RAS 9976

May 12, 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
	)	

INTERVENORS' RESPONSE TO DOMINION'S MOTION FOR SUMMARY DISPOSITION OF CONTENTION 3.3.2

I. INTRODUCTION

Intervenors Blue Ridge Environmental Defense League, Nuclear Information and Resource Service, and Public Citizen (collectively, "Intervenors") hereby respond to and oppose Dominion Nuclear North Anna, LLC's ("Dominion") Motion for Summary Disposition of Contention EC 3.3.2, Impacts on Striped Bass in North Anna. Dominion has failed to demonstrate that there is no genuine issue as to any material fact regarding the adequacy of its analysis of the impact of the proposed reactors on striped bass in Lake Anna ("Lake") and downstream, or that it is entitled to summary disposition on questions of law. Consequently, Dominion's motion must be denied.

This response is supported by Intervenors' Statement of Material Facts in Dispute; an affidavit from Shawn Paul Young, a biologist and Manager of the Aquatic Animal Research Laboratory at Clemson University and soon to be a graduate of the Fisheries Sciences doctoral program (Ph.D. to be awarded May 13, 2005) (hereafter

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SECY-02

"Young Aff."); and the March 3, 2005 comments of the Virginia Department of Environmental Quality (VDEQ) on the Draft Environmental Impact Statement (DEIS) for an Early Site Permit at the North Anna site (referenced by and submitted with the Young Affidavit) (hereafter "VDEQ Comments").

II. STATEMENT OF ISSUE

As originally framed, contention EC 3.3.2 asserted:

> The ER does not adequately address the adverse impact of operating one or two additional reactors on fish and other aquatic life health in Lake Anna and the North Anna River. In particular, the ER does not adequately consider the four primary impacts of the proposed reactors to the fish and other aquatic life at Lake Anna and downstream; increased water temperature, impingement, entrainment, and downstream flow rates. In addition, the ER does not address conflicts between Dominion's proposals for water use and the requirements of the Clean Water Act ("CWA") and its implementing regulations. Finally, the ER does not address the cumulative impacts of proposed Units 3 and 4 on the already-stressed aquatic systems in Lake Anna and the North Anna River.

Dominion correctly points out that the Atomic Safety and Licensing Board (hereafter, "Board") only admitted a portion of this contention in its August 6, 2004 Memorandum and Order Ruling on Standing and Contentions. Dominion Nuclear North Anna, LLC (Early Site Permit for North Anna Site), LBP-04-18, 60 NRC 253 (2004). The Board found that a genuine issue of material fact adequate to support further inquiry presented itself with respect to the adverse thermal impacts on striped bass, but dismissed the other "generalized portions" of the contention regarding compliance with the Clean Water Act and "effects on other aquatic life." Id. at 271. Presumably for purposes of clarification, the Board chose to attach a "revised version of this contention incorporating this ruling" to its decision.

As clarified by the Board, the revised version of EC 3.3.2 is 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.

Id. at 276, App. A (emphasis added).

Dominion's attempt to characterize this ruling as limited to striped bass within Lake Anna, (Dominion's Motion for Summary Disposition (hereafter, "Motion") at p.3), should be rejected. The Board's dismissal of "generalized portions of the contention regarding the failure adequately to address the effect on other aquatic life...", (North Anna, 60 NRC at 271), has no bearing on the Board's own revision of the contention, which explicitly includes impacts on "striped bass at Lake Anna and downstream." Id. at 276, App. A. Therefore, the issue before the Board is whether there is no genuine issue as to any material fact regarding the adequacy of Dominion's analysis of the thermal impacts of the proposed reactors on striped bass in Lake Anna and downstream, including the lowest stretch of the North Anna River.

As explained in the attached Affidavit of Shawn Young and in the VDEQ Comments, Dominion has failed to perform an adequate analysis of impacts on the important spawning, egg development, and larval and juvenile rearing habitat of the native striped bass population that occurs in the lowest reaches of the North Anna River, approximately 25 miles below the Lake Anna Dam ("Dam"), and then throughout the upper reaches of the Pamunkey River (which is formed where the North Anna and South Anna Rivers join). Further, Dominion's analysis of impacts on striped bass within Lake Anna analyzes temperature and dissolved oxygen data for an insufficient range of depths within the Lake and an inadequate number of points along the reservoir to support

Dominion's conclusion that striped bass within the Lake will be only moderately impacted. Indeed, the limited information analyzed suggests that the impact on striped bass could be much more significant. Finally, Dominion's proposed mitigation as compensation for the impact on striped bass remains incomplete and speculative and has not been subjected to public review and comment of any sort whatsoever. Material issues regarding the adequacy of Dominion's consideration of impacts on striped bass clearly remain, and its Motion for Summary Disposition must be denied as a result.

III. APPLICABLE LEGAL STANDARD

10 C.F.R. § 2.1205 sets forth specific procedures to be applied to motions for summary disposition in informal hearings conducted pursuant to Subpart L of the NRC's Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders. 10 C.F.R. §2:1205(c) states that the standards for summary disposition set forth in Subpart G (formal) hearings shall also apply to motions for summary disposition brought in Subpart L proceedings. Subpart G, and 10 C.F.R. § 2.710 more specifically, set forth the standard to be applied, and that standard mimics the standard for summary judgment under Rule 56 of the Federal Rules of Civil Procedure: a motion for summary disposition should only be granted if the record clearly demonstrates that "there is no genuine issue as to any material fact and that the moving party is entitled to a decision as a matter of law." 10 C.F.R. § 2.710(d)(2).

Dominion faces a high burden of persuasion in this proceeding. "The party seeking summary disposition bears the burden of showing the absence of a genuine issue of material fact.... [T]he evidence submitted must be construed in favor of the party in opposition thereto, who receives the benefit of any favorable inferences that can be

drawn." Duke, Cogema, Stone and Webster (Savannah River Mixed Oxide Fuel Fabrication Facility), LBP-05-04, 2005 NRC LEXIS 16, at *11 (2005). In order to grant a motion for summary disposition, the record before the Board must demonstrate clearly that there is no possibility that a litigable issue of fact exists. Any doubt as to whether the parties should be permitted or required to proceed further requires a denial of the motion. General Electric Co., LBP-82-14, 15 NRC 530, 1982 NRC Lexis 223, at *4. (1982).

IV. ARGUMENT

A. The ER, the DEIS and Dominion's Motion Papers Fail to Include Adequate Analysis of the Impact of an Additional Reactor on Important Striped Bass Habitat Downstream of Lake Anna in the North Anna and Pamunkey Rivers

Dominion incorrectly asserts that "[t]here is no genuine dispute associated with striped bass downstream of the Dam", (Motion at p. 9), because "there is no striped bass population or fishery downstream of the Dam that would be impacted by thermal discharges from additional units." Dominion's premise and conclusion are both premature.

An extremely valuable native striped bass population utilizes the entire upper Pamunkey River and approximately two miles of the lower North Anna River before the North Anna joins with the South Anna River to form the Pamunkey. While Dominion correctly points out that there is no striped bass population between the Dam and the Fall Line, (Motion at p. 9; Bolin Aff. at ¶ 15), Dominion acknowledges that striped bass may reach the two mile stretch of the North Anna River just below the Fall Line before it joins with the South Anna to form the Pamunkey. Motion at p. 11; Bolin Aff. at ¶ 17. In comments that were incorporated into the VDEQ Comments on the DEIS, the Virginia

Department of Game and Inland Fisheries (VDGIF) stated that "downstream reaches of the North Anna [River] can be seasonally important for spawning and juvenile rearing." VDEQ Comments at p. 15.

Although, as Dominion points out, striped bass "are quite common" (Motion at p. 13), the importance of the striped bass population downstream of the Dam should not be understated. Chesapeake Bay striped bass populations have been subjected to heavy stresses from the deterioration of water quality and suitable habitat throughout their range, and large-scale efforts by federal, state, and tribal agencies, consuming millions of dollars, were needed to restore this anadromous species to its current status. Young Aff. at ¶ 7. The efforts have proven extremely successful, and the Pamunkey River sub-population of striped bass is now being used to culture striped bass for stocking in other waters of the Commonwealth. Id. This may help to explain why, as VDEQ points out in its comments on the DEIS, VDGIF "strives to stock Chesapeake strain striped bass in [Lake Anna] so as not to change the genetics of downstream populations." VDEQ Comments at p. 15.

A narrow range of various habitat conditions are essential to this striped bass population for successful spawning and survival during early life history stages (egg, larval and juvenile). Young Aff. at ¶ 13. The operation of dams and hydroelectric facilities can impact fish populations a great distance downstream by altering river systems and disrupting those ranges of essential habitat conditions. One such example is the Kootenai River in Idaho and Montana, where the operation of a dam has drastically impacted fish spawning and reproduction over 100 kilometers downriver of the dam, and has also changed the fish community structure. Young Aff. at ¶ 9. The synergistic

impact from the effects of increased thermal discharge from an additional reactor at the Lake Anna site and longer durations of low-flow conditions downstream of the Dam could adversely impact the downstream striped bass population at all of these life stages. Young Aff. at ¶¶ 8-14. Yet Dominion has failed to recognize – much less evaluate – the potential impacts from an additional reactor on this important striped bass population.

In early spring, adult striped bass migrate from the Atlantic coast to the freshwater rivers in which they were born in order to reproduce. Striped bass will only return to those rivers in which they were spawned to reproduce, creating a distinct sub-population. Young Aff. at ¶ 10. If proper spawning and rearing habitat is not available in these rivers, these fish will not seek alternative rivers in which to spawn due to an inherent instinct to spawn in their natal river. As a result, the sub-population may be reduced or lost. Id. Because adult striped bass cue on both temperature and flow to locate proper spawning habitat that will provide their eggs with optimal conditions for survival, the thermal fluctuations and increased drought conditions that would result from an additional reactor could adversely affect this population's spawning. Id. at ¶¶ 10-11.

Similarly, an additional reactor could adversely impact the egg stage of this population of striped bass. In order to optimize survival to the larval stage, striped bass eggs need a minimum flow velocity of 30 centimeters per second to remain suspended in the water column, and require water temperatures between 17 and 21° C (62.5 and 70° F). Young Aff. at ¶ 12. Increased thermal discharge could combine with the longer periods of minimum flow to adversely affect the egg development, especially during periods of drought. Id. at ¶¶ 8, 12.

The survival rate of larvae is considered to be the most crucial factor for the success of striped bass populations. Young Aff. at ¶ 13. Food availability and a temperature range of 18 – 21° C (64.5 – 70° F) are critical for larval survival. Id. Increases in thermal discharges and longer durations of low-flow periods can impact zooplankton and the other aquatic invertebrates upon which larval striped bass depend as a source of food. Id. For example, a study of a mayfly species – a preferred food of larval striped bass – found that the density of the mayfly larvae from a point in the North Anna River 32 kilometers (20 miles) below the Dam was only half that of the density of the same species' larvae found in the South Anna River. The authors concluded that the biggest cause of these negative impacts on larvae densities was temperature fluctuations. Young Aff. at ¶ 13. Thermal impacts on the primary food sources of larval striped bass can obviously lead to impacts on the striped bass, itself. Additionally, predation of striped bass in the early life history stages may increase if certain fish species that occupy a higher position on the food chain than striped bass larvae are made more abundant as a result of the increased thermal discharge. Id. at ¶ 13.

Failure to analyze a similar type of potential impact led to the denial of a motion for summary disposition in Private Fuel Storage, 54 NRC 231, 2001 NRC LEXIS 201 (2001). In that case, applicant Private Fuel Storage, L.L.C. (PFS) was seeking a permit to construct and operate an independent spent fuel storage facility in Skull Valley, Utah. The State of Utah (State) had intervened, contending that PFS had failed to adequately address potential impacts of construction, operation and decommissioning of the proposed facility on the ecology and species in the region surrounding the proposed site, and more specifically, upon peregrine falcons nesting on a nearby Waterfowl

Management Area. The State argued that PFS and the DEIS issued by the NRC staff had failed to assess some important factors that the State believed might have a significant impact upon the falcons, such as a risk of collisions with the increased traffic that the construction and operation of the facility would have upon a nearby highway (Interstate 80). Id. at *9, n.6.

Specifically, the State pointed out that the effects of a possible rise in the water level of the Great Salt Lake (GSL) had not been assessed. The higher water level "could force the falcon's wetland prey species inland to search for food, which may force the falcon to shift its foraging patters closer to nearby Interstate 80," increasing the risk of vehicle collisions with the falcon. Id. at *12. The Board concluded that the issue raised a genuine dispute about some material factual matters regarding the potential impact on the falcon. Id. at *14. "[S]till unsolved is the effect of a possible GSL water level change upon falcon traffic fatalities as a result of a change in falcon feeding patterns along Interstate 80." Id. The Board denied the motion relative to this factual matter and one other, ruling "these items [were] an appropriate subject for further evidentiary presentations." Id. at *15. The potential impacts to striped bass downstream of Lake Anna are much more direct than those discussed in PFS, but the failure to analyze those potential impacts is nearly identical.[1]

[1] Similarly, both the ER and the DEIS recognize that local governments are actively considering whether to seek permission to withdraw additional amounts of drinking water from the North Anna River. Yet neither Dominion nor the NRC staff evaluates whether that additional loss of water to the river system might contribute to the cumulative impact of thermal discharges on striped bass survival, especially in conjunction with water losses due to operation of unit three. The ER acknowledges that Hanover County is considering a proposal to withdraw 30 MGD from the North Anna River, an amount that exceeds normal low flow releases from the Dam and greatly exceeds drought releases. ER Rev. 3 (Sept. 2004), at p. 3-4-16. The ER concludes that such a withdrawal "does not appear feasible", id., and says no more. The DEIS blithely asserts that "[a]ny future conflicts over water use fall within the regulatory authority of the Commonwealth of Virginia." DEIS at p.7-3.

Finally, Dominion ignores the fact that striped bass juveniles frequently utilize upriver freshwater habitats throughout their first year, including the summer months. The early juvenile stage of striped bass occurs during the summer when high water temperatures would be of greatest concern. In order to survive, these juveniles require temperatures less than 27° C (80.6° F) with adequate invertebrate and small fish food sources, and adequate cover to avoid predation. Young Aff. at ¶ 14. Again, increased thermal discharges, as well as increased occurrence and duration of minimum flows discharged from the Dam, could impact the striped bass juveniles that occupy these upriver habitats during the summer months, and an assessment of the potential impact is warranted. Id. at ¶ 14.[2]

Due to the fact that striped bass spawning, egg development, and larvae and juvenile rearing begin to occur approximately 25 miles downstream of the Dam, and that these important life history stages all require a narrow range of habitat conditions to optimize success, an investigation of the potential adverse effects of an additional reactor on this native striped bass population is warranted. As VDGIF has pointed out, "downstream reaches of the North Anna [River] can be seasonally important for spawning and juvenile rearing." VDEQ Comments at p. 15. Yet Dominion has failed to undertake any real evaluation of the potential impacts on this important striped bass population. Dominion simply asserts that striped bass would not be affected "because the

[2] Reduced flows downstream and their contribution to possible thermal impacts is not an idle concern. "Prior to dam construction, flows of 25 cfs or lower would occur once every 10 years for about 10 weeks. Addition of Unit 3 would significantly increase the frequency of drought flows downstream, and the duration of those droughts. The change to drought flows once every 2.6 years, for median duration of 7 weeks, is a significant change from conditions prior to the plant/reservoir construction ... and demonstrates the need for cumulative analysis of impacts." VDEQ Comments at p. 6. Similarly, Virginia's Department of Water Resources "disagreed with the conclusion in the Draft EIS that these pre- and post-project flow alterations and their impact can be described as small or moderate. Instead, DWR would characterize these types of alterations as large." Id. at p. 8.

temperature of water released from Lake Anna in the spring is on the order of 65 ° F (well within the thermal tolerance of the striped bass), river flow is at its maximum, and any striped bass in the river are far downstream." Motion at p. 11 (emphasis added). These conclusory statements asserting that the striped bass will not be impacted are not supported by any detailed analysis, and Shawn Young recommends that such analysis be undertaken before conclusions about potential impacts on the downstream population of striped bass can be confidently reached. Young Aff. at ¶¶ 8-12. Moreover, because the statements are all based on springtime conditions, they completely ignore the occurrence of striped bass juveniles downstream of the Dam during the summer months. At a minimum, there is a genuine dispute as to material facts on this important issue. Dominion's cursory analysis is clearly inadequate, and its motion for summary disposition must be denied as a result.

B. Dominion's Analysis of Impacts on Striped Bass Within Lake Anna Is Incomplete

Turning to the striped bass population within Lake Anna itself, Dominion presumes that striped bass will "persist" because they "will continue to find cooler refuges even after Unit 3 commences operations." Motion at p. 13. However, the information upon which Dominion supports this claim is incomplete. First, the historical water quality data that Dominion presents in the ER lacks the detail necessary to accurately predict summer habitat availability and movement of striped bass. Young Aff. at ¶ 16. The profiles for surface water temperatures, surface dissolved oxygen concentrations and average seasonal temperature are presented only for a limited number of locations in the reservoir and do not reliably describe or reflect reservoir-wide

environmental conditions. Id. Moreover, while vertical profiles for seasonal averages of water temperature near the Lake Anna Dam are provided, no profiles of dissolved oxygen are given, and dissolved oxygen is a critical component in determining habitat suitability for striped bass. Id. Finally, the presentation of the summer habitat data should be broken down by month in order to sufficiently quantify and adequately assess the degradation of habitat that will occur as temperatures rise and dissolved oxygen is depleted in the deepest portions of the lake due to thermal stratification. Id.

VDEQ's Comments on the DEIS emphasize that "[s]triped bass habitat modeling is essential...to explain the potential of a new (third) unit and its impacts on striped bass habitat." VDEQ Comments at p. 16. To accurately model striped bass habitat availability, temperatures and dissolved oxygen concentrations for the entire water column must be present since striped bass utilize the deeper portions of the Lake. A proper analysis should include water temperatures and dissolved oxygen concentrations from the surface down to the substrate in 2-meter intervals. Young Aff. at ¶ 17. Dominion's failure to look at temperatures and dissolved oxygen concentrations at a sufficient number of points and depths along the reservoir severely restricts the conclusions that can be drawn from their limited analyses. Until such information is presented and analyzed, there can be no reasonable assessments of impacts upon the summer habitat of striped bass within Lake Anna. Id. at ¶¶ 15-17.

C. The Limited Information Upon Which Dominion Relies Demonstrates that the Impact on Striped Bass in Lake Anna Could be Large

Moreover, from the limited information upon which Dominion relies, the impact of an additional reactor at the North Anna site upon the availability of summer habitat for striped bass in Lake Anna could actually be quite serious. Summer habitat availability is

the most critical factor in the success of reservoir striped bass fisheries. Young Aff. at ¶ 18. It is clear that the growth of striped bass in Lake Anna is already reduced as the fish age due to poor summer habitat, and current summer striped bass habitat availability is tenuous at best. Young Aff. at ¶ 18. Bioenergetic stresses from summer water temperatures and dissolved oxygen concentrations in Lake Anna have led to lower summer ovary weights, condition factors, and body weights for the striped bass that inhabit it, as compared to striped bass inhabiting Smith Mountain Lake, a reservoir in Virginia that has adequate summer habitat. Id. at ¶ 20.

With striped bass already being affected in Lake Anna by a lack of suitable summer habitat, the increases in water temperatures that Dominion predicts will take place with an additional reactor could have a large impact on striped bass. Unsuitable habitat for striped bass consists of water temperatures greater than 30°C (86° F) in combination with dissolved oxygen concentrations less than 2.5 mg/L. Young Aff. at ¶ 18. According to Figure 5.3-10 in the ER (predicting water-quality profiles for Lake Anna with an additional reactor during the months of June through August), water temperatures would exceed 29°C (84.2° F) at all depths, and would exceed the 30°C (86° F) limit for suitable striped bass habitat at a depth of 0 to 40 feet, during these three months. Id. at ¶ 21. Tables 5.3-19, 20 and 21 in the ER include the month of September and show that striped bass may be exposed to temperatures greater than 26.6°C (80° F) from June to September for selected sites in the reservoir at all the depths listed. Id. at ¶ 21. Exposure of striped bass to water temperatures at these levels for that length of time poses a significant risk of summer die-offs that would be noticeable and could destabilize

important attributes of the striped bass fishery.[3] Id. As VDEQ concluded in its response to the staff's conclusion in the DEIS that impacts on striped bass in Lake Anna may be "moderate", "it is inconclusive whether the installation of a third unit *would* cause acute mortality from exacerbated summer habitat squeeze. It is also inconclusive, however, that such mortality *would not* occur." VDEQ Comments at p. 15 (emphases in original). As such, Dominion has failed to demonstrate that there is no genuine issue of material fact regarding the impact on striped bass within Lake Anna.

D. Dominion Improperly Attempts to Shift the Focus of the Contention to the Lake Anna Fishery at Large

As with Dominion's analysis of impacts on striped bass *downstream* of Lake Anna, significant questions remain about the adequacy of Dominion's assessment of the impact on striped bass within the Lake. This might explain Dominion's attempt in the latter half of its Motion to shift the focus of this proceeding away from the striped bass to the Lake Anna recreational fishery as a whole. After suggesting that the value of striped bass in Lake Anna is derived from, and equivalent to, the contribution of the fish to the value of the larger recreational fishery in Lake Anna, Dominion turns its efforts to analyzing impacts on that larger Lake Anna fishery. According to Dominion, since any impact on striped bass would not destabilize the Lake Anna fishery as a whole, Dominion concludes that it has adequately described the impact on striped bass as "moderate."

[3] As such, these impacts would qualify as "large" under the NRC's "standard of significance" rating system. This system for rating environmental impacts (in which an impact is classified as either "small", "moderate" or "large") was first adopted and used by NRC in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. Its applicability to evaluating environmental impacts in an EIS for an Early Site Permit, or even in an Environmental Report, has never been determined. Nonetheless, because it has been used both by Dominion in the ER and by the NRC staff in the DEIS, Intervenors apply its terminology here for the sake of uniformity. This should not be interpreted, however, as an admission that this rating system presents the standards that apply to any aspect of this ESP hearing.

As an initial matter, the admitted contention says nothing about impacts on the Lake Anna fishery. The admitted contention speaks only of striped bass, and Dominion's attempt to shift the focus to the larger Lake Anna fishery misreads the contention and improperly diverts attention from the matter at hand.

Moreover, even if we were to accept Dominion's attempt to make the Lake Anna recreational fishery the relevant resource for the purposes of this proceeding, a characterization of an impact as "moderate" under the NRC's rating system means that "[e]nvironmental effects are sufficient to alter noticeably, but not to destabilize, *important attributes of the resource.*" DEIS, p. xxii (emphasis added). There can be no doubt that striped bass are an important attribute of the Lake Anna recreational fishery. VDEQ's comments on the DEIS noted VDGIF's concerns that "[t]he nomenclature of the DEIS on native vs. non-native species appears to minimize the value of the striped bass fishery" (VDEQ Comments at p. 13), and that striped bass are "important to the recreational fishery in the lake." VDEQ Comments at p.12. Therefore, while the Lake Anna fishery itself might not be destabilized if striped bass are adversely affected, it is still an open question as to whether or not an "important attribute of that resource" – the striped bass – would be so destabilized (as detailed above). As a result, even Dominion's characterization of the impact on the *Lake Anna fishery* as "moderate" presents a genuine issue of material fact, as the impact upon that fishery depends upon the impact of the additional unit on the striped bass within the Lake.

E. It is Premature to Determine Whether Dominion's Mitigation Proposal Would Qualify as Full Mitigation

Dominion's final attempt to find a suitable point on which it can rest its motion lies in its argument that any potential impact on striped bass (and analysis thereof) is

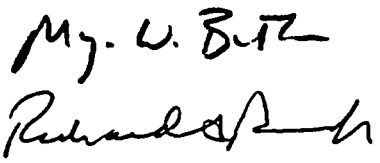
irrelevant because Dominion has committed to providing financial assistance to VDGIF to stock the Lake with a more thermally tolerant fish. Dominion claims "[t]his commitment mitigates any impact on recreational fishing." Motion at p. 15.

This argument again mistakes the scope of the contention. It is the impact on striped bass that is the focus of this proceeding, and *not* the impact on the Lake Anna fishery as a whole. Moreover, the hybrid proposal has not been sufficiently evaluated or finalized such that it can serve at this point as full mitigation for any impact on striped bass within the Lake. For example, in advancing VDGIF's position on the acceptability of a hybrid white/striped bass as an adequate replacement for the Chesapeake striped bass stocks within the Lake, Gary Martel of VDGIF sent a letter and an email to Dominion (both of which were included as exhibits to Dominion's Motion) which make it clear that VDGIF has not yet found a readily available source of the hybrid and that development of a sterile hybrid is still "being evaluated." Moreover, because the proposal is still in the most nascent of stages, it obviously has not been subject to scrutiny through public review and comment. The possibility that Dominion's proposal to stock the Lake with a hybrid may ultimately prove practicable is too uncertain at this point to be able to conclude that an impact on the Lake's striped bass (or even the Lake Anna fishery) would thereby be mitigated.

V. CONCLUSION

For the foregoing reasons, Intervenors respectfully submit that Dominion's Motion for Summary Disposition must be denied.

Respectfully submitted,



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INTERVENORS' STATEMENT OF MATERIAL FACTS IN DISPUTE, and RESPONSE TO DOMINION'S "STATEMENT OF MATERIAL FACTS ON WHICH NO GENUINE DISPUTE EXISTS"

VI. Material Facts in Dispute

Intervenors Blue Ridge Environmental Defense League, Nuclear Information and Resource Service, and Public Citizen (collectively, "Intervenors") submit, in support of their Response to Dominion's Motion for Summary Disposition, this Statement of Material Facts in Dispute.

1. The thermal discharges from an additional nuclear reactor unit at the Lake Anna site could negatively impact an important native striped bass population occurring approximately 25 miles downstream of Lake Anna in the lower reaches of the North Anna River and the upper reaches of the Pamunkey River.

2. Dominion has failed to adequately assess this potential impact in its Environmental Report ("ER") or in the papers and affidavits submitted in support of its Motion for Summary Disposition.

3. Dominion has failed to evaluate whether possible future water withdrawals from the North Anna River would exacerbate thermal impacts on striped bass occurring in the lower reaches of the North Anna River and the upper reaches of the Pamunkey River.

4. There is no data on historical striped bass summer distribution or habitat use in the ER that supports Dominion's assumption that striped bass will be able to find other suitable summer habitat after an additional unit goes into operation.

5. Dominion's analysis of potential impacts on striped bass within Lake Anna is inadequate to support the conclusion that the impact would be "moderate" at worst.

6. The impact of an additional reactor on striped bass within Lake Anna could be "large" in that it could potentially destabilize the Lake Anna striped bass fishery, and hence an important attribute of the larger Lake Anna recreational fishery.

7. The practicability of Dominion's proposal to stock the Lake with a hybrid white/striped bass to mitigate the impact on the Lake Anna fishery of the loss of the striped bass is too speculative at this point to conclude that an impact on the Lake Anna fishery from the loss of striped bass would thereby be mitigated.

VII. Response to Dominion's "Statement of Material Facts on Which No Genuine Dispute Exists"

1. Intervenors admit the assertion set forth in paragraph 1 of Dominion's Statement of Material Facts on Which No Genuine Dispute Exists (hereinafter "Statement").

2. Intervenors deny the assertions set forth in paragraph 2 of Dominion's Statement.

3. Intervenors deny knowledge or information sufficient to form a belief as to the truth of the assertions in paragraph 3 of Dominion's Statement.

4. Intervenors admit the assertions set forth in paragraph 4 of Dominion's Statement.

5. Intervenors admit the assertions set forth in paragraph 5 of Dominion's Statement.

6. Intervenors admit the assertions set forth in paragraph 6 of Dominion's Statement.

7. Intervenors deny knowledge or information sufficient to form a belief as to the truth of the assertions in paragraph 7 of Dominion's Statement.

8. Intervenors admit the assertions set forth in the first two sentences of paragraph 8 of Dominion's Statement, and deny knowledge or information sufficient to form a belief as to the truth of the remaining assertions in paragraph 8 of Dominion's Statement.

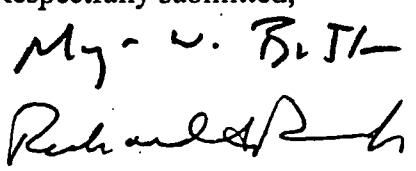
9. Intervenors deny knowledge or information sufficient to form a belief as to the truth of the assertions in paragraph 9 of Dominion's Statement.

10. Intervenors deny knowledge or information sufficient to form a belief as to the truth of the assertions in paragraph 10 of Dominion's Statement.

11. Intervenors admit that Dominion appears to have offered financial aid to assist in the development and stocking of a hybrid striped bass, but deny knowledge or information sufficient to form a belief as to the truth of the remaining assertions in paragraph 11 of Dominion's Statement.

12. Intervenors deny the assertions set forth in paragraph 12 of Dominion's Statement.

Respectfully submitted,



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COUNSEL FOR INTERVENORS BREDL, NIRS AND PUBLIC CITIZEN

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 on May 12, 2005, copies of the foregoing Intervenors' Response to Dominion's Motion for Summary Disposition were served on the following by first-class mail and, where indicated by an asterisk, by electronic mail.

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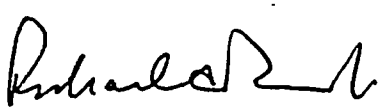

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Education

PhD Fisheries Sciences. **Expected May or August 2005.** Clemson University.
M.S. Fisheries. August 2001. Clemson University.
B.S. Environmental Studies. May 1996. Northland College, Ashland, WI.
Please See Attached Transcripts for Graduate and Undergraduate Coursework

Professional Experience

Biologist - Facility Manager (June 2000 – Present) Clemson University
Aquatic Animal Research Laboratory Clemson, SC 29634
Supervisor: Dr. Joe Tomasso (864) 656-2809. jtmss@clemson.edu

Position Description: I conduct research and manage facilities at a leading fisheries/aquaculture research laboratory that specializes in identifying and describing habitat requirements and affects of biotic and abiotic factors that influence fish and aquatic invertebrate health, physiology, behavior and population dynamics. I have conducted research on habitat requirements of marine, estuarine, anadromous, and freshwater species at the larval, juvenile, and adult life-history stages. For several studies, I have modeled the affects of biotic and abiotic factors such as temperature, salinity, dissolved oxygen, total ammonia, nitrite, heavy metals, feed rations, and population density on the health, survival, growth, condition, and behavior of numerous fish species.
Knowledge, Skills, and Abilities:

- Knowledge of fish and aquatic invertebrate physiology, ecology, health, and care.
- Supervise/assist primary researchers, graduate assistants, and student workers.
- Experimental techniques - tissue sampling, blood chemistry and osmolality.
- Assist in statistical analysis, technical writing, and presentation of research for publication in peer-reviewed journals and at professional meetings *(please refer to Publications and Presentations)*.
- Construction and repair of re-circulating and flow-through culture systems.
- Plumbing, electrical, carpentry, general construction, and mechanical repair.
- Water quality monitoring.
- Budgeting; record and data storage; maintain lab protocols and operating procedures.

Graduate Research Assistant (June 1999 – Present) Clemson University
SC Cooperative Fish and Wildlife Research Unit Clemson, SC 29634
Major Advisor: Dr. Jeff Isely (864) 656-1265. jisely@clemson.edu

Position Description: At present, I am conducting research to determine dispersal, survival, and behavior of striped bass live-released from fishing tournaments. I recently completed research quantifying diel and seasonal striped bass behavior in relation to changes in habitat/water quality at a large hydropower facility. I also have proposed lab experiments to evaluate temporal effects

of transmitter implantation on fish behavior and sub-lethal physiological effects. I recently completed a manuscript to utilize traditional and new methodology to estimate mortality rates from telemetry data and tag return data. I have also conducted research to identify and describe the critical environmental factors that affect the health and survival of striped bass and the quality of habitat in a major hydroelectric impoundment on the Savannah River. I studied the relationship between reservoir processes and critical fish habitat. I tracked fish movement and habitat selection. I also modeled the reservoir water quality dynamics to determine seasonal distribution, habitat use, and movement of striped bass in relation to environmental conditions (temperature and dissolved oxygen) over a two-year period. The study resulted in a master's thesis and a peer-reviewed publication *(please refer to Publications)*.

Knowledge, Skills, and Abilities:

- Assisted with other graduate projects:
  - Habitat use by striped bass in relation to seasonal changes in water quality.
  - Largemouth bass movement in Steele Creek-Savannah River Nuclear Reservation.
  - American shad population estimation and passage at Savannah River Lock and Dam.
  - Robust redhorse/Savannah River sucker species ecology: Behavior and habitat use.
  - Shortnose sturgeon ecology: Behavior and habitat use.
- supervise and conduct long-term telemetry studies.
- surgical implantation of telemetry devices.
- procedures and methodology for long-term habitat/ water-quality modeling and monitoring.
- Electrofishing.
- supervise fieldwork volunteers.
- data management, statistical analysis, technical writing for dissertation and thesis completion, publication in peer-reviewed journals, and presentation of project results at professional and public meetings *(please refer to Publications and Presntations)*.

Previous Professional Experience

Fisheries Field Technician (October 1997 - May 1999) Idaho Department of Fish and Game
Kootenai River Research Project 2750 Kathleen Ave
Supervisor: Vaughan Paragamian (208) 769-1414 Couer d' Alene, ID 83805

Position Description: I conducted research identifying and describing the critical environmental processes affecting the health and survival of burbot, salmonids, and white sturgeon in the Kootenai River Drainage in the Upper-Columbia River Basin. I assisted with research studying the relationships between hydroelectric generation/river processes on the biotic and abiotic factors that affect fish health, survival, behavior, and population dynamics in the Kootenai River system. I also conducted research to estimate spawning population, spawning-site selection, spawning behavior, and recruitment of fishes in the Kootenai River.

Knowledge, Skills, and Abilities:

- Radio and ultrasonic telemetry; and implantation of telemetry transmitters
- Screw trap operation - population estimates of spawning adults and out-migrating juveniles
- Backpack and boat electrofishing

- Aging and preparing otoliths and scales
- Construction of electro-fishing systems
- Data management and analysis for project reports.
- Use of hook and line, set-lines, hoop nets, and gill nets to capture fish.
- Collection of morphometric data, fin ray clips and blood.
- Evaluation of stream and river habitat, and flow velocity profiles.
- Collection of juvenile white sturgeon stomach contents for a diet analysis.
- Collection of eggs with artificial substrate.
- Benthic trawls to collect larval white sturgeon.
- Sorting and identification of aquatic invertebrates.
- Operation, trailering, and maintenance of jet, prop, inboard, fiberglass, and aluminum boats.

Fisheries Bio-Aide (April 1997 – September 1997)
District Fisheries Management
Supervisor: Ed Schriever (208) 799-5010

Idaho Department of Fish and Game
1550 Warner Drive
Lewiston, ID 83801

Position Description:
I conducted numerous salmonid population estimates using electro-fishing surveys in rivers, streams and reservoirs with backpack units and boat units. I conducted gill net and trap net surveys; back-country snorkel surveys; mountain lakes amphibian surveys. Other duties included education workshops, data entry and analysis, scale aging, and equipment maintenance.

Fisheries Volunteer (Sept 1996 – Dec 1996)
Supervisor: Michael Hoff & Charles Bronte

USGS-BRD, Great Lakes Division
Ashland, WI 54806

Position Description:
I assisted with assessment of Lake Trout restoration efforts in western Lake Superior by using large-scale gill netting from a research vessel. Subsequent laboratory duties involved stomach diet analysis of Lake Herring by zooplankton and benthic organism identification.

Fisheries Crew Hand (November 1996)
Supervisor: Mike Gallinat

Red Cliff Tribal Fisheries
Red Cliff, WI

Position Description:
I assisted with gill net lifts and fish collection; collection of morphometric data of Lake Trout and Lake Whitefish in western Lake Superior.

Fisheries Aide (June 1996 – Sept 1996)
Supervisor: Teresa Wagner

US Forest Service, Superior National Forest
Tofte, MN

Position Description:
I conducted stream habitat surveys for creating GIS database of brook trout habitat and abundance throughout watersheds within the Superior National Forest.

Publications

Young, S. P., and J.J. Isely. In Press. Temporal and spatial estimates of adult striped bass mortality from telemetry and transmitter return data. North American Journal of Fisheries Management.

Young, S. P. and J.J. Isely. 2002. Striped bass annual site fidelity and habitat utilization in J. Strom Thurmond Reservoir, South Carolina-Georgia. Transactions of the American Fisheries Society. 131:828-837.

Young, S. P. Habitat utilization by striped bass in J. Strom Thurmond Reservoir. 2001. Master's Thesis. Clemson University. Clemson, SC.

Sowers, A. D., D. M. Gatlin, **S. P. Young**, J. J. Isely, C. L. Browdy, and J. R. Tomasso. In Review. Environmental ion requirements for the culture of *Litopenaeus vannamei* in water containing low concentrations of total dissolved solids.

Sowers, A. D. and **Young, S. P.**, J. R. Tomasso, and C. L. Browdy. In Review. Nitrite toxicity of juvenile pacific white shrimp, *Litopaenaeus vannamei*, in low salinity and mixed-salt environments.

Atwood, H.L.; **S.P. Young**, J.R. Tomasso, and T.I.J. Smith. 2004. Resistance of cobia, *Ranchycentron canadum*, juveniles to low salinity, low temperature, and high environmental nitrite concentrations. Journal of Applied Aquaculture 15:191-195.

Atwood, H.L.; **S.P. Young**, J.R. Tomasso, and T.I.J. Smith. 2004. Information on selected water quality characteristics for the production of black sea bass, *Centropristis striata*, juveniles. Journal of Applied Aquaculture 15:183-190.

Atwood, H.L.; **S.P. Young**, J.R. Tomasso, and C. L. Browdy. 2003. Survival and growth of pacific white shrimp, *Litopaenaeus vannamei*, postlarvae in low salinity and mixed-salt environments. Journal of the World Aquaculture Society 24:518-523.

Atwood, H.L.; **S.P. Young**, J.R. Tomasso, and T.I.J. Smith. 2003. Effect of temperature and salinity on survival, growth, and condition of juvenile black sea bass. North American Journal of Aquaculture 34:398-402.

Isely, J. J., **S. P. Young**, T. A. Jones, and J. J. Schaffler. 2002. Effects of antenna placement and antibiotic treatment on loss of simulated transmitters and mortality in hybrid striped bass. North American Journal of Fisheries Management. 22:204-207.

Atwood, H. L.; **S. P. Young**, J. R. Tomasso, and T.I.J. Smith. 2001. Salinity and temperature tolerances of black sea bass juveniles. North American Journal of Aquaculture 63:285-288.

Presentations

Young, S.P. and J.J. Isely. 2004. Temporal and spatial estimates of adult striped bass mortality from telemetry and transmitter return data. Annual meeting of the American Fisheries Society. Madison, WI.

Atwood, H.L.; **S.P. Young**, J.R. Tomasso, and T.I.J. Smith. 2004. Effect of temperature and salinity on survival, growth, and condition of juvenile black sea bass. 28th Annual Larval Fish Conference, Early Life History Section, American Fisheries Society. Clemson, SC.

Atwood, H.L.; **S.P. Young**, J.R. Tomasso, and T.I.J. Smith. 2004. Resistance of cobia, *Ranchycentron canadum*, juveniles to low salinity and low temperature. 28th Annual Larval Fish Conference, Early Life History Section, American Fisheries Society. Clemson, SC.

Young, S.P. and J.J. Isely. 2004. Striped Bass Research – Behavior and Habitat Use. Clarks Hill Striper Fishing Club. Augusta, GA.

Young, S.P. and J.J. Isely. 2004. Temporal and spatial estimates of adult striped bass mortality from telemetry and transmitter return data. Annual meeting South Carolina Chapter, American Fisheries Society. Baruch Institute, SC.

Young, S.P. and J.J. Isely. 2004. Diel striped bass behavior in relation to diel changes in water quality in J. Strom Thurmond Reservoir, SC-GA. Annual meeting Georgia Chapter, American Fisheries Society. Athens, GA.

Young, S.P. and J.J. Isely. 2004. Temporal and spatial estimates of adult striped bass mortality from telemetry and transmitter return data. Annual meeting Georgia Chapter, American Fisheries Society. Athens, GA.

Young, S.P. 2003. Life skills training for hatchery fish: Social Learning and Survival. Department of Biological Sciences Discussion Group. Clemson University.

Young, S.P. 2003. Mechanisms for learning during early life stages of fish: Imprinting, Homing, and Conspecific Learning. Case study: Transplant/Restoration of an American Shad Population. Department of Biological Sciences Discussion Group. Clemson University.

Young, S.P. 2002. Strain-specific characteristics to manage sub-populations of fish species. Case Study: Lake trout restoration in Lake Ontario. Department of Biological Sciences Discussion Group. Clemson University.

Young, S.P., J.J. Isely, and C.W. Bales. 2001. Habitat Utilization by Striped Bass in J. Strom Thurmond Reservoir. Clark Hill Striped Bass Club. Clark Hill, SC.

Young, S.P. 2001. Habitat Utilization by Striped Bass in J. Strom Thurmond Reservoir. Master's Thesis Seminar. Clemson University. Clemson, SC.

Young, S.P., J.J. Isely, and C.W. Bales. 2001. Habitat Utilization by Striped Bass in J. Strom Thurmond Reservoir. Striper Kings Fishing Association. Greenville, SC.

Young, S.P., J.J. Isely, and C.W. Bales. 2001. Habitat Utilization by Striped Bass in J. Strom Thurmond Reservoir. Annual Mid-year meeting of the Southern Division of the American Fisheries Society. Jacksonville, FL.

Young, S.P., J.J. Isely, and C.W. Bales. 2001. Habitat Utilization by Striped Bass in J. Strom Thurmond Reservoir. Annual meeting Georgia Chapter of the American Fisheries Society. Athens, GA.

Young, S.P., J.J. Isely, and C.W. Bales. 2001. Habitat Utilization by Striped Bass in J. Strom Thurmond Reservoir. Annual meeting of the South Carolina Fisheries Workers Association. Sunset Beach, NC.

Young, S.P., J.J. Isely, and C.W. Bales. 2000. Seasonal Distribution and Habitat Use by Striped Bass in J. Strom Thurmond Reservoir. Clark Hill Striper Club. Clark Hill, SC.

Young, S.P., and J.J. Isely. 2000. Internal Implantation of Telemetry Devices. Mid-year meeting of the Southeastern American Association for Laboratory Animal Science. Savannah, GA.

Young, S.P., J.J. Isely, and C.W. Bales. 2000. Habitat Utilization by Striped Bass in J. Strom Thurmond Reservoir. South Carolina Fisheries Workers Association. Clemson, SC.

Young, S.P., J.J. Isely, and C.W. Bales. 2000. Habitat Utilization by Striped Bass in J. Strom Thurmond Reservoir. Annual Mid-year meeting of the Southern Division of the American Fisheries Society. Savannah, GA.

Awards

- 2004 Animal Research Committee Excellence Award, Clemson University.
- 2003 Outstanding Classified Employee Award-
  College of Agriculture, Forestry, and Life Sciences, Clemson University
- 2003 Employee Performance Bonus Award, Clemson University.

- 2003 Animal Research Committee Excellence Award, Clemson University

Professional Membership

- American Fisheries Society (General Member)
  - Fisheries Management Section Member
  - Physiology Section Member
  - Genetics Section Member
  - Fish Health Section Member
  - Water Quality Section Member
  - Fish Culture Section Member
- South Carolina Chapter of AFS
- Clemson Student Subunit of AFS – Current President
- South Carolina Fisheries Workers Association
- World Aquaculture Society

Environmental Advocacy Membership

- The Nature Conservancy
- Sierra Club
- Natural Resources Defense Council
- Trout Unlimited
- World Wildlife Federation
- The Ocean Conservancy
- Rainforest Alliance
- Jane Goodall Institute
- American Rivers

Professional References

Dr. Joe Tomasso
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Professor of Aquaculture and Fisheries
132 Long Hall, Clemson University
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(Major Advisor)
Professor of Fisheries, Assistant Unit Leader
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G20C Lehotsky Hall, Clemson University
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May 10, 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 SHAWN PAUL YOUNG, PH.D.

County of Pickens)
) ss.
State of South Carolina)

BACKGROUND

1. My name is Shawn Paul Young, Ph.D., (all requirements for Ph.D. are complete and degree will be officially granted May 13, 2005). I am a fisheries biologist and research facility manager for Clemson University. My business address is 132 Long Hall, Clemson University, Clemson, SC 29634.

2. My professional and educational experience is summarized in the curriculum vitae attached to this affidavit. I received a B.S. in Environmental Studies from Northland College, and a M.S. in Aquaculture, Fisheries, and Wildlife Biology from Clemson University. I have completed all requirements for a Ph.D. in Fisheries and Wildlife Sciences from Clemson University, and I will be officially granted the degree on May 13, 2005. I have nine years experience researching the affects of hydroelectric facilities and reservoir management on both introduced and native fisheries, including six years

experience studying reservoir striped bass behavior and habitat use in relation to water quality. In addition to my professional qualifications, I am an avid outdoorsman and have fished, hunted, and enjoyed nature in every manner since my early childhood.

3. I have completed four major peer-reviewed publications derived from my thesis and dissertation research in the subject area of reservoir striped bass populations. Two manuscripts have been published, and two will soon begin the review stage for publication within the journals of the American Fisheries Society, the preeminent professional society for fisheries scientists, of which I am an active member. I have been consulted by state, federal, academia, and public sectors in the subject area of striped bass ecology. I have presented scientific presentations on the subject at 10 professional meetings as well as 5 times as an invited speaker to citizen fishing associations. At Clemson University, I was honored with an outstanding employee award in 2003, and the fisheries research facility under my management has twice received facilities excellence awards.

4. I am familiar with the application of Dominion Nuclear North Anna, LLC ("Applicant" or "Dominion") for an Early Site Permit ("ESP") at the North Anna ESP site, the Environmental Review ("ER") and the Nuclear Regulatory Commission's Draft Environmental Impact Statement ("Draft EIS"), and with Dominion's Motion for Summary Disposition ("Motion"). I have reviewed materials and data provided within the documents describing the changes in thermal regime, flow patterns, reservoir discharge/flow into North Anna River, and occurrences of low flow/drought-like conditions pertaining to the striped bass populations and aquatic organisms of Lake Anna, the North Anna River, and the Pamunkey River.

5. I am providing this affidavit in support of Public Citizen's contentions outlined in Contention EC 3.3.2 -- Impacts on Striped Bass in Lake Anna. My affidavit explains justification for the contentions stated and the request that additional habitat modeling be performed to properly evaluate potential affects of the proposed additional units on striped bass within Lake Anna and downstream through the Pamunkey River. I have extrapolated my knowledge and experience in this subject matter to the scenarios and data explained and detailed within the ER, the Draft EIS, and related documentation, and I have arrived at conclusions dealing with the matters stated herein and believe them to be true and correct.

THERE IS A NATIVE STRIPED BASS POPULATION AND OTHER HIGHLY IMPORTANT ANADROMOUS FISH POPULATIONS DOWNSTREAM OF LAKE ANNA UPON WHICH POTENTIAL IMPACTS OF AN ADDITIONAL UNIT HAVE NOT BEEN ASSESSED

6. Dominion has stated that there is no striped bass population or fishery in the North Anna River between the Dam ("km 200"-indicates distance from the mouth of York River, Chesapeake Bay) and the Fall Line ("km 157", about 25 river-miles downstream of the Dam). I do not disagree with that statement in terms of a permanent resident population. In addition, Dominion has also stated that "there is no striped bass population or fishery downstream of the Dam that would be impacted by thermal discharges from additional units." However, Dominion failed to recognize the highly successful native striped bass population that utilizes the upper Pamunkey River for suitable habitat for successful spawning and survival during early life history stages (egg, larval, and juvenile) (Bilkovic et al. 2002). In addition to the upper Pamunkey River, Mr. Bolin's affidavit submitted with Dominion's Motion acknowledges in paragraph 17 that there is a small stretch of the North Anna River (about 2 river miles in length) below the

Fall Line, before it joins the South Anna to form the Pamunkey, that is accessible to spawning striped bass. In addition to striped bass, another important native fishery, American Shad, also utilizes the upper Pamunkey River and possibly the lower North Anna River for spawning and survival during early life history stages (Bilkovic et al. 2002).

7. Large-scale efforts by federal, state, and tribal agencies, consuming millions of dollars, were needed to restore these anadromous species to their current status. The efforts were successful, and the Pamunkey River population of striped bass is being used by the Commonwealth of Virginia to culture striped bass for stocking in other reservoirs, lakes and rivers in the state. Chesapeake rivers contribute 50 – 90% of the striped bass in the Atlantic coastal striped bass fishery (Bain and Bain 1982; Fay et al. 1983), of which the Pamunkey River population is one of the most important. Striped bass have been the most important species commercially, recreationally, and culturally in the Atlantic United States since the colonial days, as Congress recognized when it enacted the Atlantic Striped Bass Conservation Act in 1984 and amended it in 1997.

8. Increased thermal discharges and reduced flows discharged into the North Anna River would mimic drought-like conditions, and this warrants investigations of potential impacts on the downstream striped bass population during the adult spawning, egg, larval and juvenile stages. Due to Dominion's failure to recognize that potential impacts may extend to a short stretch of the North Anna River and then on into the main-stem Pamunkey River, and given the importance of the striped bass and other native anadromous fish species, investigations of downriver impacts should be conducted.

9. Potential impacts to downstream striped bass may begin in the lower stretch of the North Anna River in terms of thermal discharge and low-flow, and then extend into the Pamunkey River. Proper water temperature, flow rates, and food availability are all necessary for successful reproduction. Potential impacts from additional reactors at North Anna include variable water temperature and flow rates affecting spawning of adult striped bass, reduction of flow rates needed for eggs to mature after release, and changes in community structure of aquatic invertebrate and vertebrate populations that serve as the food source for the larval and juvenile striped bass. The increased summer temperatures and increased duration of low-flows downriver may affect juvenile striped bass that utilize this freshwater habitat during their first summer. In altered river systems, fish populations a great distance downstream of dams and hydroelectric facilities are still affected throughout the down-river continuum. One such example is the Kootenai River, Idaho-Montana, where the operation and presence of a dam has drastically impacted fish spawning and reproduction over 100 km down-river, and has also changed the fish community structure (Paragamian et al. 2001; Paragamian 2002; Paragamian and Wakkinen 2002). Evaluations must be extended to the North Anna River and the main Pamunkey River due to the downriver continuum.

10. Adult striped bass migrate to their natal freshwater rivers in early spring. Striped bass are an anadromous species that spend their adult stage along the Atlantic coast, and then return to their natal rivers – the freshwater rivers where they were born – in order to reproduce. This phenomenon seen in many anadromous species is termed imprinting. Species that imprint to natal rivers require additional attention by resource management. Striped bass spawned in the Pamunkey River will only return to the Pamunkey River to

reproduce, creating a sub-population distinct to the Pamunkey River. This is also true for other anadromous species such as American shad. If proper spawning and rearing habitat is not available in the Pamunkey River, these fish will not seek alternative rivers due to an inherent instinct to spawn in their natal river, and the population may be reduced or lost as a result.

11. Adult striped bass spawning in the Pamunkey River may be impacted by the increased thermal discharge and reduced flows discharged from the Lake Anna dam that are detailed in the ER and Draft EIS. The increased occurrence and duration of reduced discharges (lower flows) as described in the ER and Draft EIS may further exacerbate the potential impact of increased thermal discharge. This can impact striped bass because adults cue on the combination of temperature and flow to locate proper spawning habitat that will allow their eggs optimal conditions for survival. Another concern is that during drought conditions if water levels drop, the Lake Anna facility may have to cease operation. This scenario is stated to increase with additional units. If facility operation becomes sporadic during drought conditions, thermal fluctuations and fluctuating flows may have adverse impacts on downstream spawning of fish species.

12. To optimize survival to the larval stage, striped bass eggs need a minimum flow velocity of 30 centimeters per second (roughly 1 foot per second) to remain suspended in the water column, coupled with water temperatures of 17 – 21°C (Fay et al. 1983). The critical factor for striped bass egg survival is current velocity (Bain and Bain 1982). The egg stage lasts 48 hours. Increased occurrence of minimum flows from the Dam and increased duration of these low flows, especially during drought conditions, may have adverse impacts on the egg stage of adult striped bass and warrants investigation.

13. Larval survival rate is considered to be the most crucial factor for future abundance of striped bass populations (Bain and Bain 1982; Fay et al. 1983). Striped bass larval stage lasts 30 – 80 days depending on water temperature and nutritional state (Fay et al. 1983). Food availability in combination with temperatures 18-21°C is very important for larval survival. Changes in zooplankton and other aquatic invertebrates -- the preferred food of larval striped bass -- may occur with changes in thermal discharge and reduced flows. One such case has been documented on the North Anna River. Kondratieff and Voshell (1981) found that the density of larvae from an aquatic invertebrate (a mayfly species) in the North Anna River 32 km below the Dam was only half of that found in the free-flowing South Anna River. Kondratieff and Voshell concluded that the negative impacts on larvae densities were due to alterations of the temperature regime, changes in flow rates, absence of an important type of aquatic vegetation, and lack of food, with temperature fluctuation being the most important factor. Additionally, if changes in other fish species' composition and abundance occur, predation of striped bass and other anadromous species in the early life history stages may increase. Due to the fact that striped bass spawning, egg development, and larvae rearing occur in and require a narrow range of conditions for success in the upper reaches of Pamunkey River and possibly a stretch of the lower North Anna River, investigations of potential adverse affect on the early life stages of striped bass are warranted.

14. Striped bass juveniles may utilize upriver freshwater habitats throughout their first year, including those native to the Pamunkey River (Austin et al. 2004). Water temperatures less than 27°C, adequate food availability in the form of aquatic invertebrates and small fish, and adequate cover to avoid predation are all necessary for

survival (Bain and Bain 1982; Fay et al. 1983). The early juvenile stage of striped bass would occur during the summer when high water temperatures would be of concern. Again, the increased thermal discharge and reduced discharges as modeled and stated in the ER and Draft EIS warrant investigation of potential impacts on juvenile striped bass in the Pamunkey River.

THE ER AND DRAFT EIS DO NOT INCLUDE ENOUGH INFORMATION, NOR APPROPRIATELY PRESENT THE INFORMATION PROVIDED, IN ORDER TO ALLOW FOR A REASONABLE ASSESSMENT OF IMPACTS ON STRIPED BASS WITHIN LAKE ANNA.

15. Dominion claims that the striped bass would simply move to other suitable habitat or cool water refuges to avoid habitat degradation due to increased thermal loads with additional units; however, there is no data on historical striped bass summer distribution or habitat use provided in the ER or Draft EIS to support this claim.

16. Historical water quality data is inappropriately presented and lacking in detail, which limits the accuracy of any predictions that can be made about summer habitat availability and movements of striped bass. Surface water temperatures, surface dissolved oxygen concentrations, and average seasonal temperature profiles from a limited number of locations in the reservoir are reported throughout the ER and Draft EIS, but they do not reliably describe or reflect reservoir-wide environmental conditions. Vertical profiles are provided for seasonal averages of water temperature near the Lake Anna dam, but no profiles of dissolved oxygen are given. Further, summer habitat data should be broken down monthly in order to quantify the degradation of habitat as temperatures rise and dissolved oxygen is depleted in the hypolimnion (deeper portion) due to thermal stratification.

17. I agree with the statement of the Virginia Department of Environmental Quality (VDEQ) in its comments dated March 3, 2005 on the Draft EIS that "[s]triped bass habitat modeling is essential...to explain the potential of a new (third) unit and its impacts on striped bass habitat." To accurately model striped bass habitat availability, temperatures and dissolved oxygen concentrations for the entire water column must be present since striped bass utilize pelagic (deeper portions) habitat. A proper analysis should include water temperatures and dissolved oxygen concentrations from the surface down to the substrate (bottom) in 2 meter intervals. The appropriate data is lacking in both the ER and the Draft EIS.

AN ASSESSMENT OF THE LIMITED INFORMATION AVAILABLE INDICATES THAT THE IMPACT ON STRIPED BASS IN LAKE ANNA COULD BE "LARGE".

18. Summer habitat availability is the most critical factor in the success of reservoir striped bass fisheries (Axon and Whitehurst 1985; Matthews 1985). Optimal summer habitat for reservoir striped bass is water temperatures less than 24°C in combination with dissolved oxygen concentrations greater than 5 mg/L; suitable habitat is water temperatures 24-30°C in combination with dissolved oxygen concentrations from 2.5-5.0 mg/L; and unsuitable habitat is water temperatures greater than 30°C in combination with dissolved oxygen concentrations less than 2.5 mg/L (Crance 1984; Coutant 1985). Mortality is known to occur above 24°C depending mainly on availability of dissolved oxygen and duration of exposure (Coutant 1985; Matthews et al. 1985; Zale 1990).

19. All parties involved acknowledge that Lake Anna currently supports a striped bass fishery, but that growth of striped bass is reduced as the fish age due to poor summer habitat. The Virginia Department of Game and Inland Fisheries ("VDGIF") has

described current summer striped bass habitat availability as "tenuous" at best, and I would agree with that statement based on the limited data presented in the ER and Draft EIS, as well as a Grimes publication (1993). Indeed, based on these materials, it is my opinion that because Lake Anna appears to already be lacking in optimal striped bass habitat, any increased thermal load could heighten thermal stress to a point where the impact on the striped bass fishery would be "large", as defined by NRC rules at 10 C.F.R. Part 51, Appendix B to Subpart A, n. 3. ("[E]nvironmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.")

20. The Grimes publication reported habitat analyses which indicated that summer temperatures and dissolved oxygen concentrations were stressful to striped bass in Lake Anna, and that the resulting bioenergetic stresses lead to lower summer ovary weights, condition factors, and body weight than those of striped bass in Smith Mountain Lake, another reservoir in Virginia which has adequate summer habitat.

21. According to Figure 5.3-10 in the ER (assessing the water-quality profiles for Lake Anna for the months of June through August as predicted with an additional unit), water temperatures would exceed 29°C at all depths, and would exceed the 30°C limit for suitable striped bass habitat at 0-40 feet in depth during the 3-month period. September should also be considered when evaluating summer habitat. When including the month of September, which is included in Tables 5.3-19, 20, and 21 of the ER for selected sites, striped bass may be exposed to temperatures greater than 26.6°C from June-September at all depths listed. Water temperatures at these levels for that length of exposure pose a significant risk of summer die-offs that would be noticeable and could destabilize important attributes of the striped bass fishery.

REVIEW OF VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY'S COMMENTS ON THE DRAFT EIS.

22. I have reviewed the comments provided by VDEQ dated March 3, 2005 on the Draft EIS, incorporating the comments of VDEQ's Division of Water Resources (DWR) and the Virginia Department of Game and Inland Fisheries ("VDGIF"), and I agree with their contentions and concerns. I find the following excerpts from their comments to be most important:

1. *"DWR disagrees with the conclusion in the Draft EIS that these pre- and post-project flow alterations and their impact can be described as small or moderate. Instead, DWR would characterize these types of alterations as large."*
2. *"Striped bass habitat modeling is essential in the Final EIS to explain the potential of a new (third) unit and its impacts on striped bass habitat."*
3. *"There also is the possibility that drought flow conditions could adversely impact downstream anadromous nursery areas."*
4. *"The balance of a major argument within the document centers on subjective speculation on whether the installation of Units 3 and/or 4 would present complications for fish populations. DGIF believes that such complications would occur. More likely at issue is not if complications would occur, for they almost certainly would; but the extent of such complications and the population-level impacts. Without extensive modeling, it is impossible to argue either point successfully. We recommend the application of sound scientific modeling to the decision process and that appropriate corrections based on model outcomes be incorporated in the Final EIS."*

I agree with the contentions and support the above statements. Overall, Dominion has neglected to recognize an overall lack of data and habitat modeling, has failed to properly address down-stream impacts in the North Anna and Pamunkey Rivers, and has failed to recognize the presence of the native striped bass population and other native anadromous species that rely on the upper Pamunkey River for reproduction.

Further affiant sayeth not.

Shawn P. Young

Shawn Paul Young, Ph.D.
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Subscribed and sworn to before me
this 16th day of May, 2005.

Notary Public
My Commission expires:

My Commission Expires Feb. 11, 2015

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RDB received 3/8/05

12/10/04

69 FR 71864

#39

COMMONWEALTH of VIRGINIA

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March 3, 2005

Mr. Michael Lesar
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U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

RE: Draft Environmental Impact Statement for an Early Site Permit at the North Anna ESP Site
DEQ-04-216F

Dear Mr. Lesar:

The Commonwealth of Virginia has completed its review of the Draft Environmental Impact Statement indicated above ("Draft EIS"). The Department of Environmental Quality is responsible for coordinating Virginia's review of federal environmental documents and responding to appropriate federal officials on behalf of the Commonwealth. The following agencies joined in this review:

Department of Environmental Quality ("DEQ")
Department of Game and Inland Fisheries
Department of Agriculture and Consumer Services
Department of Conservation and Recreation
Marine Resources Commission
Department of Historic Resources
Department of Mines, Minerals, and Energy
Department of Forestry

In addition, the following agencies, planning district commissions, and localities were invited to comment:

Department of Health
Department of Transportation
RADCO Planning District Commission

ESP Review Complete

Template = ADM-013

E-RIDS = ADM-03
Cc = J. Cushing (JXC9)
A. Williamson (AKW1)

Thomas Jefferson Planning District Commission
Rappahannock-Rapidan Planning District Commission
Louisa County
Orange County
Spotsylvania County
Town of Mineral.

First, we appreciate the efforts of Nuclear Regulatory Commission (NRC) staff in visiting reviewing agencies in Richmond for a discussion of the Early Site Permit process and related matters on January 19, 2005. The meeting was helpful to reviewers of the Draft EIS. We also appreciate the holding of the Public Hearing for this review on February 17.

The availability of the Draft EIS and the public hearing were announced in the Federal Register on December 10, 2004 (Volume 69, Number 237, pages 71854-71855).

Project Description

Dominion Nuclear North Anna, LLC ("applicant" or "Dominion") has applied to the Nuclear Regulatory Commission for an Early Site Permit at the North Anna Power Station site at Lake Anna. The Draft EIS considers the applicant's proposed site for two new nuclear reactor units. The proposed site is in Louisa County near Mineral, on the existing North Anna Power Station site which is on a peninsula on the southern shore of Lake Anna about 5 miles upstream from the North Anna Dam. The applicant is considering adding the new units to the two that are in place. Cooling water for the third unit would be drawn from the Lake; the fourth unit would use dry cooling towers (Draft EIS, pages 1-5 and 1-6, section 1.2). Three additional sites are considered in the Draft EIS: one is at the applicant's Surry Power Station in Surry County, Virginia; a second is at a U.S. Department of Energy site in Ohio; and a third site is at a Department of Energy site in South Carolina (Draft EIS, page 1.6, section 1.4; see also Chapter 8). The Nuclear Regulatory Commission's Early Site Permit would, if issued, allow the applicant to "reserve" the site for as long as 20 years for a new nuclear power unit, and possibly to undertake site preparation and preliminary construction activities (Draft EIS, page 1-1, section 1.1).

Based on the applicant's proposal to add two nuclear reactors to the site, the NRC has defined "bounding plant parameters' within which a future site design would be developed. The applicant has not selected a specific plant design for the new units, but will work within the "plant parameter envelope" ("PPE") to develop the early site permit. The early site permit ("ESP") will include a site redress plan, if issued (Draft EIS, page 1-5, section 1.2).

Environmental Impacts and Mitigation

1. Natural Heritage Resources. The Department of Conservation and Recreation has searched its Biotics Data system for occurrences of natural heritage resources in the project area. "Natural heritage resources" are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, significant geologic formations, and similar features of scientific interest. According to the Department of Conservation and Recreation, natural heritage resources have been documented in the project area. However, due to the scope of project activity and the distance to the resources, the Department of Conservation and Recreation does not anticipate that the activities pursuant to the Early Site Permit would adversely affect these natural heritage resources.

Under a memorandum of agreement between DCR and the Department of Agriculture and Consumer Services (VDACS), DCR represents VDACS in commenting on potential project impacts on state-listed threatened and endangered plant and insect species. VDACS has regulatory authority to conserve rare and endangered plant and insect species. The proposed project will not adversely affect such species, according to DCR. VDACS confirms this statement.

Because new and updated information is continually added to the Biotics Data System, NRC or the applicant should contact the Department of Conservation and Recreation's Division of Natural Heritage (Christopher Ludwig, telephone (804) 371-6206) for updated information if a significant amount of time passes before the foregoing information on natural heritage resources is used.

See also item 8, below.

2. Air Quality. According to DEQ's Division of Air Program Coordination, Spotsylvania County, one of the localities touching Lake Anna and potentially affected by this project, is designated for ozone non-attainment status under the Clean Air Act. For this reason, precautions are necessary to restrict emissions of volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) in undertaking project activities.

During construction, fugitive dust must be kept to a minimum by using control methods outlined in 9 VAC 5-50-60 et seq. of the Regulations for the Control and Abatement of Air Pollution. These precautions include, but are not limited to, the following:

- Use, where possible, of water or chemicals for dust control;
- Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials;

- Covering of open equipment for conveying materials; and
- Prompt removal of spilled or tracked dirt or other materials from paved streets and removal of dried sediments resulting from soil erosion.

In addition, if project activities include the burning of any material, this activity must meet the requirements of the Regulations for open burning (9 VAC 5-40-5600 et seq.), and it may require a permit (see "Regulatory and Coordination Needs," item 1, below). The Regulations provide for, but do not require, the local adoption of a model ordinance concerning open burning. The NRC or the applicant should contact appropriate local officials to determine what local requirements, if any, apply to open burning. The model ordinance includes, but is not limited to, the following provisions:

- All reasonable effort shall be made to minimize the amount of material burned, with the number and size of the debris piles;
- The material to be burned shall consist of brush, stumps and similar debris waste and clean-burning demolition material;
- The burning shall be at least 500 feet from any occupied building unless the occupants have given prior permission, other than a building located on the property on which the burning is conducted;
- The burning shall be conducted at the greatest distance practicable from highways and air fields;
- The burning shall be attended at all times and conducted to ensure the best possible combustion with a minimum of smoke being produced;
- The burning shall not be allowed to smolder beyond the minimum period of time necessary for the destruction of the materials; and
- The burning shall be conducted only when the prevailing winds are away from any city, town or built-up area.

3. Water Quality and Wetlands.

(a) Wetlands. The Draft EIS states, "a few small wetlands and two intermittent streams exist on the North Anna ESP site" (page 4-7, section 4.4.1), but no wetland delineation of the area has been accomplished. The Draft EIS also states, in several different places, that avoidance and minimization of wetland impacts will be practiced to the maximum extent practicable. Given the above information, however, DEQ cannot determine whether project activities would adversely affect wetland or stream areas subject to DEQ water permitting jurisdiction. For this reason, DEQ recommends that the applicant submit the following:

- a National Wetland Inventory (NWI) map identifying the project area;

- photographs of the intermittent streams;

- a confirmation of the wetlands delineation by the Army Corps of Engineers; and

- any other information pertaining to the location of wetlands or streams in or near the project area.

See "Regulatory and Coordination Needs," item 2, below.

(b) Permitting Guidance. Applicable regulations require a Virginia Water Protection (VWP) Permit as follows. If the activities to be pursued under the Early Site Permit involve one or more of those listed here, the applicant must apply to DEQ for a permit; see "Regulatory and Coordination Needs," item 2, below.

Except in compliance with a VWP permit, no person shall dredge, fill, or discharge any pollutant into, or adjacent to surface waters, or otherwise alter the physical, chemical, or biological properties of surface waters, excavate in wetlands, or ...conduct the following activities in a wetland:

1. New activities to cause draining that significantly alters or degrades existing wetland acreage or functions;
2. Filling or dumping;
3. Permanent flooding or impounding; or
4. New activities that cause significant alteration or degradation of existing wetland acreage or functions.

(See the VWP permit program regulations, 9 VAC 25-210-50.A.)

In the permit application review process, DEQ will evaluate the following, *inter alia*:

- Avoidance of wetland impacts;
- Minimization of wetland impacts;
- Amount, type, and location of compensatory wetland mitigation, based on the ecologically preferable alternative.

4. Water Resources: Flows, Drought, and Supply. The Draft EIS analyzes water resource and quality impacts considering the addition of the proposed Unit 3 as a once-through water-cooled unit and Unit 4 as a dry-cooled unit having negligible effects on water supply (page 5-3, section 5.3). DEQ's Division of Water Resources commented previously in regard to its concerns for the adequacy of Lake Anna as a source of cooling water for a third nuclear reactor; these concerns remain.

(a) Flows and Drought. Earlier discussions between the applicant, DEQ, and the Department of Game and Inland Fisheries resulted in the selection of 248 feet above sea level as the Lake Anna water level elevation that is representative of a hydrologic drought. Based upon historical data, this level would have a recurrence interval of once every 8.7 years, and it was agreed upon as being indicative of drought conditions. This matches closely other commonly used drought indicators (e.g., 7Q10) as an indicator of drought conditions in streams for water quality and discharge permit conditions. Table 1 (Draft EIS, page F-102) can be used to evaluate the recurrence intervals of droughts. The USGS publication referenced in that table discusses drought recurrence intervals ranging from once every 15 to once every 80 years. Using elevation 248 as an indicator, past Dominion records demonstrate that this level has been observed 3 times in the last 26 years, a reasonable expectation of the recurrence interval (8.6 years) for a drought. Addition of Unit 3 would increase the drought recurrence interval to every 2.6 years and more than double the total weeks of flows that are 20 cubic feet per second (cfs) or lower from 67 to 143. Median duration of drought flows of 20 cfs would be 7 weeks with the proposed Unit 3. Virginia State Water Control Board Bulletin #58 reviewed flow statistics for the gauge downstream at Doswell. Prior to dam construction, flows of 25 cfs or lower would occur once every 10 years for about 10 weeks. Addition of Unit 3 would significantly increase the frequency of drought flows downstream, and the duration of those droughts. The change to drought flows once every 2.6 years, for median duration of 7 weeks, is a significant change from conditions prior to the plant/reservoir construction (see item 4(b), below), and demonstrates the need for cumulative analysis of impacts.

(b) Water Supply. One of the major earlier concerns of DEQ's Division of Water Resources was the lack of an identifiable source of water for the proposed fourth reactor (Unit 4). The applicant has indicated, according to the Division, that the proposed Unit 4 would be air-cooled (see Draft EIS, page 5-3, section 5.3 as well); the Division would have no objection to an air-cooled unit. However, the fact that the fourth unit would be air cooled does not allay the Division's concern about the adequacy of Lake Anna as a water supply for a third nuclear reactor. The Division looked at other nuclear reactors along the East Coast to compare the water resources available to them with the water resources available at North Anna (see "Table 1," first enclosure to this letter). The conclusions drawn from that research are:

- Most of the intake locations are tidal and have an essentially unlimited water supply;

- Of the remaining locations, the North Anna location has the least abundant water supply, based on the average flow of a small watershed (342 square miles) and a medium-sized reservoir; and

- There is a limited number of nuclear power stations located on non-tidal rivers. In these cases, the power plants are on large rivers such as the Connecticut and the Susquehanna.

In fact, the only location remotely similar to North Anna's situation is the Oconee plants on Lake Keowee in South Carolina. However, immediately below Lake Keowee is Hartwell Lake, so the section of non-tidal stream affected by consumptive loss is very short.

(c) Cumulative Impacts and Downstream Effects. Cumulative impacts of the current and future units on downstream hydrology and biology need to be quantitatively evaluated before any determination can be made that effects of the proposed addition of reactors to the site are "small" (page 5-10, section 5.3.2, line 9). Two options exist to reduce the significant impacts on downstream resources, according to the Department of Game and Inland Fisheries:

- Change the trigger level of elevation (248 feet) to some lower elevation that has a recurrence interval of once every 8.7 years, or

- Have Unit 3 operate under dry cooling conditions, as is proposed for Unit 4.

(d) Frame of Reference for Flows. The Department of Game and Inland Fisheries and DEQ's Division of Water Resources requested the applicant to perform an Index of Hydrologic Alteration (IHA) analysis of pre- and post-project flows below the dam (see Draft EIS, page F-122 through F-125 and the tables on pages F-126 through F-133). The two state agencies had pre-dam conditions in mind when they addressed "pre-project" conditions in their earlier discussions with the applicant. However, the tables on pages F-126 through F-133 do not evaluate pre-dam conditions and therefore cannot be considered complete. Table 1 (pages F-126 and F-127) demonstrates significant shifts in frequency of lower flows and needs to be expanded to address conditions prior to the creation of the lake. The Division of Water Resources clarifies that by "pre-project," it meant no dam and no reactors; by "post-project," it meant the lake and three once-through cooling units. This Indicators study was requested in order to assess the cumulative impact of the existing and proposed project activities on the North Anna River. A cumulative analysis of impacts of the project does not start, in our judgment, with the existing lake conditions (i.e., the lake and two reactors) and then add, incrementally, the effects of operation of the proposed third reactor (so that the "post-project" condition is the lake and three reactors). However, the Nuclear Regulatory Commission has accepted this approach, which means that a finding of no more than "moderate" impacts of the third unit (page 5-10, section 5.3.2, lines 7-13) is not surprising even if cumulative impacts have not been analyzed.

Dominion provided DEQ's Division of Water Resources (DWR) with the output of a simulation model with which Division staff is able to make some comparisons of true pre- and post-project conditions. Prior to the lake, the North Anna River at the dam site had an average flow of about 286 cubic feet per second (cfs). This is based on the flow records from 1929 to 1971 at the Doswell gauge, proportionately reduced to reflect the smaller drainage area at the dam. According to the NRC water budget analysis, the two existing units account for 50 cfs in evaporation and the third unit would account for 26 cfs in evaporation. The cumulative impact on the average flow of just the power plants (not including lake evaporation) is therefore estimated to be 76 cfs or 26% of the historic average flow. Such a large loss of the normal flow to consumptive uses is unprecedented in Virginia and other mid-Atlantic states. The U.S. Geological Survey (USGS) estimates that the average percentage of surface water lost to consumptive use in the mid-Atlantic states is 1.6% of average flow. (USGS, 1984, National Water Summary)

DWR examined pre-dam gauge records and compared those streamflow records with projected releases with three reactors operating in a once-through cooling mode. This is not a true IHA analysis but it is presented in order to give some perspective of the magnitude of true pre- and post-project conditions.

- Prior to the project, flows at the dam site were less than or equal to 20 cfs only 4.2% of the time; with the third unit, flows are projected to be 20 cfs 11.8% of the time.

- Prior to the project, flows at the dam site were greater than or equal to 156 cfs 52% of the time (pre-dam Doswell gauge); with three units, flows will be less than or equal to 40 cfs 52% of the time (Draft EIS, page 5-12, section 5.4.1.3),

- Prior to the project, during the driest 14-month period on record (early May 1931 to early July 1931) streamflow in the North Anna River averaged 90 cfs over the 14 months. With the three units, the driest 14-month period (mid- September 2001 through mid-January 2003) streamflow in the North Anna River would average only 20 cfs.

DWR disagrees with the conclusion in the Draft EIS that these pre- and post-project flow alterations and their impact can be described as small or moderate. Instead, DWR would characterize these types of alterations as large.

(e) Preferences in Cooling Method. DEQ's Division of Water Resources prefers the once-through cooling process proposed for Unit 3 to a cooling tower because the once-through process results in less consumptive use of water than the cooling tower. This preference would result in larger impingement and entrainment losses (see item 7(c), below) and a larger heat load to the Lake than the cooling tower. DEQ's Division of

Water Resources recognizes that the cooling tower is not proposed in the Draft EIS, but some commenters may propose it as a solution to thermal loading and impingement and entrainment concerns. In any case, DEQ's Division of Water Resources would defer to DEQ's Division of Water Quality in regard to thermal impacts of any water-cooled units that might be proposed.

The once-through cooling process would also entail larger impingement and entrainment losses. DEQ's Division of Water Resources defers to the Department of Game and Inland Fisheries with regard to impingement and entrainment estimates; see item 8(c), below.

(f) Alternatives Analysis: Surry Power Station site versus North Anna site. The Draft EIS indicates that a first-stage of examination aims to determine whether any alternative site is environmentally preferable to the proposed site. Based on the results of this review, the NRC examines alternatives for other factors and decides whether an alternative site is "obviously superior" to the proposed site (Draft EIS, page 8-1). DEQ's Division of Water Resources believes that the Surry site is "superior" (as described in the Draft EIS) to the North Anna site based on the following reasons:

- the limited water resources in the North Anna River watershed;
- the amount of those resources that are already being consumed by lake evaporation and the forced evaporation from the existing two reactors; and
- the competition for those resources downstream.

It appears that water availability would not be an issue on the tidal James River at Surry. The Draft EIS says, "The consumptive use of water to support mechanical draft cooling towers would be undetectable relative to the supply in the estuary."

At two meetings with DEQ staff, NRC officials were asked why North Anna rather than Surry was being proposed for an early site permit. On both occasions, NRC staff cited aesthetics and the fact that the plant might be visible from Jamestown. However, the Draft EIS, in its discussion of aesthetics (pages 8- 32 and 8-33), does not indicate that there is any problem with aesthetics at Surry. In fact, the Draft EIS states that the Surry plant's "current structures are not visually obtrusive from any vantage point, even from across the James River. However Units 1 and 2 are visible from the highest amusement rides at Busch Gardens" (page 8-32). The concerns about aesthetics are not supported by statements in the Draft EIS.

Impingement and entrainment issues would be a greater problem at the Surry site than at Lake Anna. This is because the James River is an estuary at the Surry site.

However, the alternatives section states that reactors at Surry would be cooled with cooling towers (Draft EIS, page 8-15, section 8.5). As such, the impingement and entrainment problem would be less than if once-through cooling were to be used. On April 4, 2001, Dr. John Olney of Virginia Institute of Marine Resources wrote to Mr. Tony Banks of Dominion Power on the subject of impingement and entrainment at Surry while commenting on the re-licensing of the plant. In the letter Dr. Olney states, "Further, the available information on abundance and distribution of fishes at the site suggests that there is a low probability that water withdrawals at the plant are causing declines in federally managed species." Since Dr. Olney does not express concerns about a large once-through cooling water withdrawal, it appears that a cooling tower withdrawal, orders of magnitude smaller, would also not be a concern.

In conclusion, based on the information provided, two of the most important disadvantages of the Surry site (impingement and entrainment, and aesthetics), are not substantiated, while the main disadvantage of the North Anna site (water availability) appears extremely problematic. The DWR would have no concerns about this project if both the fourth and third reactors at North Anna were air cooled.

5. Solid and Hazardous Waste Management. According to DEQ's Waste Division, the Draft EIS addressed solid waste issues and sites to some extent, but did not address hazardous waste issues or sites, or include a search of waste-related data bases.

(a) Data Base Results. DEQ's Waste Division did a cursory review of its data files and determined that the North Anna Power station is listed as follows:

- "Vepco-North Anna" (identification number VAD000620237) in the CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) data base; no further remedial action is planned, according to the CERCLA listing.

- "Virginia Power North Anna" (identification number VAD065376279) in EPA's RCRA (Resource Conservation and Recovery Act) data base, as a small-quantity generator of hazardous waste.

The following web sites may be helpful in locating additional information for these identification numbers:

- http://www.epa.gov/echo/search_by_permit.html

- http://www.epa.gov/enviro/html/rcris/rcris_query_java.html.

(b) Solid Wastes. The Draft EIS indicates that solid waste would be handled in compliance with appropriate state and federal regulations (page 3-10, section 3.2.4). See the citations in item 5(c), next.

(c) Radioactive or Other Contaminated Waste. The Draft EIS indicated the potential risk of radioactive waste occurring on site after construction (pages 4-39, 4-40, 6-22, and 8-12). Any soil suspected of radioactive wastes or other contamination generated during construction-related activities (including site preparation) must be tested and disposed of in accordance with applicable federal, state, and local laws and regulations. These include, but are not limited to:

- Federal laws and regulations: Resource Conservation and Recovery Act (RCRA) (42 U.S.C. sections 6901 et seq.); U.S. Department of Transportation Rules for Transportation of Hazardous Materials (49 CFR Part 107); applicable regulations in Title 40, Code of Federal Regulations (CFR).

- State laws and regulations: Virginia Waste Management Act (*Virginia Code* sections 10.1-1400 et seq.); Virginia Hazardous Waste Management Regulations (9 VAC 20-60); Virginia Solid Waste Management Regulations (9 VAC 20-80); Virginia Regulations for the Transportation of Hazardous Materials (9 VAC 20-110).

(d) Demolition and/or Renovation of Structures. The discussion of the Site Redress Plan (Draft EIS, page 4-46) raises the potential for structures to be demolished or removed. These should be checked for lead-based paint and asbestos before any action takes place. If lead-based paints are found, NRC or the applicant must comply with the rules in the Virginia Hazardous Waste Management Regulations (9 VAC 20-60-261); if asbestos-containing materials are found, compliance with the Virginia Solid Waste Management Regulations (9 VAC 20-80-640) is required.

(e) Pollution Prevention. DEQ encourages NRC and the applicant to implement pollution prevention principles in all construction activities. This includes reducing wastes at the source, re-using materials, and recycling waste materials. Generation of hazardous waste should be minimized, and hazardous waste should be handled appropriately in keeping with the rules cited in item 4(c) above. See also item 9, below.

6. Erosion and Sediment Control; Stormwater Management.

(a) Erosion and Sediment Control Plans. If any activities pursuant to the Early Site Permit will disturb 10,000 square feet or more, the property owner is responsible for submitting a site-specific Erosion and Sediment Control Plan to the affected County for review and approval pursuant to the local Erosion and Sediment Control ordinance,

according to the Department of Conservation and Recreation. All regulated land-disturbing activities associated with the project, including on- or off-site access roads, staging areas, or spoil or borrow areas, must be covered by an approved Plan. The Plan, in turn, must be prepared and implemented in accordance with the Virginia Erosion and Sediment Control Law (*Virginia Code* section 10.1-563), the Virginia Erosion and Sediment Control Regulations (see 4 VAC 50-30-30, 4 VAC 50-30-100), and the *Virginia Erosion and Sediment Control Handbook*, which aids the project proponent in meeting the legal and regulatory requirements. See "Regulatory and Coordination Needs," item 5(a), below.

(b) Stormwater Management Plans. Depending on local requirements, a separate Stormwater Management Plan may also be required for land-disturbing activities. Stormwater Management Plans must be prepared and implemented in accordance with the Virginia Stormwater Management Law (*Virginia Code* section 10.1-603.3) and the Virginia Stormwater Management Regulations (4 VAC 3-20-90 through 3-20-141). See "Regulatory and Coordination Needs," item 5(b), below.

General information on recent changes to stormwater management requirements is available at the Department of Conservation and Recreation's web site:

- http://www.dcr.virginia.gov/sw/vsmp.htm#geninfo.

These changes include transfer of a related stormwater management program, the Virginia Pollutant Discharge Elimination System (VPDES) Stormwater General Permit for Construction Activities, from the Department of Environmental Quality to the Department of Conservation and Recreation. See "Regulatory and Coordination Needs," item 5(c), below.

7. Historic Structures and Archaeological Resources. The Nuclear Regulatory Commission is consulting directly with the Department of Historic Resources pursuant to section 106 of the National Historic Preservation Act. The Department expects this consultation to continue.

8. Wildlife Resources.

(a) Department of Game and Inland Fisheries Powers and Duties. The Department of Game and Inland Fisheries, as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over wildlife and freshwater fish, including state or federally listed endangered or threatened species, but excluding listed insects. The Department (hereinafter "DGIF") is a consulting agency under the U.S. Fish and Wildlife Coordination Act (16 U.S.C. sections 661 et seq.), and provides environmental analysis of projects or permit

applications coordinated through the Department of Environmental Quality, the Marine Resources Commission, the Virginia Department of Transportation, the U.S. Army Corps of Engineers, the Federal Energy Regulatory Commission, and several other state and federal agencies. DGIF determines likely impacts upon fish and wildlife resources and habitat, and recommends appropriate measures to avoid, reduce, or compensate for those impacts.

(b) Department of Game and Inland Fisheries Assessment. DGIF continues to have reservations about the impacts of proposed Unit 3 on the lake and downstream resources. The Draft EIS does not address the main concerns outlined in the DGIF letter, dated January 27, 2004.

The nomenclature of the Draft EIS on native vs. non-native species appears to minimize the value of the striped bass fishery (Draft EIS, section 2.7.2.1, pages 2-33 through 2-40). Striped bass and other anadromous fish are native to the York River drainage and the North Anna River, while largemouth bass, bluegill, black crappie, walleye, and channel catfish are not. Nevertheless, all of these species are important to the recreational fishery in the lake.

(c) Impingement and Entrainment: Estimates. The Department of Game and Inland Fisheries (DGIF) applauds the applicant's use of "worst case" scenarios for estimating impingement and entrainment, and acknowledges the estimate of a 131% increase in the impingement rate for Unit 3 (Draft EIS, pages 5-13 through 5-18, sections 5.4.2.1 and 5.4.2.2). In developing the total estimate, data derived from 1979 through 1983 was added to worst-case Unit 3 operation. However, it is not clear whether the 1979-1983 values for Units 1 and 2 reflect current operating conditions and are valid. The Final EIS should indicate whether water volume pumped for these units has increased or decreased since the 1979-1983 study period, in light of the facts that plant operating time, efficiency, and volume of water pumped have all increased. In such case, the table reflecting the impacts of Units 1 and 2 (Table 5-1, page 5-17) needs to be revised to reflect current operating conditions.

(d) Entrainment and Impingement Recommendations. The Department of Game and Inland Fisheries recommends the use of state-of-the-art intake screens, as encouraged by the U.S. Environmental Protection Agency in recent screen recommendations. Specifically, the Department of Game and Inland Fisheries recommends openings of 1 millimeter (mm), and an intake velocity of 0.25 feet per second (fps) to protect aquatic life. This would greatly alleviate the impingement and entrainment issue, as would the use of a dry cooling tower.

(e) Presentation of Data. As indicated above (item 4(d)), the "pre-project" conditions should be based on the condition of the area before the lake and dam were

constructed in the 1970s. Table 1 in Appendix F (pages F-126 and F-127) is one example of this; it demonstrates significant shifts in frequency of lower flows and needs to be expanded to address conditions prior to creation of the lake.

(i) Tables in Chapter 5. The tables in Chapter 5 of the Draft EIS have several problems. Tables 5-4 through 5-6 (pages 5-22 through 5-24) reflect seasonal losses from March through July, so the "Yearly Totals" column is not appropriately named. To properly reflect yearly totals, losses for the remaining seven months need to be added to the table. If summer, fall, and winter data were not collected, that data may have to be extrapolated by the best fitting of a non-linear function to the available data. Only then can the full impacts of entrainment on important fish species begin to be addressed.

Tables 5-2 (page 5-18) and 5-5 (page 5-23) may have significant errors, or the reasons for the differences are not fully explained. For example, in Table 5-2, for Unit 3, January striped bass and bluegill numbers impinged are greater than in Units 1 and 2 (Table 5-1, page 5-17), but black crappie, gizzard shad, white perch, and yellow perch numbers are less than in Units 1 and 2. Similar discrepancies exist for other rows in the table, and for the cumulative Tables 5-3 and Table 5-6. These discrepancies should be explained further.

(ii) Characterization of Impacts on Fisheries. The Department of Game and Inland Fisheries disagrees with the assessment that the impact of Unit 3 upon gizzard shad, the most prevalent species, would be a "small" impact (page 5-21, end of section 5.4.2.2). As DGIF states:

> Gizzard shad are indeed a "prolific forage fish," but their abundance has been low in VDGIF samples in two recent years. This species is the primary forage for stocked pelagic predators (striped bass and walleye) and also supplements largemouth bass diet. Further declines in striped bass habitat (another contested issue) combined with potential reductions in the forage base could significantly impact this recreationally and economically important fishery. Section 5.4.2.2 estimates the impingement loss to the fish population as a percentage of the estimated total lake population as derived from cove rotenone. We applied this same technique to entrainment numbers and calculate that 6.8% of the gizzard shad and 87% of the black crappie are lost due to entrainment. When combined with impingement 7.7% of the gizzard shad and 93.9% of the black crappie numbers are killed by the intake structure. We do not consider losing almost 8 and 94% of these populations from an intake a small impact. Several problems exist with this approach and these need to be addressed. Lakes undergo eutrophication with age and that is occurring at Lake Anna as the watershed becomes more fully developed. As that occurs, the biomass of fish increases. The current biomass is undoubtedly higher than twenty years ago when the original entrainment/impingement analysis was conducted. The report uses cove rotenone data but does not account for spatial and temporal variation within that data. Within large reservoirs, biomass typically declines downstream through a trophic gradient. That is apparent from our routine sampling as well as historic rotenone data. The impacts of entrainment and

> impingement may be even more spatially and numerically significant in the lower lake where the numbers of fish are less than above the Rt. 208 bridge.

The Department points out that the conclusions regarding entrainment losses in the Draft EIS are not based on scientifically sound evidence. This is exemplified by the statement:

> Because the fish entrained most frequently are prolific, exhibit a high reproductive potential, and compensatory responses of the fish population occur to offset losses, the staff concludes that the impacts of entrainment would be SMALL [emphasis in the original].

(See Draft EIS, page 5-25, end of section 5.4.2.3.)

(iii) Recommendations. The Department of Game and Inland Fisheries recommends that the entrainment tables be corrected to reflect an actual annual loss. The discrepancies should be corrected and a much more rigorous spatial and temporal evaluation conducted before any conclusion can be reached that the effects of impingement and entrainment are small.

(f) Striped Bass Reservoir Habitat.

(i) Description and Habitat. The Department of Game and Inland Fisheries agrees with the descriptive statements on page 5-30, lines 24-33 of the Draft EIS. However, line 37 incorrectly states that striped bass are not native to this watershed. The use of nomenclature surrounding native vs. nonnative species appears to minimize the value of the striped bass fishery. This is incorrect. Striped bass are, in fact, native to the York River drainage and downstream reaches of the North Anna can be seasonally important for spawning and juvenile rearing. The lake population is correctly acknowledged as being supported by stocking. In recognition of this fact, the Department of Game and Inland Fisheries strives to stock Chesapeake strain striped bass in the reservoir so as not to change the genetics of downstream populations.

(ii) Impacts of Temperature and Flow Changes. An extensive amount of temperature data from historic monitoring of the lake was used to model thermal conditions at various locations in the lake. Despite that extensive data set, no modeling of summer striped bass habitat was conducted to support statements that the impacts would be small in normal years and moderate in drought years (Draft EIS, page 5-31, lines 18-19). In combination with the elevated temperatures and increased frequency of drought conditions (lowering to elevation 248) within the lake, the striped bass population could be stressed every 2.6 years. Based on the information in the Draft EIS, it is inconclusive whether the installation of a third unit *would* cause acute mortality from exacerbated summer habitat squeeze. It is also inconclusive, however, that such mortality *would not* occur. At some point, striped bass will begin to die as water quality declines (based primarily on higher water temperatures and lower dissolved oxygen).

Since no modeling of summer habitat was conducted, it is unknown whether the additive impacts of a third unit would allow reservoir conditions to reach this point, and the exact point at which this will occur is unknown; but to discount the possibility is subjective. Even with the elimination of Unit 4, the predicted maximum surface temperature increase at the dam of 3.6 degrees Fahrenheit could result in striped bass mortalities depending on the plume configuration, inflow, and stratification pattern. Striped bass habitat modeling is essential in the Final EIS to explain the potential of a new (third) unit and its impact on striped bass habitat.

(iii) Drought Comment. The following comment in the Draft EIS regarding droughts, "In such circumstances, mitigation to reduce the impact could be accomplished by stocking more fish, stocking larger fish, or managing the fishery to provide more catch opportunities of large fish," is incorrect and not a scientifically recognized fishery management solution. Such a comment does not recognize the biological and physical factors necessary for a successful striped bass population.

(g) North Anna River Fishery Issues. According to the Department of Game and Inland Fisheries, the downstream impacts to fisheries resources were ignored in the Draft EIS in spite of the increased frequency of low flows that a third water-cooled unit would produce. Currently, (with two units in the regulated "base scenario"), 67 weeks of drought conditions (20 CFS or less) out of a 26-year period would be expected. Given the addition of a third unit, the expected drought frequency would rise to 150 weeks (about 2.6 years).

(i) Analysis of Flows. The Tennant method is a common desktop method and summer flows in the 20-30% mean annual flow (MAF) range are beneficial for sustainable fisheries. Because it has been called the Montana Method, it has been deemed as only applicable in Western streams. That misconception is false, as it was developed "over the past 17 years from work on hundreds of streams in the states north of the Mason-Dixon Line between the Atlantic Ocean and the Rocky Mountains" (Fisheries 1(4): 6-10). Summer flows below the desired level of 68 cubic feet per second (cfs), or 20% of MAF, are the norm under current conditions and will worsen under future conditions. The Department of Game and Inland Fisheries recommended that an In-stream Flow Incremental Methodology (IFIM) Study be conducted to properly evaluate this project on the stream fauna. The expected increased frequency of drought flows to a common occurrence (2.6 years) is expected to have significant impacts. Conclusions need to be based upon sound scientific modeling. DGIF states that if Dominion can offer a better approach to modeling flow impacts, that Department would be happy to consider any alternative.

(ii) Impacts on River Resources. According to DGIF, the Draft EIS makes the following statement:

> ... long-term monitoring of the North Anna River has documented improvements in the abundance and diversity of aquatic biota since impoundment.

DGIF is unaware of any intensive data analysis to support such an assertion. DGIF's analysis of the Dominion data set documented changes that are reflective of drought conditions. Placing the population of aquatic species under frequent drought stress will shift the community substantially. This analysis was previously provided to Dominion. Recent DGIF surveys of the North Anna River have suggested that the primary sportfish, smallmouth bass, has much lower abundances than in other rivers in the region. Other fish populations were present in relatively low levels. It is the opinion of DGIF biologists that the low abundance and biomass of predator and forage species in the North Anna River is related to higher than naturally occurring incidences of drought conditions. There also is the possibility that drought flow conditions could adversely impact downstream anadromous nursery areas. This potential impact should be evaluated. Increasing the drought frequency to the proposed extent would have an unacceptable negative impact on this fishery.

(iii) Modeling versus Speculation. The balance of a major argument within the document centers on subjective speculation on whether the installation of Units 3 and/or 4 would present complications for fish populations. DGIF believes that such complications would occur. More likely at issue is not if complications would occur, for they almost certainly would; but the extent of such complications and the population-level impacts. *Without extensive modeling, it is impossible to argue either point* successfully. We recommend the application of sound scientific modeling to the decision process and that appropriate corrections based on model outcomes be incorporated in the Final EIS.

9. Downstream Flows and Recreation. The North Anna River is a spectacularly scenic and remote canoeing river with excellent fishing, according to the Department of Conservation and Recreation. Accordingly, discharge rates from the Lake Anna Dam should be adequate to meet minimum in-stream flows needed for recreational boating from State Route 601 to U.S. Route 301. The Department of Conservation and Recreation recommends that a minimum in-stream flow recreation study be conducted to determine what this discharge rate should be.

10. Chesapeake Bay Preservation Areas. According to the Department of Conservation and Recreation's Division of Chesapeake Bay Local Assistance, the project area, which is in Louisa County (Draft EIS, page 2-5, section 2.2.1), is not within a Chesapeake Bay Preservation Act jurisdiction.

11. Pollution Prevention. DEQ advocates that principles of pollution prevention be used in all construction projects as well as in facility operations. Effective siting, planning, and on-site Best Management Practices (BMPs) will help to ensure that

environmental impacts are minimized. However, pollution prevention techniques also include decisions related to construction materials, design, and operational procedures that will facilitate the reduction of wastes at the source. We have several pollution prevention recommendations that may be helpful in constructing or operating this project:

- Consider development of an Environmental Management System (EMS). An effective EMS will ensure that the proposed facility is committed to minimizing its environmental impacts, setting environmental goals, and achieving improvements in its environmental performance. DEQ offers EMS development assistance and recognizes facilities with effective Environmental Management Systems through its Virginia Environmental Excellence Program.
- Consider designs, techniques, and technologies that will facilitate the re-circulation and re-use of waters used for cooling and steam generation. These techniques can save money by minimizing intake and treatment needs.
- Consider environmental attributes when purchasing materials. For example, the extent of recycled material content, toxicity level, and amount of packaging should be considered and can be specified in purchasing contracts.
- Consider contractors' commitments to the environment (such as an EMS) when choosing contractors. Specifications regarding raw materials and construction practices can be included in contract documents and requests for proposals.
- Choose sustainable materials and practices for infrastructure and building construction and design. These could include asphalt and concrete containing recycled materials, and integrated pest management in landscaping, among other things.
- Integrate pollution prevention techniques into facility maintenance and operation, to include the following: inventory control (record-keeping and centralized storage for hazardous materials), product substitution (use of non-toxic cleaners), and source reduction (fixing leaks, energy-efficient HVAC and equipment). Maintenance facilities should be designed with sufficient and suitable space to allow for effective inventory control and preventive maintenance.

DEQ's Office of Pollution Prevention provides free information and technical assistance relating to pollution prevention techniques and EMS. If interested, NRC and/or the applicant contact that Office (Tom Griffin, telephone (804) 698-4545).

12. Mineral Resources. The Department of Mines, Minerals, and Energy, noting that an early site permit allows a suitability study, has no comment. If the study is

conducted in the future, the Department requests that it be given an opportunity to review the material on geology and mineral resources of the site.

13. Forest and Tree Protection. According to the Department of Forestry, the activities pursuant to the Early Site Permit will not significantly affect the forests of the Commonwealth. We offer the following guidance for protection of individual trees, or forested areas, in the project vicinity.

In order to protect trees in the project area from the effects of construction activities associated with this project, the proponent should mark and fence them at least to the dripline or the end of the root system, whichever extends farther from the tree stem. Marking should be done with highly visible ribbon so that equipment operators see the protected areas easily.

Parking and stacking of heavy equipment and construction materials near trees can damage root systems by compacting the soil. Soil compaction, from weight or vibration, affects root growth, water and nutrient uptake, and gas exchange. The protection measures suggested above should be used for parking and stacking as well as for moving of equipment and materials. If parking and stacking are unavoidable, the applicant should use temporary crossing bridges or mats to minimize soil compaction and mechanical injury to plants.

Any stockpiling of soil should take place away from trees. Piling soil at a tree stem can kill the root system of the tree. Soil stockpiles should be covered, as well, to prevent soil erosion and fugitive dust.

Questions on tree protection may be directed to the Department of Forestry (Mike Foreman, telephone (434) 977-6555).

14. Local and Regional Concerns. As indicated above (pages 1 and 2), DEQ invited three regional Planning District Commissions, three Counties, and one Town to comment on the Draft EIS.

Regulatory and Coordination Needs

1. Air Quality Regulation. In the event any open burning is planned, the applicant must contact DEQ's Northern Virginia Regional Office (Terry Darton, telephone (703) 583-3845) to determine whether an open burning permit is required, and, if so, how to apply. Similarly, that Office should be contacted to determine permitting requirements applicable to any fuel-burning equipment used in construction or in buildings.

2. Water Quality Regulation. As indicated above ("Environmental Impacts and Mitigation," item 3(a)), the applicant must furnish information to DEQ's Northern Virginia Regional Office to obtain a determination of the need for a Virginia Water Protection Permit for wetland impacts from Early Site Permit activities. The information, listed in the above discussion, requires that a wetland delineation be accomplished in the areas which might be affected by Early Site Permit activities and that the applicant obtain Army Corps of Engineers confirmation of the delineation. This information should be submitted to:

DEQ, Northern Virginia Regional Office
Attn: Tom Faha, Water Permits Manager
13901 Crown Court
Woodbridge, Virginia 22193

Questions may be addressed to that Office (Tom Faha, telephone (703) 583-3846).

In addition, activities contemplated by the regulatory provision cited above (see "Environmental Impacts and Mitigation," item 3(b)) will require Virginia Water Protection Permits from DEQ's Northern Virginia Regional Office.

3. Subaqueous Bed Encroachment. Any encroachment in, on, or over state-owned riverbeds, or the state-owned beds of bays, streams, or creeks that is channelward of ordinary high (above the fall line) or channelward of mean low water (in tidal waterways below the fall line) may require a permit from the Marine Resources Commission. Questions may be addressed to the Commission in this regard (Jeff Madden, telephone (757) 247-2200).

4. Wildlife Resources: Endangered and Threatened Species. The NRC and the applicant should coordinate with the Virginia Department of Game and Inland Fisheries (Andy Zadnik, telephone (804) 367-2733) relative to a review of threatened and endangered species. Coordination with the Virginia Field Office of the U.S. Fish and Wildlife Service (Karen Mayne, telephone (804) 693-6694) would also be in order.

5. Erosion and Sediment Control; Stormwater Management.

(a) Erosion and Sediment Control Plan. The applicant should contact Louisa County authorities (starting with the County Administrator, C. Lee Linticum (telephone (540) 967-0401) to for guidance on submission of Erosion and Sediment Control Plans for project activities pursuant to the Early Site Permit, if it is issued.

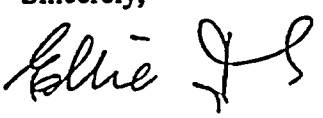
(b) Stormwater Management Plan. The applicant should contact Louisa County authorities (see item 5(a), above) for guidance on submission of stormwater management plans for project activities under the Early Site Permit, if the permit is issued by NRC.

(c) Stormwater Management Changes. As indicated above ("Environmental Impacts and Mitigation," item 6(b)), the VPDES Stormwater General Permit for Construction Activities has been transferred from the Department of Environmental Quality to the Department of Conservation and Recreation. The applicant may contact the Department of Conservation and Recreation Division of Soil and Water Conservation (Mr. C. Lee Hill, telephone (804) 786-3998) for guidance on the transfer of the program and applicability of program requirements to land-disturbing activities.

6. Historic Structures and Archaeological Resources. As indicated above ("Environmental Impacts and Mitigation," item 7), NRC is consulting with the Department of Historic Resources (Dr. Ethel Eaton, telephone (804) 367-2323, extension 112) to ensure compliance with section 106 of the National Historic Preservation Act.

Thank you for the opportunity to review the Draft EIS. We look forward to reviewing the Final EIS for the North Anna Early Site Permit.

Sincerely,



Ellie L. Irons
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Enclosures

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Subject: Comments on the Nuclear Regulatory Commission's Draft Environmental Impact Statement for an Early Site Permit for the North Anna Nuclear Power Station.

To: Charles Ellis, Office of Environmental Impact Review

From: Joseph P. Hassell, Division of Water Resources Joseph P. Hassell

Date: March 1, 2005

Thermal Loading, Impingement and Entrainment

The Division of Water Resources (DWR) has minor comments on the thermal loading, impingement and entrainment issues as they relate to water use at the Lake Anna site. The Draft Environmental Impact Statement (DEIS) considers the issuance of an Early Site Permit (ESP) for a third reactor cooled by a once through cooling process. The DWR prefers the once through cooling process to a cooling tower because it results in less consumptive use of water. The DWR recognizes that our preference for a once through cooling process and its accompanying smaller water loss entails larger impingement and entrainment losses and a larger heat load to the Lake. While we understand that Dominion and the NRC are not proposing a cooling tower, the technique is extensively discussed in the DEIS and some commenters may propose a cooling tower as a solution to the thermal loading, impingement and entrainment issues. We defer to the DEQ Division of Water Quality on the thermal loading issue and to the Department of Game and Inland Fisheries on the impingement and entrainment issue.

Water Availability

On January 15, 2004, the DWR commented on the draft application for the Early Site Permit. The Division's concerns have not all been fully addressed.

One of our major concerns was the lack of an identifiable source of water for the proposed fourth reactor. We now understand from Dominion that the fourth reactor would be air-cooled. The DWR has no objection to the fourth unit if it is air cooled.

The Division is still concerned about whether the Lake Anna watershed can provide sufficient cooling water for the third reactor without unacceptably harming instream beneficial uses. We looked at other nuclear reactors along the East Coast and compared the water resources available to those reactors with the water resources available at North Anna.

Table 1 Eastern Seaboard Nuclear Reactors and their Water Sources.[1]

Name, State,	Water Source, Availability
Brunswick, NC	Mouth of Cape Fear River, UWS
Calvert Cliffs, MD	Chesapeake Bay, UWS
Catawba 1 & 2, SC	Lake Wylie, SC, DA =3050. QAV=4238
Fitzpatrick, NY	Lake Ontario, UWS
Harris 1&2, NC	Jordan Lake DA = 1689, 14000 acres
Hatch 1&2, GA	Altamaha River, DA= 11600, QAV=11580 cfs. Minimum recorded flow= 1620 cfs, Hatch consumes 50 cfs or 0.44% of QAV
Hope Creek 1, NJ,	Lower Alloways Creek, tidal tributary of Delaware River, UWS
Indian Point 2 & 3, NY	Tidal Hudson River, UWS
Limerick 1 & 2, PA	Schuykill River DA =1760
Maine Yankee, ME	Tidal Montsweag Bay, UWS
Millstone, CT	Long Island Sound, tidal UWS
North Anna, VA	L. Anna, DA = 342, QAV= 286, MIF = 20, North Anna 1 and 2 consume 47.2 cfs, Lake evaporation consumes 55.6 cfs, Total consumption equals 36% of QAV
Oconnee 1,2&3, SC	Lake Keowee, DA ≈300 - 400
Pilgrim 1, MA;	Plymouth Harbor, Tidal, UWS
St. Lucie 1&2, FL	Tidal Indian River near Port Saint Lucie, UWS
Seabrook, NH	Atlantic Ocean, UWS
Summer, SC	Parr River, QAV= 4000
Surry 1&2, VA	Tidal James River, UWS
Susquehanna 2, PA	Susquehanna River, DA >10,000, QAV >13500
Turkey Point 3 & 4, FL	Biscayne Bay tidal, UWS
Vermont Yankee, VT	Connecticut River, DA =10000
Vogtle1 &2 GA	Savannah River, DA = 7500

1. Abbreviations:
   UWS – Unlimited water supply
   DA – Drainage Area of water supply in square miles
   SA – Surface Area of the Lake in acres
   QAV – Average flow of water source in cubic feet per second

The majority of the intake locations are located tidal waters and have an essentially unlimited water supply. The nuclear power stations located on non-tidal rivers are sited on very large rivers including the Savannah, the Connecticut, the Susquehanna and the Schuylkill. Of the remaining locations, North Anna has the least abundant water supply due to it's small watershed (only 342 square miles) and medium sized reservoir. The only location remotely similar to North Anna's situation is the Oconee plants on Lake Keowee in South Carolina. However, immediately below Lake Keowee is Hartwell Lake so the section of non-tidal stream effected by consumptive loss is very short.

We requested that Dominion perform an Index of Hydrologic Alteration (IHA) analysis of pre-and post-project flows below the dam. The information provided by Dominion and the NRC staff defined "pre-project" as the Lake and two reactors and "post-project" to be the lake and three reactors. The DEIS on page 7-2 says, "A cumulative evaluation of the effects of Units 3 and 4 on Lake Anna, by nature starts with the existing lake conditions ... and adds the effects of construction and operation to reach a cumulative impact on Lake Anna." This information does not address our concern.

The IHA was requested to assess the cumulative impact on the North Anna River not Lake Anna. The DWR does not agree that a cumulative evaluation of impacts to the North Anna River starts with the existing lake conditions and adds the effects of operation of the third unit. Dominion has only shown the incremental impact of the third unit. The applicant did not analyze the cumulative impact in a manner that addresses our concern.

Dominion provided DWR with the output of a simulation model with which we are able to make some comparisons of true pre- and post-project conditions. Prior to the lake, the North Anna River at the dam site had an average flow of about 286 cubic feet per second (cfs). This is based on the flow records from 1929 to 1971 at the Doswell gage proportionately reduced to reflect the smaller drainage area at the dam. According to the NRC water budget analysis, the two existing units account for 50 cfs in evaporation and the third unit would account for 26 cfs in evaporation. The cumulative impact on the average flow of just the power plants (not including lake evaporation) is therefore estimated to be 76 cfs or 26% of the historic average flow. Such a large loss of the normal flow to consumptive uses is unprecedented in Virginia and other mid-Atlantic states. The USGS estimates that the average percentage of surface water lost to consumptive use in the mid-Atlantic states is 1.6% of average flow. (USGS, 1984, National Water Summary)

We examined pre-dam gage records and compared those streamflow records with projected releases with three reactors operating in a once through cooling mode. This is *not a true IHA analysis but it is presented in order to give some perspective of the* magnitude of true pre and post project conditions.

- Prior to the project, flows at the dam site were less than or equal to 20 cfs only 4.2% of the time; with the third unit, flows are projected to be 20 cfs 11.8% of the time.

- Prior to the project, flows at the dam site were greater than or equal to 156 cfs 52% of the time (pre dam Doswell gage); with three units, flows will be less than or equal to 40 cfs 52% of the time (DEIS, page 5-12),

- Prior to the project, during the driest 14 month period on record (early May 1931 to early July 1931) streamflow in the North Anna River averaged 90 cfs over the 14 months. With the three units, the driest 14 month period (mid September 2001 through mid January 2003) streamflow in the North Anna River would average only 20 cfs.

DWR disagrees with the DEIS's conclusion that these pre and post project flow alterations and their impact can be described as small or moderate. We would characterize these types of alterations as large.

Alternatives Analysis

The DWR believes that the Surry site is superior to the North Anna site. We reach this conclusion based on the limited water resources in the North Anna River watershed, the amount of those resources that are already being consumed by lake evaporation and the forced evaporation from the existing two reactors, and the competition for those resources downstream. Water availability would not be an issue on the tidal James River at Surry. The DEIS says that, "The consumptive use of water to support mechanical draft cooling towers would be undetectable relative to the supply in the estuary".

At two meetings with DEQ staff, NRC officials were asked why North Anna rather than Surry was being proposed for an early site permit. On both occasions, NRC staff cited aesthetics and the fact that the plant might be visible from Jamestown. The DEIS on pages 8-32 and 8-33 does not indicate that there is any problem with aesthetics at Surry. In fact the DEIS says, "its current structures are not visually obtrusive from any vantage point, even from across the James River. However Units 1 and 2 are visible from the highest amusement rides at Busch Gardens." DWR does not understand how aesthetics could play a major role in the minds of NRC staff especially when the DEIS states that these reactors are not visually obtrusive and only readily visible from the top of a roller coaster.

Impingement and entrainment issues would be a greater problem at the Surry site than at Lake Anna. This is due to the James River being an estuary at the Surry site. However, the alternatives section states that reactors at Surry would be cooled with cooling towers. As such, the impingement and entrainement problem would be less than if once through cooling were to be used. On April 4, 2001, Dr. John Olney of Virginia Institute of Marine Resources wrote to Mr. Tony Banks of Dominion Power on the subject of impingement and entrainment at Surry while commenting on the relicensing. In the letter Dr. Olney states, "Further, the available information on abundance and distribution of fishes at the site suggests that there is a low probability that water withdrawals at the plant are causing declines in federally managed species." The fact that Dr. Olney does

not express concerns about a large once through cooling water withdrawal makes it seem likely that a cooling tower withdrawal, orders of magnitude smaller, would also not be a concern.

In conclusion, two of the most important disadvantages of the Surry site, appear not to be problems at all while the main disadvantage of the North Anna site, water availability, appears extremely problematic. The DWR would have no concerns about this project if both the fourth and third reactors at North Anna were air cooled.

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DEQ-Office of Environmental Impact Review

COMMONWEALTH of VIRGINIA

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Department of Game and Inland Fisheries

William L. Woodfin, Jr.
Director

February 15, 2005

Mr. Charles H. Ellis, III
Department of Environmental Quality
Office of Environmental Impact Review
629 East Main St., Sixth Floor
Richmond, VA 23219

RE: JPA 04-216F
Early Site Permit at North Anna ESP Site
ESSLOG 19290

Dear Mr. Ellis,

We have reviewed "Draft EIS for an early site permit at the North Anna ESP site" (document NUREG-1811) and offer the following comments and recommendations. The Department of Game and Inland Fisheries (VDGIF), as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over those resources, inclusive of State or Federally *Endangered* or *Threatened* species, but excluding listed insects. We are a consulting agency under the U. S. Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and we provide environmental analysis of projects or permit applications coordinated through the Virginia Department of Environmental Quality, the Virginia Marine Resources Commission, the Virginia Department of Transportation, the U. S. Army Corps of Engineers, the Federal Energy Regulatory Commission, and other state or federal agencies. Our role in these procedures is to determine likely impacts upon fish and wildlife resources and habitats, and to recommend appropriate measures to avoid, reduce, or compensate for those impacts.

We continue to have reservations about the proposed Unit 3 impacts on the lake and downstream resources. The document did not address the main concerns outlined in our letter of January 27, 2004. Our comments in this letter will address primarily the issues raised in Section 5.0 Station Operating Impacts at the Proposed Site.

Biological communities Section 2.7.2.1
The document's nomenclature surrounding native vs. nonnative species, appears to minimize the value of the striped bass fishery. Striped bass and other anadromous fish are native to the York River drainage and the North Anna River, while largemouth bass, bluegill, black crappie, walleye and channel catfish are not. Nevertheless, all of these species are important to the recreational fishery within the lake.

Hydrological Alterations Section 5.3

Section 5.3 addresses the water related impacts. Earlier discussions with Dominion and DEQ resulted in the selection of Lake Anna water level elevation 248 as being representative of a hydrologic drought. Based upon historic data this would have a recurrence interval of once every 8.7 years and was agreed upon as being indicative of drought conditions. This matches closely other commonly used drought indicators (e.g., 7Q10) as an indicator of drought conditions in streams for water quality and discharge permit conditions. Table 1 on page F-102 can be used to evaluate the recurrence intervals of droughts. The USGS publication referenced in that table discusses drought recurrence intervals ranging from once every 15 to 80 years. Using elevation 248 as an indicator, past Dominion records demonstrate that this level has been observed 3 times in the last 26 years, a reasonable expectation of the recurrence interval (8.6 years) for a drought. Addition of Unit 3 would increase the drought recurrence interval to every 2.6 years and more than double the total weeks of 20 cfs or lower flows from 67 to 143. Median duration of drought flows of 20 cfs would be 7 weeks with the proposed Unit 3. VA State Water Control Board Bulletin #58 reviewed flow statistics for the gage downstream at Doswell. Prior to dam construction, flows of 25 cfs or lower would occur once every 10 years for about 10 weeks. Addition of Unit 3 would significantly increase the frequency of drought flows downstream and the duration of those droughts. The change to drought flows once every 2.6 years, for median duration of 7 weeks, is a significant change from conditions prior to the plant/reservoir construction, and demonstrates the need for cumulative analysis of impacts. The Index of Hydrologic analysis computed on pages F-126-133 is not complete, as requested, since it does not evaluate pre-dam conditions. Table 1 demonstrates significant shifts in frequency of lower flows and needs to be expanded to address conditions prior to creation of the lake. Cumulative impacts of the current and future Units on downstream hydrology and biology need to be quantitatively evaluated before any determination that impacts on downstream resources are "small". Two options exist to reduce the significant impacts on downstream hydrology: change the trigger level of elevation (248) to some lower elevation that has a recurrence interval of once every 8.7 years, or have Unit 3 operate as Unit 4 under dry cooling conditions.

Intake system Section 5.4.2.1

We applaud Dominion's use of "worst case" scenarios for estimating impingement and entrainment and acknowledge their estimate of a 131% increase in impingement rate for Unit 3. In developing the total estimate of entrainment and impingement data, derived from 1979 - 1983 was added to worst-case Unit 3 operation. What is unclear is if the 1978-83 values used for Units 1 & 2 reflect current operating conditions and are valid. Has the Unit 1 and 2 water volume pumped increased or decreased from the 1979-1983 period? We understand that plant-operating time, efficiency and volume of water pumped have increased since the study period. In that case, the table reflecting the impacts of Units 1 and 2 needs to be revised to reflect current operating conditions.

Several problems are apparent in the tables in this section. In reviewing the tables, Tables 5-4 thru 5-6 do not reflect "yearly totals". Rather, they reflect only seasonal losses (March-July).

This needs to be corrected to reflect annual losses for the remaining seven months. If summer, fall, and winter data were not collected, that data may have to be extrapolated by the best fitting of a nonlinear function to the available data. Only then can the full impacts start to be addressed. Tables 5- 2 and 5-5 may have significant errors, or the reasons for differences are not fully explained. For example, in Table 5-2 for Unit 3, January striped bass and bluegill numbers impinged are greater than in Units 1 & 2 (Table 5-1), but black crappie, gizzard shad, white perch and yellow perch numbers are less than in Units 1 & 2. Similar discrepancies exist for other rows and for the cumulative Tables 5-3 and 6. These discrepancies should be further explained.

We disagree with the assessment of "small" impact due to the most prevalent species impinged (gizzard shad) based upon the magnitude of such an increase (131%). Gizzard shad are indeed a "prolific forage fish", but their abundance has been low in VDGIF samples in two recent years. This species is the primary forage for stocked pelagic predators (striped bass and walleye) and also supplements largemouth bass diet. Further declines in striped bass habitat (another contested issue) combined with potential reductions in the forage base could significantly impact this recreationally and economically important fishery. Section 5.4.2.2 estimates the impingement loss to the fish population as a percentage of the estimated total lake population as derived from cove rotenone. We applied this same technique to entrainment numbers and calculate that 6.8% of the gizzard shad and 87% of the black crappie are lost due to entrainment. When combined with impingement 7.7% of the gizzard shad and 93.9% of the black crappie numbers are killed by the intake structure. We do not consider losing almost 8 and 94% of these populations from an intake a small impact. Several problems exist with this approach and these need to be addressed. Lakes undergo eutrophication with age and that is occurring at Lake Anna as the watershed becomes more fully developed. As that occurs, the biomass of fish increases. The current biomass is undoubtedly higher than twenty years ago when the original entrainment/impingement analysis was conducted. The report uses cove rotenone data but does not account for spatial and temporal variation within that data. Within large reservoirs, biomass typically declines downstream through a trophic gradient. That is apparent from our routine sampling as well as historic rotenone data. The impacts of entrainment and impingement may be even more spatially and numerically significant in the lower lake where the numbers of fish are less than above the Rt. 208 bridge.

Dominion acknowledges that 300 million fish could be entrained annually. The statement on page 5-25 that "fish entrained most frequently are prolific high reproductive potential and compensatory responses of the fish population occur to offset losses, the staff concludes that the impacts of entrainment would be small" is subjective and not based on scientifically sound evidence.

It is apparent that the entrainment tables need to be corrected to reflect an actual annual loss. Entrainment/impingement table discrepancies need to be corrected or explained and a much more rigorous spatial and temporal evaluation needs to be conducted before it can be concluded that the impacts of entrainment and impingement are small. We continue to recommend the use of state of the art screens as encouraged by EPA in their recent screen recommendations. Based upon a thorough literature review in VA., we currently recommend 1 mm opening and 0.25 fps

intake velocity to protect aquatic life. This would greatly alleviate the entrainment/impingement issue as would use of a dry cooling tower.

Striped Bass Reservoir Habitat

We agree with the descriptive statements on page 5-30 lines 24-33. However, line 37 incorrectly states that striped bass are not native to this watershed. The use of nomenclature surrounding native vs. nonnative species appears to minimize the value of the striped bass fishery. This is incorrect. Striped bass are, in fact, native to the York River drainage and downstream reaches of the North Anna can be seasonally important for spawning and juvenile rearing. The lake population is correctly acknowledged as being supported by stocking. In recognition of this fact, we strive to stock Chesapeake strain striped bass in the reservoir so as not to change the genetics of downstream populations.

An extensive amount of temperature data from historic monitoring of the lake was used to model thermal conditions at various locations in the lake. Despite that extensive data set, no modeling of summer striped bass habitat was conducted to support statements that the impacts would be small in normal years and moderate in drought years (page 5-31 lines 18-19). In combination with the elevated temperatures and increased frequency of drought conditions (lowering to elevation 248) within the lake, the striped bass population could be stressed every 2.6 years. One cannot state with confidence that installation of a third unit *would* cause acute mortality from exacerbated summer habitat squeeze; but concurrently, one cannot state with confidence that such mortality *would not* occur. At some point, striped bass will begin to die as water quality declines (based primarily on higher water temperatures and lower dissolved oxygen). Since no modeling of summer habitat was conducted, it is unknown if the additive impacts of a third unit would allow reservoir conditions to reach this point, and the exact point at which this will occur is unknown; but to discount the possibility is subjective. Even with the elimination of Unit 4, the predicted maximum surface temperature increase at the dam of 3.6 degrees Fahrenheit could result in striped bass mortalities depending on the plume configuration, inflow, and stratification pattern. Striped bass habitat modeling is necessary and essential in the final document to explain the potential of a new (third) unit and its impact on striped bass habitat.

The comment regarding droughts; "In such circumstances, mitigation to reduce the impact could be accomplished by stocking more fish, stocking larger fish, or managing the fishery to provide more catch opportunities of large fish", is incorrect and not a scientifically recognized fishery management solution. Such a comment does not recognize the biological and physical factors necessary for a successful striped bass population.

North Anna River Fishery Issues

The downstream impacts to fisheries resources were ignored in the draft document despite the increased frequency of low flows. Currently, (with two units in the regulated "base scenario"), 67 weeks of drought conditions (20 CFS or less) out of a 26-year period would be expected. Given the addition of a third unit, the expected drought frequency would rise to 150 weeks

(about 2.6 years). The Tennant method is a common desktop method and summer flows in the 20-30% mean annual flow range are beneficial for sustainable fisheries. Because it has been called the Montana Method, it has been deemed as only applicable in Western streams. That misconception is false as it was developed "over the past 17 years from work on hundreds of streams in the states north of the Mason-Dixon Line between the Atlantic Ocean and the Rocky Mountains" (Fisheries 1(4): 6-10). Summer flows below the desired level of 68 cfs (20% of MAF) are the norm under current conditions and will worsen under future conditions. We recommended that an Instream Flow Incremental Methodology Study be conducted to properly evaluate this project on the stream fauna. The expected increased frequency of drought flows to a common occurrence (2.6 years) is expected to have significant impacts. Conclusions need to be based upon sound scientific modeling. If Dominion can offer a better approach to modeling flow impacts, we would be happy to consider any alternative. However, in response to the statement, "long-term monitoring of the North Anna River has documented improvements in the abundance and diversity of aquatic biota since impoundment", VDGIF is unaware of any intensive data analysis to support such an assertion. Our analysis of the Dominion data set documented changes that are reflective of drought conditions. Placing the population under frequent drought stress will shift the community substantially. This analysis was provided to Dominion on June 18, 2005. Recent VDGIF surveys of the North Anna River have suggested that the primary sportfish, smallmouth bass, has much lower abundances than in other rivers in the region. Other fish populations were present in relatively low levels. It is the opinion of VDGIF biologists that the low abundance and biomass of predator and forage species in the North Anna River is related to higher than naturally occurring incidences of drought conditions. There also is the possibility that drought flow conditions could adversely impact downstream anadromous nursery areas. This potential impact should be evaluated. Increasing the drought frequency to the proposed extent would have a negative impact on this fishery. Such impacts are not acceptable.

The balance of a major argument within the document centers on subjective speculation on whether the installation of Units 3 and/or 4 would present complications for fish populations. VDGIF thinks there would be complications, but Dominion and NRC disagree. More likely at issue is not if complications would occur, for they almost certainly would; but the extent of such complications and the population-level impacts. Without extensive modeling, it is impossible to argue either point successfully. We recommend the application of sound scientific modeling to the decision process and that these appropriate corrections based on model outcomes be incorporated in the final document.

Thank you for the opportunity to comment on this proposed management plan. Please call Andrew Zadnik or me at (804) 367-6913 if we may be of further assistance.

Sincerely,

Raymond T. Fernald, Manager
Nongame and Environmental Programs

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.

B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.

C. Use your agency stationery or the space below for your comments. IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.

Please return your comments to:

MR. CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

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JAN 27 2005
DEQ-Office of Environmental Impact Review

CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

We do not anticipate this project will affect VDACS' responsibilities for the preservation of agricultural lands and the protection of listed endangered and threatened plant and insect species.

(signed) (Keith R. Tignor) (date) January 20, 2005

(title) Endangered Species Coordinator

(agency) VDACS, Office of Plant and Pest Services

PROJECT # 04-216F 8/98

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Joseph H. Maroon
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

203 Governor Street
Richmond, Virginia 23219-2010
(804) 786-6124

5 February 2005

Mr. Charles H. Ellis, III
Environmental Review Coordinator
Virginia Department of Environmental Quality
629 East Main Street, 6th Floor
Richmond, Virginia 23219

Re: DEQ#04-216F: North Anna Early Site Permit Application, *Revised*

Dear Mr. Ellis:

The Department of Conservation and Recreation (DCR) functions to preserve and protect the environment of the Commonwealth of Virginia and advocate the wise use of its scenic, cultural, recreation and natural heritage resources. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, state unique or exemplary natural communities, significant geologic formations and similar features of scientific interest.

DCR has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined by the submitted map. Biotics documents the presence of natural heritage resources in the project area. However, due to the scope of the activity and the distance to the resources, we do not anticipate that this project will adversely impact these natural heritage resources.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

Any absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks additional natural heritage resources. New and updated information is continually added to Biotics, please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

In addition, the Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters, that may contain information not documented in this letter. Their database may be accessed from http://www.dgif.virginia.gov/wildlife/info_map/index.html , or contact Shirl Dressler at (804) 367-6913.

Be advised that if a project on privately- or locality-owned lands involves a land-disturbing activity of 2,500 square feet or more, the property owner is responsible for submitting a site-specific erosion and sediment control (ESC) plan to Spotsylvania County for review and approval pursuant to the local ESC ordinance. The ESC plan must be approved prior to initiation of any land disturbance on the project site. All regulated land-disturbing activities associated with the project, including on or off site access roads, staging areas, of spoil or borrow areas, must be covered by an approved plan. Dependent on local requirements, a separate stormwater management (SWM) plan may also be required. Local ESC program requirements should be requested through Spotsylvania County. Stormwater Management program requirements should be requested from DCR's Division of Soil and Water Conservation, Mr. C. Lee Hill (804.786.3998, email: Lee.Hill@DCR.Virginia.gov). For general information on the recent changes to stormwater management requirements, you may wish to visit our website at http://www.dcr.virginia.gov/sw/vsmp.htm#geninfo. *[Reference: Virginia Erosion and Sediment Control Law §10.1-563; Virginia Erosion and Sediment Control Regulations §4VAC50-30-30; Virginia Stormwater Management Law §10.1-603.3; Virginia Stormwater Management Regulations §4VAC-3-20-90 - 141]*

Finally, please note the North Anna River is a spectacularly scenic and remote canoeing river with excellent fishing. Permits for the new generators must protect downstream uses of the river, especially during the prime recreation season. Discharge rates from the Lake Anna Dam should be adequate to meet minimum instream flow for recreational boating from Route 601 to Route 301. A MIF Recreation study should be conducted to determine what this discharge level should be.

Thank you for the opportunity to offer comments on this project.

Sincerely,

Robert S. Munson

Robert S. Munson
Planning Bureau Manager

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 10009, Richmond, Virginia 23240
Fax (804) 698-4500 TDD (804) 698-4021
www.deq.state.va.us

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Robert G. Burnley
Director

(804) 698-4000
1-800-592-5482

MEMORANDUM

TO: Charles H. Ellis, Environmental Program Planner

FROM: DRB Allen Brockman, Waste Division Environmental Review Coordinator

DATE: December 21, 2004

COPIES: Sanjay Thirunagari, Waste Division Environmental Review Manager; Devlin Harris; file

SUBJECT: Draft Environmental Impact Assessment— NRC's Early Site Permit at the North Anna ESP Site; DEQ Project Code # 04-216F

The Waste Division has completed its review of the Draft Environmental Impact Statement for NRC's Early Site Permit at the North Anna ESP Site near Bumpass, Virginia. We have the following comments concerning the waste issues associated with this project:

The report somewhat addressed solid waste issues and sites. However, the report did not address hazardous waste issues and sites. Also, the report did not include a search of waste-related databases. The Waste Division staff performed a cursory review of its data files and determined that the facility is listed as "VEPCO – NORTH ANNA" (ID number VAD000620237) in the CERCLA database and it is listed that no further remedial action is planned (NFRAP) on the CERCLA site. Also, the site is designated as "VIRGINIA POWER NORTH ANNA," a small quantity generator of hazardous waste, in EPA's RCRA database, ID number VAD065376279). The following websites may prove helpful in locating additional information for these identification numbers: http://www.epa.gov/echo/search_by_permit.html or http://www.epa.gov/enviro/html/rcris/rcris_query_java.html . Devlin Harris of the DEQ's CERCLA unit was contacted for his review of this determination, and he will reply in a separate memo (if he identifies any additional issues).

The draft assessment noted that it presents a construction plan and that actual construction will not occur prior to our review of a further submittal (see assessment abstract). However, the information presented in this memo should be considered as part of this initial statement. Also, the draft assessment noted the potential risk of radioactive waste occurring on site after construction (see, e.g., p. 4-39, 4-40, 6-22, and 8-12). Any soil that is suspected of contamination or wastes (radioactive or otherwise) that are generated during construction-related activities must be tested and disposed of in accordance with applicable Federal, State, and local laws and regulations. Some of the applicable state laws and regulations are: Virginia Waste

Management Act, Code of Virginia Section 10.1-1400 *et seq.*; Virginia Hazardous Waste Management Regulations (VHWMR) (9VAC 20-60); Virginia Solid Waste Management Regulations (VSWMR) (9VAC 20-80); Virginia Regulations for the Transportation of Hazardous Materials (9VAC 20-110). Some of the applicable Federal laws and regulations are: the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section 6901 *et seq.*, and the applicable regulations contained in Title 40 of the Code of Federal Regulations; and the U.S. Department of Transportation Rules for Transportation of Hazardous materials, 49 CFR Part 107.

Also, any structures that may be demolished/removed/renovated (see, e.g., Site Redress Plan on p. 4-46) should be checked for asbestos-containing materials (ACM) and lead-based paint prior to performing these activities. If ACM or LBP are found, in addition to the federal waste-related regulations mentioned above, State regulations 9VAC 20-80-640 for ACM and 9VAC 20-60-261 for LBP must be followed.

Please note that DEQ encourages all construction projects and facilities to implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately.

If you have any questions or need further information, please contact Allen Brockman at (804) 698-4468.

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR PROGRAM COORDINATION

ENVIRONMENTAL REVIEW COMMENTS APPLICABLE TO AIR QUALITY

TO: Charles H. Ellis III

DEQ - OEIA PROJECT NUMBER: 04 – 216F

PROJECT TYPE: ☐ STATE EA / EIR / FONSI X FEDERAL EA / EIS ☐ SCC

☐ CONSISTENCY DETERMINATION/CERTIFICATION

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DEC 21 2004

DEQ-Office of Environmental Impact Review

PROJECT TITLE: EARLY SITE PERMIT AT THE NORTH ANNA ESP SITE

PROJECT SPONSOR: NUCLEAR REGULATORY COMMISSION

PROJECT LOCATION: X OZONE NON ATTAINMENT AREA (PARTLY)

REGULATORY REQUIREMENTSMAY BE APPLICABLE TO: ☐ CONSTRUCTION ☐ OPERATION

STATE AIR POLLUTION CONTROL BOARD REGULATIONS THAT MAY APPLY:

1. ☐ 9 VAC 5-40-5200 C & 9 VAC 5-40-5220 E – STAGE I
2. ☐ 9 VAC 5-40-5200 C & 9 VAC 5-40-5220 F – STAGE II Vapor Recovery
3. ☐ 9 VAC 5-40-5490 et seq. – Asphalt Paving operations
4. X **9 VAC 5-40-5600 et seq. – Open Burning**
5. X **9 VAC 5-50-60 et seq. Fugitive Dust Emissions**
6. ☐ 9 VAC 5-50-130 et seq. - Odorous Emissions; Applicable to_____
7. ☐ 9 VAC 5-50-160 et seq. – Standards of Performance for Toxic Pollutants
8. ☐ 9 VAC 5-50-400 Subpart_____, Standards of Performance for New Stationary Sources, designates standards of performance for the_____
9. ☐ 9 VAC 5-80-10 et seq. of the regulations – Permits for Stationary Sources
10. ☐ 9 VAC 5-80-1700 et seq. Of the regulations – Major or Modified Sources located in PSD areas. This rule may be applicable to the_____
11. ☐ 9 VAC 5-80-2000 et seq. of the regulations – New and modified sources located in non-attainment areas
12. ☐ 9 VAC 5-80-800 et seq. Of the regulations – Operating Permits and exemptions. This rule may be applicable to_____

COMMENTS SPECIFIC TO THE PROJECT:

One of the counties (Spotsylvania) is designated for ozone non-attainment. Precautions are therefore necessary to restrict the emissions of volatile organic compounds (VOC) and oxides of nitrogen (NOx).

K.S. Narasimhan

(Kotur S. Narasimhan)
Office of Air Data Analysis

DATE: December 20, 2004

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FEB 02 2005

DEQ-Office of Environmental Impact Review

MEMORANDUM

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY
Ellen Gilinsky, Ph.D., Director

TO: Charles H. Ellis, III
Office of Environmental Impact Review

FROM: Michelle Henicheck (MH)
Office of Wetlands & Water Protection

DATE: 31 January, 2005

SUBJECT: Environmental Impact Statement (EIS), Draft Early Site Permit at the North Anna ESP Site 04-216F

We have reviewed the information provided concerning the above-referenced project. According to information provided in the report, the early site permit (ESP) is a Nuclear Regulatory Commission (NRC) approval of a site or sites for one or more nuclear power facilities. The ESP application and review process makes it possible to evaluate and resolve safety and environmental issues related to siting before the applicant makes large commitment of resources. It does not authorize construction or operation of a nuclear power plant.

According to the report (page 4-7), "a few small wetland areas and two intermittent streams exist on the North Anna ESP site." However at this time, a wetland delineation of this area has not yet been done. Without additional information on the precise location and extent of the wetland and stream areas, we cannot infer whether or not the proposed project will adversely affect areas within our enforceable program. DEQ recommends submittal of a National Wetland Inventory (NWI) map identifying the project area, photographs of the intermittent stream, an Army Corps of Engineers (ACOE) confirmation of the wetlands delineation and any other information pertaining to the location of wetlands or streams near the project area.

If State waters, including wetlands, are to be impacted by the project activities, a Virginia Water Protection (VWP) permit may be required, and the project proponent should coordinate with the DEQ Northern Virginia Regional Office for a final permit determination. The report states, in several different sections, that avoidance and minimization of wetland impacts will occur to the maximum extent practicable. This determination is more appropriately conducted during permit application review. Further, the amount, type, and location of compensatory wetland mitigation is also conducted during permit application review and is based upon the ecologically preferable alternative.

The withdrawal of cooling water for a once through cooled reactor number would require a Virginia Water Protection Permit from the Department of Environmental Quality. The

Division of Water Resources will be commenting under a separate memorandum on the water quantity issues.

Please note that because the dwarf wedgemussel (*Alasmidonta heterodon*) is listed as surviving in the South Anna River in Louisa County, a complete review of Threatened and Endangered Species will be done as part of the review process and should be coordinated with the Department of Game and Inland Fisheries.

We recommend strict adherence to erosion and stormwater management practices and further encourage the project proponent to monitor construction activities to make certain that erosion and stormwater management practices are adequately preventing sediment and pollutant migration into adjacent surface waters. A VPDES stormwater general permit for construction activities will be required should the project disturb one or more acres of land.

Ellis,Charles

From: Bowden,John
Sent: Wednesday, February 02, 2005 8:07 AM
To: Ellis,Charles
Subject: EIS #04-216F

NVRO comments regarding the Early Site Permit at the North Anna ESP Site project sponsored by the Nuclear Regulatory Commission are as follows:

1. Air Permitting-All the environmental issues regarding this project are water related issues. Additionally the EIR ERR Form date 12/10/04 refers to and ESP to license to undertake a study process to determine whether the site in question is suitable for construction of an atomic reactor and not the actual construction the facility.

2. Waste Compliance-The *Draft Environmental Impact Statement for an Early Site Permit at the North Anna ESP Site* by the Nuclear Regulatory Commission has been reviewed for compliance with the Virginia State Waste Regulations. They indicate in Section 3.2.4 *Nonradioactive Waste Systems* that solid wastes generated from the site would be handled in compliance with state and federal regulations. Since the state does not have authority over radioactive wastes, this statement is sufficient to handle the nonradioactive waste they may generate.

3. Wetlands-Dominion Nuclear North Anna L.L.C. is considering the addition of two new nuclear reactors at the Dominion Virginia Power Company's North Anna facilities in Louisa County, Virginia. The Draft Environmental Impact Statement indicates that the proposed activities will impact state waters. A Virginia Water Protection (VWP) permit from the Virginia Department of Environmental Quality is required for the following activities, as stated in 9 VAC 25-210-50.A of the VWP permit program regulations:

> Except in compliance with a VWP permit, no person shall dredge, fill or discharge any pollutant into, or adjacent to surface waters, or otherwise alter the physical, chemical or biological properties of surface waters, excavate in wetlands, or on or after October 1, 2001, conduct the following activities in a wetland:

1. New activities to cause draining that significantly alters or degrades existing wetland acreage or functions;
2. Filling or dumping;
3. Permanent flooding or impounding; or
4. New activities that cause significant alteration or degradation of existing wetland acreage or functions

If the proposed project includes one or more activities mentioned above, the applicant must apply for a VWP permit.

4. Water Permitting-Tom Faha, NVRO Water Permitting Manager, attended a meeting at Central Office on January 19, 2005, with Ellie Irons, Joe Hassell, and Richard Rassumussen. He presented his comments directly to the responsible parties at that time.

John D. Bowden
Deputy Regional Director
Department of Environmental Quality
Northern Virginia Regional Office
(703) 583-3880
jdbowden@deq.virginia.gov

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.

B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.

C. Use your agency stationery or the space below for your comments. IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.

Please return your comments to:

MR. CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

Charles H. Ellis III

CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

Please be advised that the Marine Resources Commission, pursuant to Section 28.2-1200 et seq of the Code of Virginia, has jurisdiction over any encroachments in, on, or over the beds of the bays, ocean, rivers, streams, or creeks which are the property of the Commonwealth. Accordingly, if any portion of the subject project involves any encroachments channelward of ordinary high water along natural rivers and streams above the fall line or mean low water below the fall line in tidal waterways, a permit may be required from our agency. Additionally, permits may be required from the Commission or the local wetlands board should the proposed project encroach onto a coastal primary sand dune and beach. Any jurisdictional impacts will be reviewed by VMRC during the Joint Permit Application process. Thank you for the opportunity to comment.

(signed) _____ (date) _____

(title) Environmental Engineer

(agency) VA Marine Resources Commission

PROJECT # 04-216F

8/98

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JAN 13 2005
DEQ-Office of Environmental Impact Review

Charles H. Ellis III
CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

The NRC is currently consulting with DHR directly pursuant to Section 106 of the National Historic Preservation Act. We anticipate this consultation to continue.

(signed) Richard Holma (date) 12 Jan 05

(title) Architectural Historian

(agency) DHR

PROJECT # 04-216F 8/98

DHR project # 2000-1210

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FAX #804/698-4319

Charles H. Ellis III
~~CHARLES H. ELLIS III~~
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

As an early site permit allows a suitability study, DMME has no comment. If, in the future, this study is conducted, DMME requests review those areas of concern to DMME, i.e. geology and mineral resources of the site.

(signed) [signature] (date) 24 January 2005

(title) GEOLOGIST

(agency) DMME

PROJECT # 04-216F 8/98

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DEQ-Office of Environmental Impact Review

Charles H. Ellis III

~~CHARLES H. ELLIS III~~
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

No significant impact on the forests of the Commonwealth.

(signed) J Michael Farmer (date) 12-20-04

(title) Forest Mgt.

(agency) DOF

PROJECT # 04-216F

8/98

FSPR-NRC-01-03
North Anna early site permits

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Charles H. Ellis III

CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

This is not within a Chesapeake Bay Preservation Act jurisdiction, therefore, we have no comment.

(signed) Alice R.T. Baird (date) 1-26-05

(title) Chesapeake Bay Special Projects Coordinator

(agency) DCR-DCBLA

PROJECT # 04-216F 8/98