternative's intake structure that differs significantly from that for the proposed system). *Id*. at 9.4.1-6 through 9.4.1-8.

The ESRP does not mention mitigation or elimination of impacts from existing units on the same or an adjacent site as an alternative to the proposed heat dissipating system.

3. Dissent on Alternative Site Consideration

a. Summary of Dissenting Opinion

One member of the Board dissented from the majority's determination that the NRC Staff adequately considered all reasonable alternatives to Dominion's requested ESP as required by §§ 102(2)(C)(iii) and 102(2)(E) of NEPA. LBP-07-09, Dissent (slip op. at 1). Specifically, the dissent concluded as follows: The NRC Staff failed to consider and search for (or demand that Dominion search for) the best alternative sites that could reasonably be found within Dominion's large region of interest. *Id*. In particular, the Staff failed to comply with its own guidance requiring that the proposed site be compared against "all nuclear power plant sites within the identified region of interest." *Id*. at 4, quoting ESRP at 9.3-7 (emphasis omitted). The Staff short-circuited the alternatives analysis by fixating on a very small slate of sites proffered by Dominion. *Id*. at 1. Once the NRC's vision was narrowed to this short slate of three alternative sites, the result was predetermined because none of them was "obviously superior" to the site preferred by Dominion – the North Anna ESP site. *Id*. The dissent concluded, therefore, that the Staff's alternative site analysis was inconsistent with both the letter and spirit of NEPA. *Id*.

b. Summary of Majority Opinion

The majority opinion of LBP-07-09 determined that the NRC Staff alternative site description and analysis satisfied NEPA § 102(2)(C)(iii) based on the following rationale:

Federal case law does not require, nor does NRC guidance recommend, that the Staff identify site alternatives on its own. LBP-07-09 (slip op. at 81); *see River Road Alliance*, 764 F.2d at 452-53. Rather, the NRC Staff evaluates whether the applicant's selection process was adequate and whether "the candidate site areas identified by the applicant represent a reasonably complete list of such areas within the identified ROI." LBP-07-09 (slip op. at 82), quoting ESRP at 9.3-9. Again quoting the ESRP (at 9.3-10), the majority of the Board stated that the guidance allows for screening of the candidate sites. *Id*.

The majority of the Board then assessed the facts as follows: Dominion defined its ROI adequately and justified its large size, based on deregulation of the power industry, which eliminated cost-of-service rates and resulted in a competitive power market. *Id*. (slip op. at 83). Dominion discussed and identified an appropriate number of candidate sites, using appropriate criteria. *Id*. The Staff correctly reviewed the Dominion alternative site selection process. *Id*. The Staff recognized that many applicants can no longer define the ROI based on a service area, and the Staff determined that the Dominion ROI "does not appear to be unreasonable." *Id*., quoting Environmental Questions Final Exhibit B (Staff Pre-filed Exhibit 10) ("Staff Answers to Environmental Questions") at 92. The majority concluded that the Staff evaluated Dominion's process for selecting candidate sites, and examined whether "the process they used to identify those sites was reasonable, that the slate of sites was reasonable." *Id*., quoting EH Tr. at 572.

The majority rejected the dissent's position that more possible sites for the project could have been found, particularly those of competitors. *Id*. The majority discussed at length how, in accordance with controlling Commission and Federal court decisions, Dominion's project goal controlled and limited the reasonable site alternatives. *Id.* (slip op. at 84). Specifically, the majority described how Dominion's goal is to "generate power for sale to consumers in a competitive marketplace [and] Dominion would only proceed with the development of such a new facility if it is economically viable." *Id*. citing ER, § 3-9-2. The majority concluded that this

goal would not be met by locating a plant at a competitor's site. *Id*. Accordingly, the majority found that the Staff appropriately excluded such sites from consideration as unreasonable alternatives. *Id*.

With respect to pre-existing sites of nuclear plants within the ROI not owned by Dominion or its affiliates, the majority responded to the dissent by noting that the ESRP is binding on neither the Staff nor the Board. *Id*. (slip op. at 85). The majority ruled that the Staff's exclusion of such sites from consideration was of no moment and that "Dominion and the Staff presented a range of realistic and very different alternatives which allowed the Staff to conduct a detailed examination of each site's various positives and negatives that . . . more than satisfies NEPA's alternatives analysis requirement." *Id*. Finally, the majority concluded that the Staff complied with the regulatory requirement to compare the proposed site to the three alternative sites. *Id*. (slip op. at 86). The dissent did not disagree with this last conclusion.

c. The Majority Opinion Should not be Disturbed

At root, the dissent believes that "the outcome of the alternative site analysis was foreordained. . . . Neither the FEIS nor the Staff's post-hearing submission establishes that the NRC Staff rigorously, skeptically, and adequately reviewed even the process that Dominion used to pre-select the short slate of three alternatives." *Id.* Dissent (slip op. at 11) (emphasis added). The evidence of record, however, shows that the process was not, as suggested by the dissent, "foreordained," as follows:

> JUDGE KARLIN: I mean, I would propose to you that if I had a proposed site A, and if you give me the ability to select the three alternative sites against which A needs to be compared, I can rig that game very quickly so that you would have to pick A.
>
> MR. KUGLER: Yes, you could. And that's –
>
> JUDGE KARLIN: How do you know that didn't happen?
>
> MR. KUGLER: That was part of our review. We took a –

> JUDGE KARLIN: What other sites did you look at?
>
> MR. KUGLER: We took a look at the process they use, and we look at—took a look at the candidates that they came up with.

EH Tr. at 582:16. In this exchange, Mr. Kugler testified that the Staff reviewed the site analysis, and it was not "rigged," as suggested by Judge Karlin's question. The dissent, while failing to cite any evidence to the contrary, nonetheless did not accept this answer. *See* LBP-07-09, Dissent (slip op. at 7-8, 13). The Staff amplified its testimony in this regard as follows:

> MR. KUGLER: Now, one thing I will say, I mean in looking at this we were looking to make sure that the sites that have been put forward as candidates were strong candidate sites. And in the end, we found that any of these sites could hold a new nuclear powerplant. Any of them would be viable options.
>
> JUDGE KARLIN: Are you saying that those are the best that could reasonably be found for siting of a nuclear powerplant on an environmental basis within that region of interest? Those are the best three that you could find, that anybody could find?
>
> MR. KUGLER: That was our conclusion, yes, Your Honor.

EH Tr. 584:10. The Staff testified that the alternatives were "the best that could reasonably be found" within the ROI, but the dissent again did not accept this answer, again without citing any evidence of record to the contrary. *See* LBP-07-09, Dissent (slip op. at 3-4, 6). The majority, however, recognized that the alternative sites evaluated and compared to the proposed North Anna ESP site were indeed among the best that can reasonably be found within Dominion's ROI for the siting of a nuclear power plant. *See* LBP-07-09 (slip op. at 85); *see also* EH Tr. 573:22 ("[W]e had taken a look at the approach used, the set of sites that Dominion identified as candidate sites, and determined that that was a reasonable slate of sites[.]"); EH Tr. 582:7 ("We looked at . . . this group of four [sites], once we determined that we felt that that was a reasonable slate."); "Affidavit of Andrew J. Kugler in Response to 'Dominion's Supplement to the Record on Alternative Sites' and to Supplement the Record in this Proceeding with Respect to Alternative Sites," dated May 11, 2007 (describing the Staff review

of the process Dominion used to identify the alternatives to the proposed site)("Kugler Aff.").[25]

In addition, the dissent's legal objections to the majority opinion of LBP-07-09 are not well taken. First, the dissent states that the ESRP "improperly delegates NEPA compliance to the applicant." LBP-07-09, Dissent (slip op. at 7). The dissent continues by stating that "NEPA does not require federal agencies to decide whether the applicant's ER is adequate. NEPA requires federal agencies to examine all reasonable alternatives." *Id*. The majority, however, correctly held that the NRC staff is entitled to rely on the ER, and need not search for alternative sites omitted by an applicant. LBP-07-09 (slip op. at 81), quoting *River Road Alliance*, 764 F.2d at 452-53 and *Friends of the Earth*, 800 F.2d at 835. Second, the dissent states that decisions like *Burlington*, 938 F.2d 190, which gives weight to an applicant's goals, are completely inapposite, and cannot be relied upon to rule out consideration of sites of existing nuclear power units not owned by Dominion. LBP-07-09, Dissent (slip op. at 8-9). The majority once again correctly identifies Dominion and Staff testimony that establishes that "siting a new nuclear power station at the site of an existing nuclear power station operated by another utility would likely present logistical, competitive, and regulatory complications," which would not be "consistent with Dominion's business purposes." LBP-07-09 (slip op. at 84), quoting Staff

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[25] The approach here is not unlike a Licensing Board decision in an uncontested proceeding dating from 1977. *See Tennessee Valley Authority* (Phipps Bend Nuclear Plant, Units 1 and 2), LBP-77-60, 6 NRC 647 (1977). In *Phipps Bend*. the Board suggested that the Staff should have made inquiry about the existence of alternative site possibilities beyond those suggested to it by TVA, yet ultimately found that "[t[he evidence is, however, that the alternate sites examined were not plainly frivolous selections. In view of the inherent uncertainties in the NEPA concept of "reasonableness" [citation omitted], and the lack of clear guidance in the decided cases on the point at issue, we are compelled to find the Staff's analysis minimally acceptable in the circumstances of this case." *Phipps Bend*, 6 NRC at 659. One significant difference between *Phipps Bend* and this proceeding is that the alternative sites in *Phipps Bend* were not in the ROI, and the Staff knew that the distance from load centers (lower transmission costs) would weigh heavily against the alternatives. *Id*. at 658. The Staff found that the ROI Dominion used for consideration of potential ESP sites was consistent with major load centers, and desirable candidate areas were not excluded on the basis of an arbitrarily defined ROI. FEIS § 8.3.1 at 8-8. Accordingly, location of load centers was not an issue with respect to alternative site selection for the North Anna ESP application.

Answer to Environmental Question 121 [Staff Exhibit B] and Dominion Answer to Environmental Question 121 [Applicant Exhibit 3], respectively. Accordingly, *Burlington* does apply here, as the majority posits. *See* Kugler Aff. ¶ 11. The dissent does not cite any evidence of record to the contrary.[26]

d. Evidence and Argument Perceived as Deficient

The Staff has discussed above much of the evidence and argument connected to the consideration of candidate sites as part of its evaluation of alternative sites. While the Staff acknowledges that the FEIS is not a model of clarity on this point (EH Tr. 573:19), the Staff position is not as deficient as the dissent would have it. The Staff now discusses the remaining perceived deficiencies in the evidence and argument, starting with the dissent.

The dissent first points to the ESRP, quotes the passage "requiring" consideration of all nuclear power plant sites within the ROI, and asserts that neither the Staff nor Dominion complies with this guidance. LBP-07-09, Dissent (slip op. at 3-6). In this regard, the Staff testified that the ROI is a function of transmission system areas. EH Tr. 561:6. Further, the Staff candidly admitted that it did not follow this particular portion of the ESRP, and explained why. *Id*. at 566:24. In doing so, the Staff cited *Seabrook*, CLI-77-8, 5 NRC 503 for the proposition that it is *per se* unreasonable to consider alternative sites owned by another utility. EH Tr. 567:1. The dissent rightly criticized this Staff statement regarding *Seabrook* (LBP-07-09, Dissent (slip op. at 4-5)); the Staff, however, rightly relied on *Seabrook*, CLI-77-8, 5 NRC at 540, to consider "legal and institutional obstacles to plant construction and operation at existing

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[26] The dissent cites a newspaper article, Tim Mekeel, PPL Aims to Keep Option to Build Nuclear Reactor, Lancaster New Era (June 13, 2007) to the effect that Dominion might enter into a joint venture to build a new reactor at the Susquehanna site. LBP-07-09, Dissent (slip op. at 5-6). This article was not admitted into evidence (indeed it was published after the hearing), and neither the Staff nor the Applicant has had the opportunity to probe its veracity.

nuclear sites not owned by Dominion." Kugler Aff. ¶ 11. It is the analysis of the facts of the case, and not a *per* se rule criticized by the dissent that the Staff relies upon.[27] Second, the dissent criticizes Dominion for "briefly" dismissing greenfield sites in its ER. LBP-07-09, Dissent (slip op. at 3). The Staff, however, dismissed greenfield sites from further consideration because land use, ecological resource and aesthetic impacts associated with siting new nuclear generating capacity on such a site are large in comparison to impacts at sites with existing nuclear power plants. Kugler Aff. ¶ 8; EH Tr. 597:21. Little analysis is necessary to do so.

Third, the dissent suggests, without citation to evidence of record, that Dominion would have to enter a joint venture with the current owners of NAPS Units 1 and 2 to build and operate new units on the North Anna ESP site. LBP-07-09, Dissent (slip op. at 5). The dissent goes on to mention the Susquehanna site, which is discussed above, and to suggest that if it is *per se* unreasonable to consider alternative sites within an ROI owned by different companies, absurd results obtain. *Id*. (slip op. at 6). The dissent's reasoning is not supported by evidence of record. The Staff is unwilling to speculate on whether Dominion and PPL, the Susquehanna licensee, or the Tennessee Valley Authority or any other NRC reactor licensee might be amenable to a joint venture, or whether they are competitors in the power market. The fact is that there is no evidence on this subject other than that submitted by Dominion, to the effect that "the possibility of Dominion building new nuclear units at an unaffiliated utility's sites is neither reasonable, feasible, nor consistent with Dominion's business purpose." *See id*. (slip op. at 10), quoting Dominion's Answer to Environmental Question 121. The dissent states that there is no reason to accept this proposition. *Id*. "This proposition," however, is the only evidence on the subject in the record. The dissent has no basis to reject it.

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[27] The Staff also noted that this portion of the ESRP was in need of updating. EH Tr. 567:19. A draft of that update is now available in ADAMS at ML071800223.

Finally, the dissent states that the Staff did not take "a serious look at other non-nuclear power plant sites owned by Dominion and its affiliates." *Id*. (slip op. at 8). To the contrary, the Staff did consider so-called "brownfield" candidate sites. Kugler Aff. ¶¶ 7, 9-11. While the Staff testified that it "did not look at" such sites (EH Tr. 580:25), the context of that testimony shows that it was directed to assessing the environmental impacts at alternative sites in depth—the Staff "looked at" the Surry site and DOE sites. EH Tr. 580:18; 581:7. This testimony did not describe a failure to screen non-nuclear power plant sites owned by Dominion and its affiliates as candidate sites for evaluation.

The discussion of the evidence and argument regarding alternative sites in the majority opinion in LBP-07-09 echoes that in the dissent, and does not warrant further discussion. *See* LBP-07-09 (slip op. at 56-58). In view of the foregoing, the Commission need not disturb the majority opinion in LBP-07-09.

4. Dissent on Design Alternatives:

The dissent is based, in part, on the NRC Staff's exclusion of consideration of "the alternative of asking or requiring Dominion's affiliates to install additional water conservation measures on the existing nuclear power reactors Units 1 and 2, to compensate or mitigate against the significant and adverse incremental impacts that will be caused by proposed Units 3 and 4." LBP-07-09, Dissent (slip op. at 11). The dissent observes that "[w]hen a company operates an existing facility that emits pollution and/or has adverse environmental impacts, it is common for a regulator to at least consider, and sometimes impose, additional environmental controls on the existing units as a trade-off for obtaining approval to construct additional units." *Id*. (slip op. at 12). The dissent asserts that this is "sometimes a very cost-effective way to reduce the total pollution or environmental impact of an expanding industrial facility." *Id*. As support for this approach, the dissent quotes the Commission statement that "the fact that a possible *alternative* is beyond the Commission's power to implement, does not absolve us of

any duty to consider it." *Id*. (slip op. at 12), quoting *Seabrook*, CLI-77-8, 5 NRC at 540; 10 C.F.R. Part 51 App. A, § 5.

The majority opinion summarily rejected the dissent on this point.[28] LBP-07-09 (slip op. at 86-87). The Staff unquestionably followed the ESRP guidance in evaluating heat dissipation system alternatives. *See id*.; FEIS § 8.2. The Staff submits that the approach suggested by the dissent should be rejected because it would call for "significant changes in government policy or legislation." *See City of New York v. DOT*, 715 F.2d at 743. The government policy that would need to be changed is embodied in the Backfit Rule, 10 C.F.R. § 50.109.

Under the Backfit Rule,[29] the Staff may not impose a new requirement on an existing plant (a "backfit") unless the Staff determines in a documented analysis that there is a substantial increase in the overall protection of the public health and safety or the common defense and security from the backfit, and that the direct and indirect costs of implementing the backfit for the facility are justified in view of the increased protection, with three exceptions.

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[28] The dissent "rejects the suggestion that the NEPA alternatives analysis for ESPs is limited solely to consideration of alternative sites." LBP-07-09, Dissent (slip op. at 12, n.3). The Staff also rejects this suggestion. Indeed, the Staff has examined the transcript of the hearing and has not identified any witness who made such a suggestion. The dissent itself does not identify any party as having made such a suggestion, and acknowledges that FEIS § 8.2 included a discussion of "System Design Alternatives" *See id*.

[29] A "backfit" is:

> [T]he modification of or addition to systems, structures, components or design of a facility . . . which may result from a new or amended provision in the Commission rules or the imposition of a regulatory position interpreting the Commission rules that is either new or different from a previously applicable staff position after . . . the date of issuance of the operating license for the facility for facilities having operating licenses[.]"

10 C.F.R. § 50.109(a)(1).

10 C.F.R. § 50.109(a)(3). The three exceptions are when the backfit is necessary to (i) bring a facility into compliance with a license or the Commission rules or orders or written commitments of the licensee, (ii) ensure that the facility provides adequate protection to the health and safety of the public and is in accord with the common defense and security, or (iii) define or redefine the level of protection to the public health and safety or common defense and security that should be regarded as adequate. 10 C.F.R. § 50.109(a)(4)(i)-(iii).

The Backfit Rule applies explicitly to safety and common defense and security requirements. Because the Commission cannot require modifications or additions to systems, structures, components ("SSCs") or design of a facility for safety or common defense and security reasons except under the limited circumstances described above, *a fortiori*, the Commission policy embodied by the Backfit rule likewise counsels against imposition of such modifications or additions in the context of an environmental review in the absence of such reasons. *See* "10 CFR Part 50: Revision of Backfitting Process for Power Reactors," 53 Fed. Reg. 20603-20609 (June 6, 1988). The dissent's approach to cooling system design alternatives would run afoul of this policy. To consider such a change in Commission policy would call for significant analysis and stakeholder input and this proceeding is far from the appropriate forum in which to consider, much less implement, such a change in policy. Accordingly, the Staff need not have considered the dissent's suggestion that NAPS Units 1 and 2 be altered as a cooling system design alternative, and the Commission similarly need not consider it.[30] The Commission should reject the dissent in this regard.

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[30] At the hearing, the Staff stated that it was unclear that any modifications to NAPS Units 1 and 2 would actually reduce evaporative losses, and that some would actually result in some consumptive water use. EH Tr. 125:19. In addition, in response to a Board question, the Staff stated that imposing more stringent water-saving measures on existing NAPS Units 1 and 2 would likely result in derating the plants, thereby reducing generating capacity. *See* Staff Exhibit 10, Staff Environmental Brief, Attachment at 34 (Response to Board Question 45); (continued. . .)

C. PERCEIVED DEFICIENCIES IN EVIDENCE AND ARGUMENT NOT ADDRESSED ABOVE

In its Order dated August 2, 2007, the Commission invited the NRC staff and Dominion "to submit initial and reply briefs addressing . . . the suggestions in LBP-07-09 regarding perceived deficiencies in the NRC Staff's and Dominion's evidence and arguments[.]" CLI-07-23 (slip op. at 2) (footnote omitted). The Commission directed the Staff and Dominion to specific portions of the Board's Initial Decision in a footnote associated with the above-quoted passage. *Id*. (slip op. at n.3). The testimony cited by the Commission in footnote 3 to CLI-07-23 and that has not been addressed in other sections of this filing is specifically addressed below.

1. Tritium Testimony – Initial Decision, at 45-46:

In LBP-07-09, the Board raised the following issues regarding the Staff's testimony described on pages 45 and 46 of that decision: (1) the Staff did not verify that the PPE value of 850 Ci/yr reasonably bounds operation of a CANDU ACR-700, and (2) the tritium release and per unit dose estimates do not account for unintentional leaks. LBP-07-09 (slip op. at 45-46). These issues are addressed below.

a. NRC Staff Did Not Verify that 850 Ci/year was a Reasonable PPE Value for CANDU ACR-700:

As the Board points out, the Staff did not determine whether a release rate of 850 Ci/year for tritium could reasonably be achieved if an applicant referencing the ESP chose to operate a CANDU ACR-700 on the North Anna ESP site. EH Tr. 334:10. The Board seems

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(. . .continued)
EH Tr. 124:11. The Staff reasoned that reducing the generating capacity of existing units so that new units could be built to meet increased electrical needs was not a reasonable alternative. *See* Staff Exhibit 10, Staff Environmental Brief, Attachment at 34 (Response to Board Question 45).

to have been concerned that the Staff did not perform this analysis because the original vendor estimate for liquid tritium releases from the CANDU ACR-700 was 3100 Ci/year, and the Staff had determined that a tritium release at this level could result in a tritium concentration in Lake Anna exceeding the Environmental Protection Agency's ("EPA") drinking water standard. *See* LBP-07-09 (slip. op. at 44-45).

An ESP, however, is based on design parameters that an applicant provides, and not design characteristics associated with a specific reactor design. Therefore, an ESP does not approve construction and operation of any specific reactor design at the proposed ESP site. Rather, the Staff's analysis in an ESP review centers on whether a plant with design characteristics bounded by the design parameters (in this case, a Plant Parameter Envelope or "PPE") can be constructed and operated on a site possessing the site characteristics of the proposed ESP site. If a PPE is employed, as in the Dominion application, the pertinent inquiry is not whether any particular design has characteristics that are bounded by the postulated design parameter or PPE values, but whether the PPE values themselves are reasonable with respect to at least some reactors. Here, the relevant design parameter included in the ESP application is a tritium liquid effluent release rate of 850 Ci/year, and the Staff determined that at least some designs would have tritium release rates bounded by this value. *See* EH Tr. at 332:1; Staff Exhibit 2 at 11-3 – 11-5. Therefore, the Staff concluded that design parameter itself – rather than whether any one, specific design can achieve that parameter – was not unreasonable for evaluating whether radioactive effluents could meet regulatory requirements at the North Anna ESP site.

b. Tritium Release Estimates Include Only Intentional Discharges:

The Board's final point regarding tritium is that the activity (850 Ci/year), concentration (9,400 pCi/L), and dose estimates (0.81 millirem per unit) provided by Dominion and the Staff result from consideration of intentional discharges from the proposed units to Lake Anna. *Id*.

(slip op. at 46). As the Board points out, the Staff did not consider unintentional leakage to groundwater as an exposure pathway to humans. *Id*.

As the Staff testified, unintentional leaks to groundwater were not considered as a human exposure pathway due to the lack of radioactive waste system design information available at the ESP stage, as well as the requirement imposed by a permit condition to be included in the ESP that would require any CP or COL applicant referencing the North Anna ESP to ensure that the radioactive waste management systems, structures, and components for a future reactor include features to preclude accidental releases of radionuclides into potential liquid pathways. EH Tr. at 306:2. As Staff Counsel clarified, this permit condition is not an absolute prohibition on unintentional releases, but was designed to provide reasonable assurance of adequate protection and to reduce the probability of occurrence to the point where these types of leaks are no longer reasonably foreseeable. EH Tr. at 778:2 – 784:7. In addition, as the Staff testified, if such releases were to occur and were detected by a licensee, they could not be ignored from an operational standpoint, but would be addressed through the existing reporting requirements. EH Tr. at 307:5.

2. Testimony Regarding Hydrology:

With respect to PPE values relating to hydrology, the Board focused on the Staff's response to Board Safety Questions 50A & B, going so far as to categorize the Staff's answer to question 50B as unresponsive. *See* LBP-07-09 (slip op. at 34). While nothing prevents the Applicant from developing "estimates" of the composition of the radioactive waste effluent, the usefulness of such an exercise is limited, because lack of design-level information necessarily affects the usefulness of those estimates for the purpose of evaluating the factors important to hydrological radionuclide transport. Specifically, even if the composition of the radioactive waste effluents were estimated - despite the inherent limitations resulting from a lack of design-level information – the lack of information on the exact location and elevation of a likely

point of the release undermines the usefulness of such estimates. *See* Staff Response to Safety Question 50A. Given the fact that hydrogeologic properties are highly varied in space (*See* Staff Response to Safety Question 50A), knowledge of the location and elevation of potential releases is essential in order to perform a meaningful examination of site-specific "factors important to hydrological radionuclide transport." 10 C.F.R. § 100.20(c)(3).

Because it was not practicable to examine these factors at this point in the licensing process, the Staff proposed imposition of a permit condition, to read as follows:

> [a]n applicant for a CP or COL referencing this ESP shall ensure that any new unit's radioactive waste management systems, structures, and components, as defined in Regulatory Guide 1.143, for a future reactor include features to preclude accidental releases of radionuclides into potential liquid pathways.

Staff Exhibit 17, Draft *Dominion Nuclear North Anna*, LLC, Early Site Permit ("Staff Exhibit 17") at pg. 3. As Staff Counsel stated, the Commission has accepted the use of this permit condition as a possible method of complying with 10 C.F.R. § 100.20(c)(3). EH Tr. at 778:23 – 779:10*; see Exelon Generating Company, LLC* (Early Site Permit for Clinton ESP Site), CLI-07-12, 65 NRC 203 (2007); *System Energy Resources, Inc.* (Early Site Permit for Grand Gulf Site), CLI-07-14, 65 NRC 216 (2007). As the Board recognized, "[t]he Commission rulings are dispositive on the issues they address, and we will apply those rulings here." LBP-07-09, at 30. The Board also questioned whether an adequate hydrology baseline had been established at the site, such that contamination from Units 3 and 4 could be distinguished from pre-existing contamination at the NAPS site. *See* LBP-07-09 (slip op. at 35). The type of information that the Board was looking for does not exist or was not produced. The slide to which the Board referred (indicating that there were no radiological contaminants at the ESP site) was presented and the questioning revealed no monitoring wells at the time the review was performed. EH Tr. 205:12 – 207:14. This information, however, is irrelevant to the ESP decision. That is, the findings required by Part 100 or § 52.17 do not depend on this information. While the Staff

agrees it would be salutary to obtain information that would allow the NRC to distinguish between contamination resulting from new Units 3 and 4 and that already existing as a result of the operation of NAPS Units 1 and 2, that is a potential future enforcement concern not at issue in this ESP proceeding. To the extent that information relevant to that question is extant, the operational programs (ODCM and REMP) would be used to identify any existing contamination and to help differentiate contamination resulting from the new plants from that originating at the existing plants. *See* Staff Exhibit 6, Staff Safety Brief, Attachment A, Answer to Board Question 50C.

D. STAFF COMMENT ON CONTENTS OF ESP

In its Order dated August 2, 2007, the Commission invited the NRC Staff and Dominion to address any other issues raised in LBP-07-09 that, in their view, warrant comment. CLI-07-23 (slip. op. at 2). In response, the Staff raises the following issue for Commission consideration.

1. Board Findings:

In addressing its findings on NEPA Baseline Issue 3 in LBP-07-09 the Board stated:

> It is our determination that the ESP *should be issued and should include* the proposed permit conditions contained in Staff Exhibit 17, and the permit conditions, COL action items, site characteristics, plant parameter envelope values, *representations, assumptions, and unresolved issues* specified in Appendices I and J to the FEIS.

LBP-07-09 (slip op. at 90) (emphasis added). The "representations, assumptions, and unresolved issues" referenced by the Board are contained in Appendix J to the North Anna FEIS.[31] As discussed below, the Staff does not believe that the "representations, assumptions,

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[31] Appendix I of the Staff FEIS includes ESP Site Characteristics and the Plant Parameter Envelope; Appendix J of the Staff FEIS includes Permit Conditions, Representations, Assumptions, and Unresolved Issues; and Appendix A of the Staff FSER includes Permit Conditions, COL Action Items, Site (continued. . .)

and unresolved issues" contained in Appendix J to the FEIS should be included in the ESP. The Staff's position is consistent with other portions of the Board's Initial Decision and the approach taken in both the Clinton and Grand Gulf ESP proceedings.[32] However, given the language quoted above, the Staff requests Commission direction on whether to include the Appendix J information in the North Anna ESP.

2. Staff Analysis:

The language of LBP-07-09 (slip op. at 90) seems to direct the Staff to include the representations, assumptions, and unresolved issues listed in Appendix J to the FEIS in the ESP itself. While this language is not mandatory and does not appear to be completely consistent with the language used elsewhere in the Board's Initial Decision, a plain reading suggests that the Board intended that the Staff include this information in the ESP. As explained below, permit conditions, COL action items, site characteristics, and plant parameter envelope values are appropriate for inclusion in an ESP, but "representations, assumptions, and unresolved issues" from the FEIS are not.

Should the Commission determine to issue the requested North Anna ESP, the Staff would incorporate the "proposed permit conditions contained in Staff Exhibit 17, and the permit conditions [from the Safety Evaluation Report], COL action items, site characteristics, [and] plant parameter envelope values" into the permit. Part 52 explicitly contemplates inclusion of

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(. . .continued)
Characteristics, and Bounding Parameters. *See* FEIS, Appendices I and J (ADAMS Accession No. ML063470314).

[32] *See* LBP-07-09 (slip op. at 1, 108)("ESP should be issued, *subject to* the . . . representations, assumptions and unresolved issues specified in [FEIS Appendix] J")(emphasis added); *Exelon Generating Company, LLC* (Early Site Permit for Clinton ESP Site), LBP-06-28, 64 NRC 460, 467 (2006)(Board findings are "subject to the COL Action Items, Permit Conditions . . . and all other items not resolved at this point"); *System Energy Resources, Inc*. (Early Site Permit for Grand Gulf ESP Site), LBP-07-01, 65 NRC 27, 34 (2007)(Board independently determined "subject to the commitments and assumptions specified in . . . Appendix J of the Final Environmental Impact Statement" that the Grand Gulf ESP should be issued).

site characteristics and plant parameters in an ESP. *See* 10 C.F.R. §§ 52.39 and 52.79. Similarly, permit conditions are appropriate for inclusion in the ESP pursuant to 10 C.F.R. § 52.24. COL action items (which are set forth in Appendix A to the FSER) are also appropriate for inclusion in an ESP because they identify significant safety matters that must be addressed in a COL or CP application referencing the ESP. The site characteristics, plant parameter values, and permit conditions serve a well-defined purpose as part of an ESP, as set forth in NRC regulations. Specifically, the site characteristics and plant parameters are the foundation for establishing the finality of the matters resolved in the ESP proceeding pursuant to § 52.39, and the permit conditions impose requirements on the ESP holder or an applicant referencing the ESP with respect to its use. *See* 10 C.F.R. § 52.79 (COL applicant demonstrates that design of facility falls within the parameters specified in the early site permit).

In contrast, the representations, assumptions, and unresolved issues in FEIS Appendix J identified by the Board are not contemplated by the regulations as appropriate for incorporation into the ESP, nor would they serve any purpose defined by the regulations if so incorporated. To the contrary, the Staff is uncertain what purpose might be served if these items are incorporated into the ESP. While important to the Staff's analysis, the Staff included the representations, assumptions, and unresolved issues in Appendix J to aid the Staff and an applicant referencing the ESP in a CP or COL application. FEIS, at J-1.

With respect to the "representations and assumptions," the Staff prepared Appendix J primarily to memorialize the key representations made by the Applicant and the key assumptions made by the Staff, thereby aiding the Staff in determining whether those representations and assumptions remain valid at the COL or CP stage of the licensing process. As the Staff points out, "[s]hould a CP or COL applicant reference the ESP, and the staff determine that a representation or assumption has not been satisfied . . . that information would be considered new and potentially significant, and the affected impact area could be subject to

re-examination."[33] *Id*. Moreover, these lists are not necessarily exhaustive and were not meant to replace the analysis in the FEIS. Inclusion of these items in the ESP could imply that these were the only representations and assumptions on which the Staff relied in the FEIS. Accordingly, inclusion of these items in the ESP could be deemed to limit the Staff's inquiry into whether there is new and significant information should the ESP be referenced in an application.

In addition, the unresolved issues in Appendix J provide a useful guide for the Staff and an applicant in the event that the North Anna ESP is referenced in the future, but they too were not intended to condition the ESP. Incorporation of the unresolved issues in Appendix J into the ESP might be deemed to narrow the bounds of the environmental issues that remain for further consideration in subsequent proceedings under § 52.39. That is, including the Appendix J information in the ESP may create the false impression that Appendix J represents an exhaustive list of issues to be addressed in evaluating a CP or COL application referencing this ESP, and that all other issues are resolved. Rather, the FEIS itself, with all the detailed information it sets forth, should be controlling with respect to what environmental matters are considered resolved or not resolved pursuant to 10 C.F.R. § 52.39 in a CP or COL proceeding in which the North Anna ESP is referenced.

In view of the foregoing, the Staff submits that the reach of issue preclusion and the bounds of the Staff inquiry into new and significant information should be as broad as the contents of the FEIS itself and, therefore, set by the FEIS. Accordingly, the ESP should not be conditioned on, or otherwise include, the "representations, assumptions and unresolved issues" included in Appendix J to the FEIS, nor should those items otherwise be included in the

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[33] An applicant referencing an ESP must submit information to resolve any significant environmental issue that was not resolved in the ESP proceeding, and any new and significant information for issues related to the impacts of construction and operation of the facility that were resolved in the ESP proceeding. *See* 10 C.F.R. §§ 52.79(a)(1), 52.89.

North Anna ESP. Moreover, the North Anna ESP would not be consistent with the Clinton and Grand Gulf ESPs if these items were incorporated into the North Anna ESP.[34] The Staff requests Commission direction on this issue.

CONCLUSION

As set forth above, the Staff submits that the Commission need not disturb the majority opinion in LBP-07-09, that the application should be granted, and that the ESP should not include the representations, assumptions, and unresolved issues in Appendix J to the FEIS.

Respectfully submitted,

/RA/

Robert M. Weisman
James P. Biggins
Jerry Bonanno
Counsel for the NRC Staff

Dated at Rockville, Maryland
this 23rd day of August, 2007

[34] *See* Early Site Permit No. ESP-001 (ADAMS Accession No. ML070670140)(Clinton ESP); Early Site Permit No. ESP-002 (ADAMS Accession No. ML070780457)(Grand Gulf ESP).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

CERTIFICATE OF SERVICE

I hereby certify that copies of the "NRC STAFF'S RESPONSE TO COMMISSION'S AUGUST 2, 2007, ORDER," have been served on the following through deposit in the NRC's internal mail system, with copies by electronic mail, as indicated by an asterisk, and by deposit in the U.S. mail, first class postage prepaid, with copies by electronic mail, as indicated by double asterisk, this 23rd day of August, 2007:

Alex S. Karlin, Chairman*
Administrative Judge
Atomic Safety and Licensing Board Panel
Mail Stop: T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: ASK2@nrc.gov)

Thomas S. Elleman**
Administrative Judge
Atomic Safety and Licensing Board Panel
5207 Creedmoor Road, # 101
Raleigh, NC 27612
(E-mail: elleman@ncsu.edu)

Richard F. Cole*
Administrative Judge
Atomic Safety and Licensing Board Panel
Mail Stop: T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: RFC1@nrc.gov)

Atomic Safety and Licensing Board Panel
Mail Stop: T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(hard copy only)

Office of Commission Appellate Adjudication*
Mail Stop 0-16C1
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: ocaamail@nrc.gov)

Office of the Secretary*
ATTN: Docketing and Service
Mail Stop: 0-16C1
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: HEARINGDOCKET@nrc.gov)

Diane Curran, Esq.**
Harmon, Curran, Spielberg & Eisenberg LLP
1726 M Street NW, Suite 600
Washington, DC 20036
(E-mail: dcurran@harmoncurran.com)

Marcia Carpentier, Esq.*
Law Clerk
Atomic Safety and Licensing Board Panel
Mail Stop: T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: mxc7@nrc.gov)

Margaret Parish*
Law Clerk
Atomic Safety and Licensing Board Panel
Mail Stop: T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: map4@nrc.gov)

David R. Lewis, Esq.**
Robert B. Haemer, Esq.**
Timothy J.V. Walsh, Esq.**
Blake J. Nelson, Esq.**
Pillsbury Winthrop Shaw Pittman, LLP
2300 N Street, N.W.
Washington, DC 20037
(E-mail: david.lewis@pillsburylaw.com
robert.haemer@pillsburylaw.com
timothy.walsh@pillsburylaw.com
blake.nelson@pillsburylaw.com)

Lillian M. Cuoco, Esq.**
Dominion Resources Services, Inc.
Rope Ferry Road
Waterford, CT 06385
(E-mail:Lillian_Cuoco@dom.com)

Paul Gunter**
Director, Reactor Watchdog Project
Nuclear Information and Resource Service
6930 Carroll Avenue, Suite 340
Takoma Park, MD 20912
(E-mail: nirsnet@nirs.org)

Michele Boyd**
Legislative Representative, Public Citizen
215 Pennsylvania Avenue, SE
Washington, DC 20003
(E-mail: mboyd@citizen.org)

Richard A. Parrish, Esq.**
Morgan W. Butler, Esq.**
Southern Environmental Law Center
201 West Main Street
Charlottesville, VA 22902
(E-mail: rparrish@selcva.org
mbutler@selcva.org)

/RA/

Robert M. Weisman
Counsel for the NRC Staff