May 11, 2005

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)	)	ASLBP No. 04-822-02-ESP

NRC STAFF ANSWER SUPPORTING DOMINION'S MOTION FOR SUMMARY DISPOSITION OF CONTENTION EC 3.3.2

INTRODUCTION

Pursuant to 10 C.F.R. § 2.1205(b), the NRC staff ("Staff") herein responds to "Dominion's Motion for Summary Disposition [of] Contention EC 3.3.2 - Impacts on Striped Bass in Lake Anna," ("Motion") filed by Dominion Nuclear North Anna, LLC ("Dominion" or "Applicant") on April 22, 2005. For the reasons set forth below and in the affidavit of Duane A. Neitzel, the Staff submits that there does not exist a genuine dispute of material fact concerning Contention EC 3.3.2. Accordingly, the Applicant is entitled to a decision in its favor as a matter of law and its Motion should be granted.

BACKGROUND

On September 25, 2003, Dominion filed an application pursuant to 10 C.F.R. Part 52 in which it requested an early site permit ("ESP") for the North Anna site in Louisa County, Virginia. The Applicant's submittal consisted of several documents, including an Environmental Report ("ER"). A joint petition for leave to intervene was filed by the Blue Ridge Environmental Defense League ("BREDL"), the Nuclear Information and Resource Service ("NIRS") and Public Citizen (collectively, "Intervenors"), and several contentions were filed, including seven contentions concerning the ER.

On August 6, 2004, the Atomic Safety and Licensing Board ("Licensing Board") ruled upon the admissibility of the Intervenors' proffered contentions. *Dominion Nuclear*

North Anna, LLC (Early Site Permit for North Anna ESP Site), LBP-04-18, 60 NRC 253 (2004). The Licensing Board admitted two contentions, EC 3.3.2 and EC 3.3.4.[1] Contention EC 3.3.2, as admitted, was restated by the Board as follows:

> The ER does not adequately address the adverse impact of operating one or two additional reactors on the striped bass in Lake Anna *and the North Anna River.* In particular, the ER does not adequately consider the impacts of the proposed reactors on the striped bass at Lake Anna and downstream arising from increased water temperature.

LBP-04-18, Appendix A, 60 NRC at 276 (emphasis added). In making its ruling on the contention, however, the Licensing Board expressly limited the scope of the contention to include impacts on the striped bass population in Lake Anna only. Specifically, the Licensing Board stated:

> Ruling: Admitted as supported by bases sufficient to raise a genuine issue of material fact adequate to further inquiry as it concerns the adverse thermal impacts on the striped bass population *of Lake Anna.* Inadmissible, as to the other generalized portions of the contention regarding the failure adequately to address effects on other aquatic life in that they lack adequate factual or expert opinion support, fail properly to challenge the ER, and/or raise matters outside the scope of the proceeding. . .
>
> *. . . Further, the Petitioners' . . . downstream impact assertions fail to raise and lack support regarding ESP-related concerns.*

Id. at 271 (emphasis added). For this reason, it appears that the scope of this admitted contention is limited to the assessment in the ER of impacts on the striped bass population of Lake Anna. Assuming that the scope of the admitted contention were to include impacts on striped bass downstream of Lake Anna, as discussed further below, there is nevertheless no genuine issue with respect to striped bass in the North Anna River.

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[1] The Licensing Board dismissed Contention EC 3.3.4 following the Applicant's and Intervenors' "Joint Motion for Approval of Settlement and Dismissal of Contention EC 3.3.4," dated December 29, 2004. *See Dominion Nuclear North Anna, LLC* (Early Site Permit for North Anna ESP Site), Order (Approving Settlement and Dismissal of Contention EC 3.3.4), slip op. January 6, 2005.

In November 2004, the Staff published the "Draft Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna Site," NUREG-1811 ("DEIS").[2] Therein, the Staff addressed the thermal impacts of an additional unit on the striped bass. *See* DEIS Section 5.4.2.5. The affidavit of Duane A. Neitzel ("Neitzel Aff."), appended hereto as Staff Exhibit 1, sets forth, among other things, the conclusions drawn by the Staff in the DEIS.

On April 22, 2005, Dominion filed its Motion seeking summary disposition of Intervenors' Contention EC 3.3.2.

DISCUSSION

A. Legal Standards

1. *Standards Governing Motions for Summary Disposition*

A moving party is entitled to summary disposition of a contention as a matter of law if the filings in the proceeding, together with the statements of the parties and the affidavits, demonstrate that there is no genuine issue as to any material fact. *See* 10 C.F.R. §§ 2.1205 and 2.710(d)(2); *see also Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plant), CLI-01-11, 53 NRC 370, 384 (2001); *Advanced Medical Systems, Inc.* (One Factory Row, Geneva, Ohio), CLI-93-22, 38 NRC 98, 102-03 (1993).

The Commission's summary disposition procedures have been analogized to Rule 56 of the Federal Rules of Civil Procedure.[3] *See Advanced Medical Systems*, CLI-93-22, 38 NRC at 102; *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-04, 61 NRC 71, 79 (2005). As such, the party seeking summary disposition bears the

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[2] The DEIS was transmitted to the administrative judges and the parties to this proceeding on December 9, 2004. *See* Letter from R.M. Weisman to Administrative Judges, dated December 9, 2004.

[3] In pertinent part, this rule states, "The judgment sought shall be rendered forthwith if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a judgment as a matter of law." FED. R. CIV. P. 56(c).

burden of demonstrating the lack of a genuine issue of material fact and the evidence submitted must be construed in favor of the non-moving party. See *Sequoyah Fuels Corp. & General Atomics Corp.* (Gore, Oklahoma Site Decontamination and Decommissioning Funding), LBP-94-17, 39 NRC 359, 361, *aff'd,* CLI-94-11, 40 NRC 55 (1994).

For a finding that there is a genuine issue of material fact, "the factual record, considered in its entirety, must be enough in doubt so that there is a reason to hold a hearing to resolve the issue." *Cleveland Elec. Illuminating Co.* (Perry Nuclear Power Plant, Units 1 & 2), LBP-83-46, 18 NRC 218, 223 (1983). As such, to avoid summary disposition of Contention EC 3.3.2, any affidavit filed by the Intervenors in opposition to the Dominion Motion must establish that a genuine issue of material fact remains in dispute regarding Contention EC 3.3.2. *See Florida Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), ALAB-950, 33 NRC 492, 496-99 (1991) (affirming licensing board's grant of motion for summary disposition despite difference of opinion between intervenor's expert supporting motion and the licensee).[4] In this vein, it should be noted that, in discussing changes made in 1989 to the contention requirements of 10 C.F.R. § 2.714 (now § 2.309) and the summary disposition criteria of 10 C.F.R. § 2.749 (now § 2.710),[5] the Commission described as follows the higher level of evidentiary support needed to withstand summary disposition motions, compared to the standard for admitting contentions:

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[4] *See also Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-03-21, 58 NRC 338, 342-43 (2003), quoting *Perry,* LBP-83-46, 18 NRC at 223 ("It is not enough that the nonmoving party merely allege an 'issue of fact'; rather, the issue of fact must be 'genuine.' In order to be 'genuine', the factual record, in its entirety, must 'be enough in doubt so that there is reason to hold a hearing to resolve the issue.'")

[5] Although the Commission recently revised its Rules of Practice in 10 C.F.R. Part 2, the standards for judging motions for summary disposition were not substantively changed. *See* Final Rule, Changes to Adjudicatory Process, 69 Fed. Reg. 2182, 2218, Table 1, "Cross-References Between New Subparts C and G and Old Provisions of Subpart G" (Jan. 14, 2004) (noting that the modifications to "old" Section 2.749 consist of "new requirements on timing of summary disposition motions, responses, and presiding officer consideration of the motions." *See also* 69 Fed. Reg. at 2227 col. 1 ("Section 2.710 generally retains the former provisions of Section 2.749 regarding summary disposition.")

> The Commission expects that at the contention filing stage the factual support necessary to show that a genuine dispute exists need not be in affidavit or formal evidentiary form and need not be of the quality necessary to withstand a summary disposition motion. At the summary disposition stage the parties will likely have completed discovery and essentially will have developed the evidentiary support for their positions on a contention. Accordingly, there is much less likelihood that substantial new information will be developed by the parties before the hearing. Therefore, the quality of the evidentiary support provided in affidavits at the summary disposition stage is expected to be of a higher level than at the contention filing stage.[6]

Moreover, the Commission has stated that bare assertions or general denials are not sufficient to bar summary disposition. *See Advanced Medical Systems*, CLI-93-22, 38 NRC at 102. *See also Houston Lighting & Power Co.* (Allens Creek Nuclear Generating Station, Unit 1), ALAB-629, 13 NRC 75, 78 (1981); *Virginia Elec. Power Co.* (North Anna Power Station, Units 1 2), ALAB-584, 11 NRC 451, 455 (1980).

Finally, where there is disagreement among competing experts over material facts, it is not appropriate in ruling on a summary disposition motion to "untangle the expert affidavits and decide which experts are more correct."[7] The trier of fact should be left to weigh competing expert opinions at hearing, so long as such opinions are shown to be relevant to material facts.[8] However, conflicting expert testimony will not necessarily preclude summary disposition. The trier of fact must focus on whether opinions supporting or opposing summary disposition are sufficiently

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[6] Final Rule, Rules of Practice for Domestic Licensing Proceedings - Procedural Changes in the Hearing Process, 54 Fed. Reg. 33,168, 33,171 col. 3 (August 11, 1989), *aff'd sub nom. Union of Concerned Scientists v. NRC*, 920 F.2d 50 (D.C. Cir. 1990).

[7] *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-01-39, 54 NRC 497, 510 (2001), *citing Norfolk Southern Corp. v. Oberly*, 632 F. Supp. 1225, 1243 (D.Del. 1986), *aff'd on other grounds*, 822 F.2d 388 (3d Cir. 1987).

[8] *PFS*, LBP-01-39, 54 NRC at 510, *citing Kannankeril v. Terminix Int'l*, 128 F.3d 802, 807 (3d Cir. 1997).

grounded in a factual basis.[9] Thus, a party cannot avoid summary disposition simply by presenting the unsupported opinion of an expert.[10] Expert opinion may defeat summary disposition only if it appears that the affiant is competent to give an expert opinion and the factual basis for the opinion is adequately stated in the affidavit. *See Garside v. Osco Drug, Inc.*, 895 F.2d 46, 50 (1st Cir. 1990).

As more fully set forth below, the Staff submits that summary disposition of Contention EC 3.3.2 is appropriate in accordance with these standards.

2. *Challenges to the ER as Challenges to the DEIS*

The adequacy of the Staff's environmental review as reflected in the adequacy of a draft or final EIS may be an appropriate issue for litigation in a licensing proceeding. *See Duke Power Co.* (Catawba Nuclear Station, Units 1 & 2), CLI-83-19, 17 NRC 1041, 1049 (1983). The Commission has recognized, however, that some matters may be capable of being raised prior to the Staff's issuance of a DEIS, and need not await publication of the DEIS. *Id.* In fact, the Commission's regulations pertaining to intervention require that contentions raising NEPA-based issues must focus on the applicant's ER. 10 C.F.R. § 2.309(f)(2). Following the issuance of the Staff's draft or final EIS, a petitioner can amend its contentions or raise new contentions if there are data or conclusions in the Staff's draft or final EIS that differ significantly from the ER. *Id.* Should the Staff set forth a different analysis in its DEIS, ample opportunity exists "to either amend or dispose of the contention." *Catawba*, CLI-83-19, 17 NRC at 1049.

In the instant case, the Intervenors could not anticipate what the Staff's DEIS would address. *See Catawba*, CLI-83-19, 17 NRC at 1049 (recognizing that the adequacy of the DEIS

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[9] *Kannankeril*, 128 F.3d at 807.

[10] *Rohrbough by Rorhbough v. Wyeth Laboratories, Inc.*, 719 F. Supp. 470 (N.W.D.Va. 1989), *aff'd on other grounds*, 916 F.2d 970 (4th Cir. 1990); *State Farm Fire & Cas. Co. v. Miles*, 730 F. Supp. 1462 (S.D. Ind. 1990), *aff'd*, 930 F.2d 25 (7th Cir. 1991).

cannot be determined before its preparation). Therefore, the Intervenors were required to submit contentions based on the Applicant's discussion of the impacts to striped bass in its ER, to challenge any perceived inadequacies therein. The Intervenors did this.[11] The Intervenors' challenge to the ER may be considered to be a challenge to the Staff's consideration of that information in its DEIS. *See Louisiana Energy Servs., L.P.* (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 84 (1998) (contentions filed based on ER are appropriately deemed to be challenges to the EIS). *See also Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-01-23, 54 NRC 163, 172 n.3 (2001)(citing CLI-98-3 and noting that this "migration" tenet does not change the basic form of the contention, *i.e.*, whether it challenges the soundness of the information provided or claims that necessary information has been omitted); *Louisiana Energy Servs., L.P.* (Claiborne Enrichment Center), LBP-96-25, 44 NRC 331, 338 (1996)(contentions that assert deficiencies in the Applicant's ER also necessarily include the "same general deficiency" that remains applicable to the EIS). Therefore, the general deficiency alleged by the Intervenors with respect to the Applicant's ER – the assertion that the ER did not adequately characterize thermal impacts on striped bass – could also apply to the Staff's environmental analysis. As described below, however, the Staff, in its DEIS, has resolved these matters. Therefore, the Staff's issuance of its DEIS addressing the general deficiency raised by the Intervenors demonstrates that there is no genuine dispute of material fact and the Applicant is entitled to summary disposition as a matter of law.

B. Contention EC 3.3.2

In its Motion, Dominion argues that the admitted contention may be subdivided into three issues: (1) thermal impacts on striped bass in the North Anna River; (2) thermal impacts from a

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[11] *See* "Contentions of Blue Ridge Environmental Defense League, Nuclear Information and Resource Service, and Public Citizen Regarding Early Site Permit Application for Site of North Anna Nuclear Power Plant," dated May 3, 2004, at 32-40.

fourth unit; and (3) thermal impacts arising from the effect of increased temperature due to operation of a third unit on the striped bass fishery in Lake Anna. The Staff agrees that these are the issues that must be addressed in dispositioning the contention. Each of these matters is discussed in turn.

1. *No Striped Bass Population Has Been Identified in the North Anna River.*

As stated above, the scope of Contention EC 3.3.2, as admitted, should be limited to the adequacy of Dominion's characterization of the thermal impacts on striped bass in Lake Anna only. Nonetheless, should Contention EC 3.3.2 be read to include the characterization of impacts on striped bass in the North Anna River within the scope of the contention, the Staff agrees with the applicant's conclusion that there is no genuine issue of material fact connected with striped bass in the North Anna River. *See* Motion at 11.

As discussed the affidavit of Mr. Neitzel, prior to the impoundment of the dam, the North Anna River did not support a striped bass population, and could not support a striped bass population today. Neitzel Aff. ¶ 13. Eggs and larvae of striped bass often settle to the bottom of a stream or river and die in short reaches of spawning rivers, which limits natural freshwater reproduction. *Id.* Additionally, the occurrence of spawning adults near the dam is limited by a natural fall line downstream of the dam in the North Anna River. *Id.* It is very likely that spawning fish could not swim upstream of the fall line.[12] *Id.* The presence of this fall line, together with the absence of striped bass collections by the fisheries biologist monitoring the presence of fish in the river, indicate that there are not striped bass in the North Anna River near the dam, except for occasional "pourover" fish from Lake Anna. *Id.* Accordingly, summary disposition on this issue is appropriate.

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[12] Mr. Neitzel also notes that the section of the river upstream of the Lake Anna Dam lacks the required flow, depth, and length to support striped bass spawning. Neitzel Aff. ¶ 20.

2. There Will be No Impacts on the Striped Bass Fishery from the Operation of a Postulated Unit 4.

Contention EC 3.3.2, as admitted, states that the issue is whether the ER does not adequately address the adverse impact of operating one *or two* additional reactors on the striped bass. In its Motion, Dominion argues that there is no genuine dispute associated with the thermal impacts from a fourth unit, as Dominion has revised its application for the fourth unit to use dry cooling towers. *See* Motion at 11. The Staff concurs with this assessment.

According to the plant parameter envelope ("PPE") value stated in the Application, postulated Unit 4 would require a primary cooling system to dissipate up to 9.7×10^9 BTU/hr of waste heat rejected from the main condenser and the auxiliary heat exchangers during normal plant operation at full station load. Neitzel Aff. ¶ 4. The Application states that a closed-cycle dry cooling system would be used for postulated Unit 4. *Id.* In using dry cooling towers for heat dissipation, the exhaust from the plant's steam turbines would be directed to a surface condenser where the heat would be rejected to a closed loop of cooling water. *Id.* The heated cooling water would be circulated to the finned tubes of the dry cooling towers where heat content of the cooling water would be transferred to the ambient air. *Id.* To increase heat rejection to the atmosphere, electric motor-driven fans would be used to force airflow across the finned tubes. *Id.* After passing through the cooling towers, the cooled water would be recirculated back to the surface condenser to complete the closed-cycle cooling water loop. *Id.*

Except for the initial filling of the cooling water loop, Unit 4 would have no make-up water need since dry tower systems typically have no evaporative water losses and would have no continuous blowdown discharge to the waste heat treatment facility ("WHTF"). *Id.* ¶ 5. Any make-up water needed to replenish the small evaporative losses for Unit 4 and other service water needs for the postulated units would be obtained from the North Anna Reservoir. *Id.* Since this replenishment would be minimal, if any, and there would be no blowdown discharge to the WHTF

from the Unit 4 dry cooling system, there will be no impacts to the striped bass fishery from the operation of postulated Unit 4. *Id.* In view of the above, summary disposition on the issue of the thermal impacts on striped bass from a postulated fourth unit is appropriate.

3. Dominion's ER and the DEIS Adequately Characterized the Potential Impacts on Striped Bass in Lake Anna from the Operation of a Postulated Unit 3.

The crux of Contention EC 3.3.2 is whether Dominion's ER adequately considers the impacts of a postulated third unit on the striped bass at Lake Anna arising from increased water temperature. As noted in the Motion (at 12, citing Bolin Aff.¶ 25), the ER stated that the impact on striped bass from increased thermal discharges from a third unit would be moderate and could warrant mitigation. As discussed in the DEIS, and as set forth below, the Staff concurs in this assessment.

a. Striped Bass - Background

As set forth in the Neitzel Affidavit at ¶¶ 6-8, the striped bass *Morone saxatilis* is an anadromous species, living most of its life in the ocean or estuary and returning to fresh water to spawn and/or early life rearing before returning to salt water. Striped bass were, until the 1940s, found only in estuaries along the Atlantic Coast from Nova Scotia to South Carolina and, during their annual spawning runs, in large freshwater rivers that flow into these estuaries. The striped bass's ability to physiologically adapt to fresh water led fisheries managers to stock them in many inland reservoirs, including a number in Virginia. Since then, the species has been introduced into impoundments throughout the United States. Over 37 states in the United States stock freshwater lakes and rivers with either striped bass and/or hybrid striped bass annually.

The striped bass is not protected as a threatened or endangered species at either the Federal or the State level.

b. Lake Anna - Background

Lake Anna was created to serve as the cooling water source for the North Anna Power Station. Neitzel Aff. ¶ 9. The lake was made in 1971 by erecting a dam on the main stem of the North Anna River, just upstream of the confluence of the North Anna River and Northeast Creek. *Id.* Further details regarding the lake's characteristics are set forth in the Neitzel Affidavit, ¶¶ 9-10. Lake Anna is used extensively for recreation and fishing, and its aquatic resources are managed cooperatively by Virginia Power and State natural resource agencies, including the Virginia Department of Game and Inland Fisheries ("VDGIF"), and the Virginia Department of Environmental Quality ("VDEQ").

c. Striped Bass in Lake Anna

When the impoundment of the North Anna River began, several species of fish were expected to carry over from the existing river and stream system into the lake, including pumpkinseed *Lepomis gibbosus*, spotted bass, gizzard shad *Dorosoma cepedianum* and several types of catfish *Ictalurus* spp. Neitzel Aff. ¶ 11. There were no striped bass in the river. *Id.* The impoundment was completed in 1972. *Id.* Initial stockings began in 1972, with introductions of largemouth bass, bluegill *Lepomis macrochirus*, redear sunfish *L. microlophus*, and channel catfish *I. punctatus*. Subsequent stockings of channel catfish, largemouth bass (northern and southern strains), redear sunfish, striped bass, and walleye *Stizostedion vitreum* were made to improve and diversify the fishery. *Id.* Blueback herring *Alosa aestivalis* and threadfin shad *D. petenense* were successfully introduced in the 1980s to provide additional forage for pelagic (open-water) predators. *Id.*

In 1972, VDGIF stocked Lake Anna with more than 350,000 juvenile striped bass. *Id.* ¶12. Several years later, this initial stocking was augmented with 80,000 Florida-strain striped bass. VDGIF's management program and the abundant population of bait fish, such as threadfin shad,

gizzard shad, and blueback herring, has resulted in Lake Anna being the premier bass lake in the Commonwealth of Virginia. *Id.*

Striped bass have not been observed to naturally reproduce in the impoundment, so VDGIF stocks approximately 200,000 fingerlings each year. *Id.* ¶ 13. Annual stockings of striped bass and walleye are generally made to maintain the fishery. *Id.* Management of the fishery also includes catch limits and regulations on the size of fish taken from the fishery. *Id.* Prior to 1985, a 12-inch size limit was in effect for largemouth bass. *Id.* Since that time, a 12 - 15 inch protected slot has been in effect to restructure the largemouth bass population. The current regulation allows harvest of fish less than 12 inches and larger than 15 inches. Fish between 12 and 15 inches must be released. Striped bass are currently managed under a 20-inch minimum size limit. *Id.*

d. Thermal Tolerance of Striped Bass

The striped bass, a non-native species introduced into Lake Anna for recreational fishing, is one of the most thermally-sensitive fish species in Lake Anna, and perhaps the species most vulnerable to thermal stress. Neitzel Aff. ¶ 15. Based on its thermal preferences and tolerances, the striped bass would be classified as a cool-water species. *Id.* The term "cool-water species" is not rigorously defined, but it refers generally to fish species that are distributed by temperature preference between the cold water salmonid communities of the northern United States and the more diverse centrarchid-dominated warm water assemblages of the southern United States. *Id.*

Striped bass in reservoirs across the southeast show a preference for deeper, cooler water in late summer and are often found concentrated in the area of the thermocline at these times. *Id.* ¶ 16. If conditions in the area of the thermocline become inhospitable (*i.e.*, too warm or too low in dissolved oxygen), striped bass in some southeastern reservoirs disperse to thermal refuges, areas within the reservoir that are slightly cooler because they are deeper, or cooled by underwater seeps or springs, or influenced by cooler inflowing streams. *Id.* As noted in the Neitzel Affidavit, Coutant and Carroll found that sub-adult striped bass preferred temperatures of 18° to 24° C

(68° F to 75° F) in summer, but frequently made brief "excursions" to warmer and cooler water. *Id.* Cheek et al. discovered that striped bass were restricted in summer to riverine areas of the Watts Bar Reservoir where temperatures were less than 24° C (75° F) and dissolved oxygen concentrations exceeded 4.0 milligrams per liter. *Id.* Other researchers have noted a tendency of striped bass to move to deep, downlake areas near dams in late summer in search of cooler water. *Id.*

Coutant theorized that striped bass populations are limited by available summer habitat, which he defined as 18° to 25° C (64° F to 77° F) temperatures and 2.0 to 3.0 milligrams per liter dissolved oxygen concentrations. *Id.* ¶ 17. Mathews *et al.* found that in late summer, large adult striped bass moved downlake to deeper, cooler water "just above the anoxic hypolimnion," and that these adults were able to tolerate temperatures somewhat higher than 25° C (77° F). *Id.* Moss observed that striped bass in two Alabama reservoirs sought out cool-water refuges in summer when water temperatures approached 27° C (81° F). *Id.* Several researchers, including Coutant and Carroll and Dudley *et al.* have suggested 26° to 27° C (79° F to 81° F) as upper avoidance temperatures for striped bass. *Id.*

e. The Striped Bass Fishery in Lake Anna and the Potential Impacts of Postulated Unit 3

Thermal impacts on important aquatic species are discussed in Section 5.3.2.2.2 of the Applicant's ER. Specifically with respect to striped bass, the Applicant concluded, "Thermal impacts on striped bass would be moderate and could warrant mitigation." ER at 3-5-69. As discussed below, the Staff generally agrees with the Applicant's assessment.

The Staff discusses the potential impacts of a postulated Unit 3 in Section 5.4.2.5 of the DEIS. As stated therein, and in Mr. Neitzel's affidavit, experience has shown that unusually high air temperatures and low rainfall in summer (*e.g.*, the drought conditions seen over the 1998 to 2002 period) can reduce striped bass habitat in some portions of Lake Anna. Neitzel Aff. ¶ 18.

This situation could be exacerbated by adding an additional unit that rejects heat to Lake Anna. *Id.* According to ER Section 3.4.1.1, a postulated new Unit 3 with a once-through cooling system would reject 9.7 x 10^9 BTU/hr to the WHTF. *Id.* The impact of the additional heat and water discharged to the WHTF from a postulated new Unit 3 can be estimated by extending the current impacts to fish that exist in the WHTF into the main body of the lake. *Id.* Based on the Staff's analysis, increasing the heat load and associated flow, with the addition of a postulated third unit, would increase the portion of the lake experiencing WHTF-like conditions. *Id; see* DEIS at 5-30. The WHTF contains about 21 percent of the total volume of Lake Anna. Assuming that all of these Unit 3-related WHTF-like conditions occur in the main body of the lake, on average, 19 percent of the main body of the lake would experience WHTF-like conditions with the postulated new unit. These WHTF-like conditions could extend even further into the lake during periods of high summer temperatures. Neitzel Aff. ¶ 18.

Experience has also shown that even extreme circumstances (*e.g.*, an extended drought) do not eliminate striped bass habitat in the upper lake and mid-lake areas. *Id.* ¶ 19. No striped bass die-offs have been observed in the main portion of Lake Anna. *Id.* Striped bass restricted to a narrow layer of water around the thermocline or to thermal refuges may not be able to move freely and feed normally; thus they may be forced to live on stored energy reserves. *Id.* As a consequence, they may lose weight or show a decline in condition. *Id.* This phenomenon has been observed at a number of southeastern reservoirs where striped bass experience a late-summer habitat "squeeze." *Id.* When surface waters cool in September and October, striped bass are able to move freely in the water column again and resume normal feeding. *Id.* Weight gain and an improvement in their condition generally follow. *Id.; see* DEIS at 5-30.

A number of southeastern reservoir populations experience a summer habitat "squeeze," trapped between a too-warm upper water layer and an oxygen-deficient lower water layer. Neitzel Aff. ¶ 20. Because the Lake Anna striped bass population is not native to this portion of the

watershed and does not reproduce naturally in the lake, the striped bass fishery is dependent on annual stockings. *Id.* (The Lake Anna striped bass population provides a "put-grow-and-take" fishery.) *Id.* Odenkirk reports in his study of the Lake Anna fisheries that striped bass habitat is "marginal." *Id.* Thus, reproduction and a naturally sustaining population are not occurring in Lake Anna or its environs, nor is it likely that the lake could be managed for a naturally sustaining population (with or without any thermal discharge to the lake). *Id.*

Based on the available information, the Staff determined that waste heat input to Lake Anna from a postulated new unit with a once-through cooling system could affect striped bass in the reservoir by forcing them up-lake into areas that provide suitable habitat, but that effects would be limited to a three-to-four month period in summer and early fall. *Id.* ¶ 21; *see* DEIS at 5-31. There could be some energetic costs associated with the up-lake movement and there could be a period of "lost" growth, if fish are restricted to relatively small areas with an inadequate supply of forage. Neitzel Aff. ¶ 21. When confined in late summer to areas that provide only marginal habitat, striped bass sometimes cease feeding. *Id.* Thermal impacts on striped bass may be detectable in that fish take longer to grow to sizes desired by fishermen, fish health may decline during summer months, optimum habitat may be reduced during summer months, and fish may have to congregate in other parts of the lake. *Id.* In cooler months and non-drought years, "put-grow-and-take" fishing provides optimum fishing opportunities. *Id.*

The Lake Anna striped bass population is a "put-grow-and-take" fishery of a fish that did not occur in or migrate through the North Anna River before the North Anna Dam was completed and Lake Anna was impounded. *Id.* ¶ 22. Because suitable habitat would continue to exist within Lake Anna, the Staff concluded that the heat stress impact of Unit 3's once-through cooling system on the striped bass would be small[13] during cooler months and non-drought years.

[13] In accordance with 10 C.F.R. Part 51, a SMALL impact is defined as follows: "For the (continued...)

Neitzel Aff. ¶ 22; DEIS at 5-31. During drought years, the Staff concluded that impacts without mitigation may be moderate.[14] Neitzel Aff. ¶ 22; DEIS at 5-31. In such circumstances, mitigation to reduce the impact could be accomplished by stocking more fish, stocking larger fish, managing the fishery to provide more catch opportunities of larger fish or replacing striped bass with a more heat tolerant hybrid.[15] Neitzel Aff. ¶ 22.

In summary, the Staff agrees with Dominion's conclusions regarding the potential impacts on striped bass related to the postulated operation of one or two additional units at the North Anna ESP site. *Id.* ¶ 26. There are no striped bass in the North Anna River downstream of the dam that would be affected by the thermal discharge from postulated Unit 3. *Id.* There will be no thermal impacts from a fourth unit as proposed because dry cooling towers would result in no thermal discharge to Lake Anna. *Id.* Finally, the potential impacts to striped bass in Lake Anna are reasonably described in Dominion's ER because the potential thermal impacts would not be expected to destabilize the recreational fishery. *Id.* All of these issues have been adequately addressed in the DEIS, and therefore there remains no genuine issue of material fact.

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[13](...continued)
issue, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource."

[14] In accordance with 10 C.F.R. Part 51, a MODERATE impact is defined as follows: "For the issue, environmental effects are sufficient to alter noticeably, but not destabilize, important attributes of the resource."

[15] In its Motion, Dominion also argues that persistence of striped bass if a third unit is added is no longer a material issue because stocking of an alternative fish (the example given was the so-called "Palmetto bass") with tolerance to higher temperatures would provide equivalent recreational fishing value. As discussed in the Neitzel Affidavit at ¶¶ 23-25, Dominion has made a commitment to provide financial assistance to aid in the development and stocking of a more thermally-tolerant species (such as a sterile white bass/striped bass hybrid) suitable for maintaining the recreational fishery in Lake Anna. The Staff does not address here whether the Palmetto bass would provide an equivalent recreational fishery. *Id.* ¶ 24. However, the Staff concurs generally that any thermal impacts on the managed striped bass fishery of Lake Anna can be mitigated. *Id.*

CONCLUSION

For the reasons set forth above, the Staff submits that the Applicant's motion for summary disposition of Contention EC 3.3.2 should be granted as a matter of law.

Respectfully submitted,

Brooke D. Poole
Counsel for NRC Staff

Dated at Rockville, Maryland
this 11th day of May, 2005

NRC Staff Exhibit 1
May 2, 2005

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)	)	ASLBP No. 04-822-02-ESP

AFFIDAVIT OF DUANE A. NEITZEL

I, Duane A. Neitzel, being duly sworn, declare as follows:

1. I am competent to make this affidavit, and the statements herein are true and correct to the best of my knowledge, information and belief. The opinions expressed herein are based on my best professional judgment, and pertain to Contention EC 3.3.2 submitted in this proceeding by the Blue Ridge Environmental Defense League ("BREDL"), Nuclear Information and Resource Service ("NIRS") and Public Citizen (collectively, "Intervenors"). Contrary to Contention EC 3.3.2, I believe that the Environmental Report ("ER") prepared by the applicant, Dominion Nuclear North Anna, LLC ("Dominion"), adequately addressed the adverse impact of operating two additional reactors on the striped bass in Lake Anna.

2. I am employed as a staff scientist with the Ecology Group at the Battelle Pacific Northwest Division, Pacific Northwest National Laboratory. I am providing this affidavit under a technical assistance contract with the U.S. Nuclear Regulatory Commission ("NRC"). I am the lead technical reviewer on aquatic biology issues in connection with the application submitted by Dominion for an early site permit ("ESP") for a site within the existing boundaries of the North Anna Power Station in Louisa County, Virginia. Specifically, I evaluated entrainment, impingement, and the physical, chemical, and thermal effects of heated water discharge on the aquatic environment. In this role, I assisted in preparation of the NRC Staff's "Draft Environmental Impact Statement for

an Early Site Permit (ESP) at the North Anna ESP Site" ("DEIS"), issued on December 2, 2004, and am also involved in preparing the final EIS for the proposed ESP application. A statement of my educational training and professional qualifications is appended hereto as Attachment A.

3. This affidavit reflects my previous familiarity with and/or recent review of the following documents, among others: (a) "Dominion's Motion for Summary Disposition Contention EC 3.3.2 - Impacts on Striped Bass in Lake Anna," dated April 22, 2005; (b) "Affidavit of John William Bolin, III in Support of Dominion's Motion for Summary Disposition of Contention EC 3.3.2," dated April 21, 2005; (c) "Patrick J. Ryan Affidavit in Support of Dominion's Motion for Summary Disposition of Contention EC 3.3.2," dated March 31, 2005; (d) North Anna Early Site Permit Application, Revision 3, dated September 2004 ("Application"); and (e) the DEIS, dated November 2004. Additional documents are identified in the footnotes below.

Thermal Impacts from a Postulated Fourth Unit

4. According to the plant parameter envelope ("PPE") value stated in the Application,[1] postulated Unit 4 would require a primary cooling system to dissipate up to 9.7×10^9 BTU/hr of waste heat rejected from the main condenser and the auxiliary heat exchangers during normal plant operation at full station load. The Application states that a closed-cycle dry cooling system would be used for postulated Unit 4.[2] In using dry cooling towers for heat dissipation, the exhaust from the plant's steam turbines would be directed to a surface condenser where the heat would be rejected to a closed loop of cooling water. The heated cooling water would be circulated to the finned tubes of the dry cooling towers where heat content of the cooling water would be transferred to the ambient air. To increase heat rejection to the atmosphere, electric motor driven fans would

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[1] Application, Part 3 - Environmental Report, Revision 3, at 3-3-56 (appended hereto as Attachment B).

[2] Application, Part 2 - Site Safety Analysis Report, Revision 3, at 2-2-112 (appended hereto as Attachment C).

be used to force airflow across the finned tubes. After passing through the cooling towers, the cooled water would be recirculated back to the surface condenser to complete the closed-cycle cooling water loop.

5. Except for the initial filling of the cooling water loop, Unit 4 would have no make-up water need since dry tower systems typically have no evaporative water losses and would have no continuous blowdown discharge to the waste heat treatment facility ("WHTF"). Any make-up water needed to replenish the small evaporative losses for Unit 4 and other service water needs for the postulated units would be obtained from the North Anna Reservoir. Since this replenishment would be minimal, if any, and there would be no blowdown discharge to the WHTF from the Unit 4 dry cooling system, there will be no impacts to the striped bass fishery from the operation of postulated Unit 4.

Assessment of Thermal Impacts on Striped Bass in Lake Anna

Striped Bass - Background

6. The striped bass *Morone saxatilis* is the largest member of the Moronidae or sea bass family. The sea basses are often called "temperate" or "true" basses to distinguish them from species such as largemouth bass *Micropterus salmoides*, smallmouth bass *Micropterus dolomieu*, and spotted bass *Micropterus punctulatus*, which are actually members of the Centrarchidae or sunfish family.[3] Although *Morone* is of unknown derivation, *saxatilis* is from the Latin, "dwelling among rocks." The other members of the Moronidae family include white perch *Morone americana*, white bass *Morone chrysops*, and yellow bass *Morone mississippiensis*.

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[3] Nelson, J.S., E.J. Crossman, H. Espinosa-Perez, H.T. Findley, C.R. Gilbert, R.N. Lea, and J.D. Williams. 2004. Common and Scientific Names of Fishes from the United States, Canada, and Mexico, Sixth Edition. 386 pages. Published by American Fisheries Society, Bethesda, Maryland.

7. The striped bass is an anadromous species, living most of its life in the ocean or estuary and returning to fresh water to spawn and/or early life rearing before returning to salt water. Striped bass were, until the 1940s, found only in estuaries along the Atlantic Coast from Nova Scotia to South Carolina and, during their annual spawning runs, in large freshwater rivers that flow into these estuaries. The striped bass's ability to physiologically adapt to freshwater led fisheries managers to stock them in many inland reservoirs, including a number in Virginia.[4] Scruggs reported the reproduction of resident striped bass in a reservoir in South Carolina.[5] Since then, the species has been introduced into impoundments throughout the United States. Over 37 states in the United States stock freshwater lakes and rivers with either striped bass and/or hybrid striped bass annually.[6]

8. The striped bass is not protected as a threatened or endangered species at either the Federal or the State level.[7]

Lake Anna - Background

9. Lake Anna was created to serve as the cooling water source for the North Anna Power Station. The lake was made in 1971 by erecting a dam on the main stem of the North Anna River, just upstream of the confluence of the North Anna River and Northeast Creek. Lake Anna

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[4] Jenkins, R.E. and N.M. Burkhead. 1994. Freshwater Fishes of Virginia, American Fisheries Society, Bethesda, Maryland.

[5] Scruggs, G.D. "Reproduction of Resident Striped Bass in Santee-Cooper Reservoir, South Carolina," Transactions of the American Fisheries Society 85: 144-159, 1957 (appended hereto as Attachment D).

[6] *See* <http://www.fishnsba.com/about.cfm>, last accessed April 29, 2005 (appended hereto as Attachment E).

[7] *See* U.S. Fish and Wildlife Service. "Threatened and Endangered Species system (TESS) Listings by State and Territory as of 03/01/2004. Virginia." <Http://ecos.fws.gov/tess_public/TESSWebpageUsaLists?state=VA>, last accessed March 1, 2004 (appended hereto as Attachment F); Letter from K. Mayne, U.S. Fish and Wildlife Service, Gloucester, Virginia, to NRC dated October 25, 2004 (ADAMS accession number ML 043090290) (appended hereto as Attachment G).

drains an area of 888 km^2 (343 mi^2).[8] The dam is approximately 27 m (90 ft) high and 1500 m (5000 ft) long and contains 700,000 m^3 (900,000 yd^3) of earth and rock.[9] Lake Anna began filling during January 1972 and reached full pool in December of that year.[10] Lake Anna is approximately 27 km (17 mi) long, with 435 km (272 mi) of shoreline. It is relatively shallow (maximum depth 27 m [90 ft]; average depth approximately 8 m [25 ft] at full pool), with a surface area of 5300 ha (13,000 ac).[11] The normal elevation of the reservoir is 76 m (250 ft) above mean sea level, at which stage it holds 376,000,000 m^3 (305,000 acre-feet) of water.[12] Lake Anna is used extensively for recreation and fishing. The aquatic resources of Lake Anna are managed cooperatively by Virginia Power and State natural resource agencies including the Virginia Department of Game and Inland Fisheries ("VDGIF"), and the Virginia Department of Environmental Quality ("VDEQ").

10. Lake Anna is divided into two distinct bodies of water: the WHTF and the reservoir. The reservoir is the larger body of water and is physically separated from the WHTF by three dikes. The WHTF is the smaller body of water into which the waste heat from existing North Anna Units 1 and 2 is discharged via a discharge canal. The total surface area of the WHTF is 1400 ha (3400 ac). The surface area of the reservoir is 3900 ha (9600 ac). The WHTF was formed by diking off the three southernmost arms of Lake Anna. These arms are the three cooling lagoons of the WHTF; all three lagoons are interconnected by canals.

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[8] *See* Virginia Department of Environmental Quality, Section 316(a) Demonstration for North Anna Power Station: Environmental Studies of Lake Anna and the Lower North Anna River. Virginia Power Corporate Technical Assessment. Water Quality Department, Richmond, Virginia (1986).

[9] U.S. Atomic Energy Commission. 1973. Final Environmental Statement Related to the Continuation of Construction and the Operation of Units 1 and 2 and Construction of Units 3 and 4, North Anna Power Station, Washington, D.C (ADAMS accession number 3000008168).

[10] *Id.*

[11] *Id.*

[12] *Id.*

Striped Bass in Lake Anna and Downstream

11. When the impoundment of the North Anna River began, several species of fish were expected to carry over from the existing river and stream system into the lake, including pumpkinseed *Lepomis gibbosus*, spotted bass, gizzard shad *Dorosoma cepedianum* and several types of catfish *Ictalurus* spp. There were no striped bass in the river.[13] The impoundment was completed in 1972. Initial stockings began in 1972, with introductions of largemouth bass, bluegill *Lepomis macrochirus*, redear sunfish *L. microlophus*, and channel catfish *I. punctatus*. Subsequent stockings of channel catfish, largemouth bass (northern and southern strains), redear sunfish, striped bass, and walleye *Stizostedion vitreum* were made to improve and diversify the fishery. Blueback herring *Alosa aestivalis* and threadfin shad *D. petenense* were successfully introduced in the 1980s to provide additional forage for pelagic (open-water) predators.

12. In 1972, VDGIF stocked Lake Anna with more than 350,000 juvenile striped bass. Several years later, this initial stocking was augmented with 80,000 Florida-strain striped bass. VDGIF's management program and the abundant population of bait fish, such as threadfin shad, gizzard shad, and blueback herring, has resulted in Lake Anna being the premier bass lake in the Commonwealth of Virginia.[14] The Lake Anna fishery consistently produces more citation striped bass (8 lb or 22 ") each year than any other body of water in the state. During 2001, 50 citation bass were recorded by Lake Anna anglers. Also in 2001, Lake Anna ranked third in the state for citation crappie with 18. Because of the influence of the warm water coming from the WHTF, particularly on the lower end of Lake Anna, nearly half of these citation fish were caught in the

[13] *See* <http://home.earthlink.net/~egerdj/lakeanna_1972.html>, last accessed April 29, 2005 (appended hereto as Attachment H).

[14] *See* <http://www.highpointmarina.com/lakeanna.html>, last accessed April 29, 2005 (appended hereto as Attachment I).

months of December, January, February, and March - a time when the striped bass in most other lakes are in near hibernation.

13. Striped bass have not been observed to naturally reproduce in the impoundment, so VDGIF stocks approximately 200,000 fingerlings each year. Annual stockings of striped bass and walleye are generally made to maintain the fishery. Management of the fishery also includes catch limits and regulations on the size of fish taken from the fishery. Prior to 1985, a 12-inch size limit was in effect for largemouth bass. Since that time, a metric 12 - 15 inch protected slot has been in effect to restructure the largemouth bass population. The current regulation allows harvest of fish less than 12 inches and larger than 15 inches. Fish between metric 12 and 15 inches must be released. Striped bass are currently managed under a 20-inch minimum size limit.[15]

14. Prior to the impoundment of the dam, the North Anna River did not support a striped bass population. In my opinion, the river could not support a striped bass population today. Coutant reports that eggs and larvae of striped bass often settle to the bottom of a stream or river and die in short reaches of spawning rivers.[16] This limits natural freshwater reproduction. Additionally, the occurrence of spawning adults near the dam is limited by a natural fall line downstream of the dam in the North Anna River. I have visited this site twice. It is very likely that spawning fish could not swim upstream of the fall line. The presence of the fall line and the absence of striped bass collections by the fisheries biologist monitoring the presence of fish in the river indicate that there are not striped bass in the North Anna River near the dam, except for occasional "pourover" fish from Lake Anna.

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[15] *See* <http://www.dgif.state.va.us/fishing/lakes/lake_anna/index.html>, last accessed April 29, 2005 (appended hereto as Attachment J).

[16] Coutant, C.C., "Striped Bass, Temperature, and Dissolved Oxygen: A Speculative Hypothesis for Environmental Risk," Transactions of the American Fisheries Society 114:31-61, 1985 (appended hereto as Attachment K).

Thermal Tolerance of Striped Bass

15. The striped bass, a non-native species introduced into Lake Anna for recreational fishing, is one of the most thermally-sensitive fish species in Lake Anna, and perhaps the species most vulnerable to thermal stress. Based on its thermal preferences and tolerances, the striped bass would be classified as a cool-water species. The term "cool-water species" is not rigorously defined, but it refers generally to fish species that are distributed by temperature preference between the cold water salmonid communities of the northern United States and the more diverse centrarchid-dominated warm water assemblages of the southern United States.[17]

16. Striped bass in reservoirs across the southeast show a preference for deeper, cooler water in late summer and are often found concentrated in the area of the thermocline at these times. If conditions in the area of the thermocline become inhospitable (*i.e.*, too warm or too low in dissolved oxygen), striped bass in some southeastern reservoirs disperse to thermal refuges, areas within the reservoir that are slightly cooler because they are deeper, or cooled by underwater seeps or springs, or influenced by cooler inflowing streams. Coutant and Carroll found that sub-adult striped bass preferred temperatures of 18° to 24° C (68° F to 75° F) in summer, but frequently made brief "excursions" to warmer and cooler water.[18] Cheek et al. discovered that striped bass were restricted in summer to riverine areas of the Watts Bar Reservoir where temperatures were less than 24° C (75° F) and dissolved oxygen concentrations exceeded

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[17] Trendahl, A. 1978. "Preface," Pages IX-X in (R.L. Kendall, editor) Selected Coolwater Fishes of North America. American Fisheries Society, 1978 (appended hereto as Attachment L).

[18] Coutant, C.C., and D.S. Carroll. "Temperatures Occupied by Ten Ultrasonic-Tagged Striped Bass in Freshwater Lakes," Transactions of the American Fisheries Society 109:195-202, 1980 (appended hereto as Attachment M).

4.0 milligrams per liter.[19] Other researchers have noted a tendency of striped bass to move to deep, downlake areas near dams in late summer in search of cooler water.[20]

17. Coutant theorized that striped bass populations are limited by available summer habitat, which he defined as 18° to 25° C (64° F to 77° F) temperatures and 2.0 to 3.0 milligrams per liter dissolved oxygen concentrations.[21] Mathews et al. found that in late summer, large adult striped bass moved downlake to deeper, cooler water "just above the anoxic hypolimnion," and that these adults were able to tolerate temperatures somewhat higher than 25° C (77° F).[22] Moss observed that striped bass in two Alabama reservoirs sought out cool-water refuges in summer when water temperatures approached 27° C (81° F).[23] Several researchers, including Coutant and Carroll and Dudley et al. have suggested 26° to 27° C (79° F to 81° F) as upper avoidance temperatures for striped bass.[24]

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[19] Cheek, T.E., J. M. Van Den Avyle, and C.C. Coutant. "Influence of Water Quality on Distribution of Striped Bass in a Tennessee River Impoundment," Transactions of the American Fisheries Society 114:67-76, 1985 (appended hereto as Attachment N).

[20] Combs, D.L., and L.R. Peltz. "Seasonal Distribution of Striped Bass in Keystone Reservoir, Oklahoma," North American Journal of Fisheries Management 2:66-73, 1982 (appended hereto as Attachment O).

[21] *See supra* n. 16.

[22] Mathews, J.M., L.G. Hill, D.R. Edds, and F.P. Gelwick, "Influence of Water Quality and Season on Habitat Use by Striped Bass in a Large Southwestern Reservoir," Transactions of the American Fisheries Society 118:243-250, 1989 (appended hereto as Attachment P).

[23] Moss, J.L. "Summer Selection of Thermal Refuges by Striped Bass in Alabama Reservoirs and Tailwaters," Transactions of the American Fisheries Society 114:77-83, 1985 (appended hereto as Attachment Q).

[24] *See supra* n. 18; Dudley, R.G., A.W. Mullis, and J.W. Terrell, "Movements of Adult Striped Bass (*Morone saxatilis*) in the Savannah River, Georgia," Transactions of the American Fisheries Society 106:314-322, 1977 (appended hereto as Attachment R).

The Striped Bass Fishery in Lake Anna and the Potential Impacts of Postulated Unit 3

18. Experience has shown that unusually high air temperatures and low rainfall in summer (*e.g.*, the drought conditions seen over the 1998 to 2002 period) can reduce striped bass habitat in some portions of Lake Anna. This situation could be exacerbated by adding an additional unit that rejects heat to Lake Anna. According to ER Section 3.4.1.1, a postulated new Unit 3 with a once-through cooling system would reject 9.7×10^9 BTU/hr to the WHTF. The impact of the additional heat and water discharged to the WHTF from a postulated new Unit 3 can be estimated by extending the current impacts to fish that exist in the WHTF into the main body of the lake. Based on the Staff's analysis, increasing the heat load and associated flow, with the addition of a postulated third unit, would increase the portion of the lake experiencing WHTF-like conditions. The WHTF contains about 21 percent of the total volume of Lake Anna. Assuming that all of these Unit 3-related WHTF-like conditions occur in the main body of the lake, on average, 19 percent of the main body of the lake would experience WHTF-like conditions with the postulated new unit. These WHTF-like conditions could extend even further into the lake during periods of high summer temperatures.

19. Experience has also shown that even extreme circumstances (*e.g.*, an extended drought) do not eliminate striped bass habitat in the upper lake and mid-lake areas. No striped bass die-offs have been observed in the main portion of Lake Anna. Striped bass restricted to a narrow layer of water around the thermocline or to thermal refuges may not be able to move freely and feed normally; thus they may be forced to live on stored energy reserves. As a consequence, they may lose weight or show a decline in condition. This phenomenon has been observed at a number of southeastern reservoirs where striped bass experience a late-summer habitat "squeeze."[25] When surface waters cool in September and October, striped bass are able to move

[25] *See* Cheek, T. "Stripers Under Stress," Tennessee Wildlife Vol. 6:116-20 (1982) (continued...)

freely in the water column again and resume normal feeding. Weight gain and an improvement in their condition generally follow.

20. A number of southeastern reservoir populations experience a summer habitat "squeeze," trapped between a too-warm upper layer and an oxygen-deficient lower layer. Because the Lake Anna striped bass population is not native to this portion of the watershed and does not reproduce naturally in the lake, the striped bass fishery is dependent on annual stockings.[26] (The Lake Anna striped bass population provides a "put-grow-and-take" fishery.) The section of the river upstream of the Lake Anna Dam lacks the required flow, depth, and length to support striped bass spawning. Odenkirk reports in his study of the Lake Anna fisheries that striped bass habitat is "marginal."[27] Thus, reproduction and a naturally sustaining population are not occurring in Lake Anna or its environs, nor is it likely that the lake could be managed for a naturally sustaining population (with or without any thermal discharge to the lake).

21. Based on the available information, the staff determined that waste heat input to Lake Anna from a postulated new unit with a once-through cooling system could affect striped bass in the reservoir by forcing them up-lake into areas that provide suitable habitat, but that effects would be limited to a three-to-four month period in summer and early fall. There could be some energetic costs associated with the up-lake movement and there could be a period of "lost" growth,

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[25](...continued)
(appended hereto as Attachment S); Coutant, C.C. "Temperature-Oxygen Habitat for Freshwater and Coastal Striped Bass in a Changing Climate," Transactions of the American Fisheries Society 119: 240-53 (1990)(appended hereto as Attachment T); Coutant, C.C. and D.L. Benson, "Summer Habitat Suitability for Striped Bass in Chesapeake Bay: Reflections on a Population Decline," Transactions of the American Fisheries Society 119:757-78 (1990) (appended hereto as Attachment U).

[26] *See* <http://www.dgif.state.va.us/fishing/lakes/lake_anna/index.html>, last accessed April 29, 2005 (*see* Attachment J).

[27] Odenkirk, J. Lake Anna Fisheries Management Report. Report from the Virginia Department of Game and Inland Fisheries. Fredericksburg, Virginia, 2003 (appended hereto as Attachment V).

if fish are restricted to relatively small areas with an inadequate supply of forage. When confined in late summer to areas that provide only marginal habitat, striped bass sometimes cease feeding.[28] Thermal impacts on striped bass may be detectable in that fish take longer to grow to sizes desired by fishermen, fish health may decline during summer months, optimum habitat may be reduced during summer months, and fish may have to congregate in other parts of the lake. In cooler months and non-drought years, "put-grow-and-take" fishing provides optimum fishing opportunities.

22. The Lake Anna striped bass population is a "put-grow-and-take" fishery of a fish that did not occur in or migrate through the North Anna River before the North Anna Dam was completed and Lake Anna was impounded. Because suitable habitat would continue to exist within Lake Anna, I conclude that the heat stress impact of Unit 3's once-through cooling system on the striped bass would be SMALL[29] during cooler months and non-drought years. During drought years, the impacts without mitigation may be MODERATE.[30] In such circumstances, mitigation to reduce the impact could be accomplished by stocking more fish, stocking larger fish, managing the fishery to provide more catch opportunities of larger fish or replacing striped bass with a more heat tolerant hybrid.

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[28] Siler, J.R., W.J. Foris, and M.C. McInerny. Spatial Heterogeneity in Fish Parameters Within a Reservoir, Pages 122-136 in (G.E. Hall and M.J. Van Den Ayvle, editors) Reservoir Fisheries Management. Reservoir Committee, Southern Division American Fisheries Society, 1986 (appended hereto as Attachment W).

[29] In accordance with 10 C.F.R. Part 51, a SMALL impact is defined as follows: "For the issue, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource."

[30] In accordance with 10 C.F.R. Part 51, a MODERATE impact is defined as follows: "For the issue, environmental effects are sufficient to alter noticeably, but not destabilize, important attributes of the resource."

Mitigation of Potential Impacts to the Lake Anna Striped Bass Fishery

23. In an April 12, 2005, response to an NRC Staff request for additional information, Dominion transmitted to the NRC a letter to the VDGIF in which Dominion proposed a commitment to VGDIF, as follows:

> If Dominion obtains approval and decides to construct and operate an additional nuclear unit at its North Anna site, the company will work with the [VGDIF] to support a healthy and viable Lake Anna fishery and to assist in maintaining its successful recreational fishing venue. Our commitment includes providing financial assistance to aid in the development and stocking of a more thermally-tolerant species (such as a sterile white bass/striped bass hybrid), or such other species as the [VGDIF] reasonably determines to be most suitable to maintaining an equally viable and enjoyable recreational fishery.[31]

In his Affidavit (¶ 31), Dr. Bolin states, "Our commitment includes providing assistance to develop and stock a more thermally tolerant fish, such as a sterile white bass/striped bass hybrid, or such other fish as the [VDGIF] reasonably determines to be the most suitable in maintaining an equally enjoyable environment." In responses dated February 9, 2005, and February 17, 2005, and in a communication to the NRC dated April 27, 2005, the VDGIF ultimately stated that a sterile striped bass/white bass hybrid may an acceptable replacement for the striped bass in Lake Anna.[32]

24. In his Affidavit (¶ 32), Dr. Bolin also states, among other things, "Based on my discussions with Mr. Martel, the Palmetto bass [the sterile striped bass/white bass hybrid] would

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[31] *See* Letter from P.F. Faggert, Dominion, to G.F. Martel, VDGIF, dated January 12, 2005 (included in Dominion's Response to NRC Supplemental Request for Additional Information, NRC ADAMS accession number ML051040415) (appended hereto as Attachment X).

[32] *See* Letter from G.F. Martel, VDGIF, to P.F. Faggert, Dominion, dated February 9, 2005; electronic mail message from G. Martel, VDGIF, to W. Bolin et al., dated February 17, 2005 (included in Dominion's Response to NRC Supplemental Request for Additional Information, NRC ADAMS accession number ML051040415) (*see* Attachment X). *See also* electronic mail message from G. Martel, VDGIF, to J. Cushing, NRC, dated April 27, 2005, in which Mr. Martel stated: "A clear solution in the form of a producer or alternate species is not available at this time . . . . If we determine that we can produce the fish with financial support from Dominion, and this is the best solution then that would be an acceptable alternative." The April 27, 2005 message is appended hereto as Attachment Y.

be the expected replacement if Dominion were to proceed with the development of new units in the near term." Although I do not address in this Affidavit the issue of whether Palmetto bass would provide an equivalent recreational fishery, I concur with the general sentiment of his opinion. It is my opinion that any thermal impacts on the managed striped bass fishery of Lake Anna can be mitigated.

25. Mitigation of managed fisheries includes many options and can be accomplished by stocking more fish, stocking larger fish, managing the fishery to provide more catch opportunities of larger fish or changing the species or stock of fish. For example, hybrid striped bass are stocked by VDGIF in Claytor Lake in Pulaski County, Virginia.[33] They have been stocked there since 1992 and are stocked each year. VDGIF reports that many of the fish from the earliest stockings are 3.6-5.4 kg (8-12 pounds) today. The hybrids can tolerate higher water temperatures, and live at similar depths and locations as striped bass. Their diet is very similar to striped bass so they can be caught using the same techniques.

Conclusion

26. In conclusion, I agree with the statements made by Mr. Bolin and Dr. Ryan regarding the potential impacts on striped bass related to the postulated operation of one or two additional units at the North Anna ESP site. There are no striped bass in the North Anna River downstream of the dam that would be affected by the thermal discharge from postulated Unit 3. There will be no thermal impacts from the fourth unit as proposed because dry cooling towers would result in no thermal discharge to Lake Anna. Finally, the potential impacts to striped bass in Lake Anna are reasonably described in Dominion's ER because the potential thermal impacts would not be expected to destabilize the recreational fishery. Finally, as discussed above, potential impacts to the striped bass fishery in Lake Anna can be mitigated.

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[33] *See* <http://www.dgif.state.va.us/fishing/lakes/claytor_lake/>, last accessed April 29, 2005 (appended hereto as Attachment Z).

26. The information presented above is true and correct to the best of my knowledge and belief.

Duane A. Neitzel

Sworn and subscribed to before me this 2 day of May 2005.

Notary Public

CHRISTY KRUL
Notary Public
STATE OF WASHINGTON
My Commission Expires 12-22-08

My Commission expires: 12/22/2008

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)	)	ASLBP No. 04-822-02-ESP

CERTIFICATE OF SERVICE

I hereby certify that copies of the "NRC STAFF ANSWER SUPPORTING DOMINION'S MOTION FOR SUMMARY DISPOSITION OF CONTENTION EC 3.3.2" in the captioned proceeding 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, or by overnight mail, as indicated by double asterisk, with copies by electronic mail this 11th day of May, 2005:

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: TSE@nrc.gov)

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

Office of Commission Appellate Adjudication
Mail Stop 0-16C1
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

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)

David R. Lewis, Esq.**
Robert B. Haemer, Esq.**
Pillsbury Winthrop Shaw Pittman, LLP
2300 N Street, NW
Washington, DC 20037
(E-mail: david.lewis@pillsburylaw.com
robert.haemer@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
1424 16th Street, NW #404
Washington, DC 20036
(E-mail: nirsnet@nirs.org)

Jonathan M. Rund, Esq.*
Law Clerk
Atomic Safety and Licensing Board Panel
Mail Stop: T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: JMR3@nrc.gov)

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)

Brooke D. Poole
Counsel for NRC Staff