

FACT SHEET

Virginia Water Protection Individual Permit
Joint Permit Application No. 10-2001

Unit 3 at Dominion's North Anna Power Station
Part III – Major Water Withdrawal for Operational Activities and Lake Level Rise
Louisa, Orange, and Spotsylvania Counties, Virginia

The Virginia Department of Environmental Quality (DEQ) has reviewed the application for the Virginia Water Protection (VWP) Individual Permit Number 10-2001 and has determined that the project qualifies for an individual permit. Based on the information provided in the application and in compliance with § 401 of the Clean Water Act as amended (33 USC 1341 et seq.) and the State Water Control Law and regulations, DEQ has determined that there is a reasonable assurance that the activity authorized by this permit will protect beneficial uses, will not violate applicable water quality standards, and will not cause or contribute to significant impairment of state waters or fish and wildlife resources, provided the applicant complies with all permit conditions.

Surface water impacts have been avoided and minimized to the maximum extent practicable. The proposed permit also addresses no net loss of wetland acreage and function through compensatory mitigation. Permitted wetland impacts have been inventoried in evaluating this proposed permit.

The following details the application review process and summarizes relevant information for developing the Part I - Special Conditions for permit issuance.

1. Contact Information:

Applicant Legal Name and Address:

Virginia Electric & Power Company dba Dominion Virginia Power
5000 Dominion Boulevard
Glen Allen, Virginia 23060
Phone: (804) 273-2442
Fax: (804) 273-3903
Attn: Mr. Eugene Grecheck
Eugene.Grecheck@dom.com

Agent Legal Name and Address:

Virginia Electric & Power Company dba Dominion Virginia Power
5000 Dominion Boulevard
Glen Allen, Virginia 23060
Phone: (804) 273-3051
Attn: Ms. Kimberly Lanterman
kimblery.q.lanterman@dom.com

2. Processing Dates:

Received Application:	December 20, 2010
Letters sent to Commissioner of Revenue*:	N/A
Application Complete:	December 20, 2010
Letters sent to VDH, VDGIF, VDCR, VMRC:	January 18, 2011
Letters sent to Riparian Landowners:	February 1, 2011
Letter(s) sent to Local Government(s):	February 1, 2011
1 st Request for Additional Information Sent:	February 9, 2011
Response to 1 st Request for Additional Information Received:	April 8, 2011 (Addendum 1) April 27, 2011 (Addendum 2)
Processing Deadline (120 days from Complete Application):	April 18, 2011
Permit Fee Deposited by Accounting:	April 19, 2011
2 nd Request for Additional Information Sent:	May 19, 2011
Response to 2 nd Request for Additional Information Received:	June 17, 2011 (Addendum 3) July 22, 2011 (Addendum 4) August 12, 2011 (Addendum 5)
Decision to Hold Public Hearing:	November 21, 2011
Draft Permit Package Issued:	December 5, 2011
Copy of Public Notice sent to DEQ Central Office:	December 5, 2011
Public Notice Published:	December 15, 2011 (all newspapers)
Copy of Public Notice sent to Admin. Board Planning:	December 15, 2011
Received Verification of Publication:	
<i>The Central Virginian</i>	December 19, 2011
<i>Fredericksburg Free Lance-Star</i>	January 6, 2012
<i>Hanover Herald Progress</i>	December 16, 2011
<i>Richmond Times-Dispatch</i>	January 11, 2012
Public Hearing:	January 18, 2012
End of Public Comment Period:	February 9, 2012
SWCB Meeting:	April 5, 2012
Permit Issued:	April 9, 2012

*Due to the large scope of riparian landowners (approximately 3,300), the applicant contacted the Commissioners of Revenue on DEQ's behalf to obtain riparian landowner information for all counties in which surface water impacts are proposed. The riparian landowner information was provided to staff along with the Joint Permit Application (JPA) and associated materials submitted for Part I (VWP Permit No. 10-1256).

3. Project Location:

The North Anna Power Station (NAPS) site is located at 1022 Haley Drive in Louisa County, Virginia. The activities associated with the Part III project will occur in Louisa, Orange, and Spotsylvania, Counties, Virginia.

Intake Location of Surface Water Withdrawal:

City/County: Louisa County
Waterbody: Lake Anna
Basin: York River
Section: 3
Class: III
Special Standards: None
HUC: 02080106
Latitude & Longitude: 38°03'43.3" N -77°47'26.5" W
U.S.G.S. Quadrangle: Lake Anna West
State Watershed No.: F07

Change to shoreline wetlands associated with 3 inch rise:

City/County: Louisa, Spotsylvania and Orange Counties
Waterbody: Lake Anna
Basin: York River
Section: 3
Class: III
Special Standards: None
HUC: 02080106
Latitude & Longitude: 38°04'56" N -77°48'46" W
U.S.G.S. Quadrangle: Lake Anna West, Lake Anna East
State Watershed No.: F06, F07, F08

Off-site Compensation:

Site Name: Woodford Wetland and Stream Mitigation Bank
City/County: Caroline County
Waterbody: Poni River
Basin: York River
Class: III
HUC: 02080106
Latitude & Longitude: 38°07'04" N -77°25'34"
U.S.G.S. Quadrangle: Guinea

4. Project Description:

Overall Purpose and Need

The applicant proposes to construct and operate a new nuclear unit (Unit 3) at the existing NAPS site to provide additional base load electric service needed to meet Virginia's growing demand for electricity caused by increased development from residences, businesses and government facilities. The secondary purpose of the project is to maintain fuel diversity, reduce Virginia's dependence on imported power and promote the regional economy while not contributing to air emissions. The purpose of the proposed surface water withdrawal is to provide water for the operation of the proposed Unit 3.

See page 1 of Addendum 4 – Response to Additional Information Request dated July 22, 2011, for more information regarding project purpose and need.

Overall Project Activities

The VWP regulated activities are proposed to be covered by three VWP Permits for three parts of the project. The applicant submitted a Joint Permit Application (JPA) for each part. The three parts of the project are summarized below:

- Part I – Surface Water Construction Related Impacts, VWP Permit No. 10-1256. Part I of the project proposes surface water impacts related to construction activities.
- Part II – Minor Surface Water Withdrawal for Construction Activities, VWP Permit No. 10-1496. Part II of the project proposes a minor surface water withdrawal for construction related activities.
- Part III – Major Surface Water Withdrawal for Operational Activities and Lake Level Rise, JPA No. 10-2001. Part III of the project proposes a major surface water withdrawal associated with the operational activities of Unit 3 and a change to shoreline wetlands as a result of a permanent increase of 3 inches in the normal target pool elevation of Lake Anna and resulting increase in the water level in the Waste Heat Treatment Facility (WHTF) and is the subject of this permit.

The original JPA for Part I (VWP Permit No. 10-1256) included the proposal of a change to shoreline wetlands as a result of a permanent increase of 3 inches in the normal target pool elevation of Lake Anna and resulting increase in the water level in the WHTF. However, in response to citizen comments received by DEQ during the application process for Part I, the applicant requested on December 17, 2010, that DEQ move the proposal for the 3 inch rise from Part I to Part III (JPA No. 10-2001) to allow additional time to address citizens' concerns.

VWP permit No. 10-1256 for Part I was issued concurrent with VWP permit No. 10-1496 for Part II on April 15, 2011.

Part III Project Activities

As part of the Part III application, the applicant proposes a major surface water withdrawal from Lake Anna for operational activities and a permanent increase of 3 inches in the normal target pool elevation of Lake Anna and resulting increase in the water level in the WHTF associated with a new nuclear unit (Unit 3) at the existing NAPS site to provide additional base load electric service to meet growing demand.

See pages 1-4 of Addendum 4 – Response to Additional Information Request dated July 22, 2011 for more information regarding the purpose and need of the proposed project activities.

5. Water Withdrawal Activities Requested in JPA:

Water Uses

The surface water withdrawal is proposed to be used for the Circulating Water System (CWS), Ultimate Heat Sink (UHS) Cooling Tower Make-up Water System, Station Water System (STW) and Fire Protection Water Supply System (FSS).

Below briefly describes the purpose for each system:

- CWS and UHS Systems: The majority of the withdrawal for these two systems is to supply make-up water to the cooling towers. The consumptive use of water is associated only with these systems and will occur due to evaporative and drift losses.

CWS System – Provides the bulk of cooling for the generation process. This system provides cooling water to the station's main condenser to condense the steam leaving the turbine and to dissipate heat generated by components in the Turbine Building. This system is out-of-service during plant shutdown. The volume of water withdrawn for this system is dependent on ambient air temperature and plant mode of operation. The majority of water conservation measures are implemented through the manner in which this system operates.

UHS System – Provides cooling for systems within the reactor building only. The major cooling loads for this system are the spent fuel pool and the residual heat in the reactor core following shutdown of the reactor. This system operates during normal plant operations and during plant shutdown. The volume of water withdrawn for this system is much smaller than that required for the CWS, and is dependent mostly on ambient air conditions and heat load to the system.

- STW System: Provides water for the Demineralized Water Treatment System. The use of this system is dependent on plant needs and not on ambient air temperature or plant mode of operation. There is no consumptive use for this system during typical operation; however, non-routine maintenance activities may result in isolated steam releases to the atmosphere.
- FSS: Provides water during a fire event. Typically, this system is in stand-by readiness mode, with the exception of the volume of water needed for the initial fill of the system. The withdrawal for this system will occur during a fire event or pipe rupture, periodic flushes and flow tests, and when the jockey pump is activated to maintain system pressure. There is no consumptive use assumed for this system during typical operation of testing and system flushing as it is assumed the water will end up in building drains that will discharge the water back to Lake Anna.

Pages 4, 7-9 of the JPA dated December 2010 and received December 20, 2010, page 5 of Addendum 1 – Response to Additional Information Request dated and received April 8, 2011, and pages 1-2 and 24-26 of Addendum 4 – Response to Additional Information Request dated and received July 22, 2011, detail the water uses of the withdrawal.

Proposed Withdrawal Demand in JPA

The proposed total maximum daily withdrawal volume for operational activities is 31.8 million gallons per day (mgd) and the proposed average daily withdrawal is 18.7 mgd, both of which include the consumptive and non-consumptive volumes. The maximum daily consumptive volume of the withdrawal is 23.3 mgd. The average daily consumptive volume is 14.0 mgd, which is the expected annual consumptive loss as a result of projected water consumption under the mixture of conservation modes given the variations in inflows that has occurred in the historical record.

The proposed total (non-consumptive and consumptive) withdrawal volumes from Lake Anna were calculated from the sum of the non-consumptive volume (blow down) and consumptive volume (drift and evaporation). The proposed total daily average withdrawal volume of 18.7 mgd are based upon two cooling system modes of operation (see Section 6 for more information regarding these modes of

operation) and Unit 3 operating at a 96 percent capacity factor, which assumes the unit is out-of-service 4 percent of the time over the long term (29 year modeling period).

The proposed total maximum withdrawal volumes for all systems combined are based upon Unit 3 operating at a 100 percent capacity factor in the cooling system mode of operation that requires the most water, Energy Conservation (EC) Mode. The total maximum daily value of 31.8 mgd represents the largest one day withdrawal over the modeling period of approximately 29 years. The total maximum monthly and yearly volumes are based upon the maximum daily average withdrawal obtained during 30 day and 365 day running periods over the modeling period, which are 30.2 mgd and 26.0 mgd, respectively. From these values, the proposed total maximum monthly volume of 936 million gallons ($30.2 \times 31 = 936$ million gallons) and total maximum annual volume of 9,490 million gallons ($26.0 \times 365 = 9,490$ million gallons) were obtained.

The maximum consumptive volumes proposed were based upon the evaporation rate (including wet tower drift) of the CWS and UHS cooling towers and the mode of operation of the CWS cooling towers. The evaporation rate for each time step was based upon operating in EC Mode, daily average temperature, and daily average relative humidity. The maximum monthly and yearly consumptive volumes are based upon the maximum daily average consumptive withdrawal obtained during 31 day and 365 day running periods over the modeling period of approximately 29 years with Unit 3 operating in EC Mode at a 100 percent capacity factor, which are 22 mgd and 18.9 mgd, respectfully. From these values, the proposed maximum monthly consumptive volume of 682 million gallons ($22 \times 31 = 682$ million gallons) and maximum annual consumptive volume of 6,884 million gallons ($18.89 \times 365 = 6,884$ million gallons) were obtained.

See pages 5-9 of the JPA dated December 2010 and received December 20, 2010, pages 1-7 of Addendum 1 – Response to Additional Information Request dated and received April 8, 2011, pages 18-20 of Addendum 4 – Response to Additional Information Request dated and received July 22, 2011, and page 5 of Addendum 5 – Response to Additional Information Request dated August 12, 2011, for additional information regarding the proposed water volumes.

Lake Anna Water Budget Model

The proposed withdrawal volumes were determined using the Lake Anna Water Budget Model (model) developed by the Bechtel Corporation that simulates Unit 3 operations using approximately 29 years of historical data. The consumptive loss calculations were based on a model of cooling tower performance that considered energy demand, daily average temperature, and daily average relative humidity. This same model has been used during the U.S. Nuclear Regulatory Commission (NRC) licensing process and the Instream Flow Incremental Methodology (IFIM) study. The data set was updated with more recent data for each process in which the model was used. (See Note No. 1 on page 1 of Addendum 4 – Response to Additional Information Request dated July 22, 2011 for further explanation). The following documents provide additional information on the Lake Anna Water Budget Model: Addendum 1 – Response to Additional Information Request dated and received April 8, 2011, and Part 3, Section 5.2 of ESP application, Revision 9, dated September 2006.

6. Water Withdrawal Related Alternatives Reviewed:

The applicant reviewed different sites for locating the new nuclear reactor and cooling system alternatives to minimize the volume of water needed to meet the purpose of the proposed project. The cooling system alternatives included once-through cooling and closed cooling systems that considered one-hundred

percent wet tower cooling, cooling using varying degrees of wet and dry cooling towers, and one-hundred percent dry tower cooling.

Siting of New Nuclear Reactor

The applicant reviewed alternative sites for construction suitability and operation of a new nuclear power generation facility. In addition to the North Anna Power Station, they also looked at Dominion's Surry Power Station in Surry County, Virginia, U.S. Department of Energy's (DOE) Portsmouth Gaseous Diffusion Plant in Pike County, Ohio and DOE's Savannah River Site in Aiken and Barnwell Counties, South Carolina. The alternative sites analysis was documented in their application to the NRC for an Early Site Permit (ESP) and Addendum 4 – Response to Additional Information Request dated and received July 22, 2011.

NRC stated in their Final Environmental Impact Statement (FEIS) for the ESP dated December 2006 that none of the alternative sites were determined to be environmentally preferable or obviously superior to the North Anna Power Station site. Based upon DEQ's review of the FEIS developed by the NRC, the applicant's ESP application to the NRC, and Addendum 4 – Response to Additional Information Request dated and received July 22, 2011, we concur with the NRC's findings.

The following documents provide additional information regarding the alternative sites reviewed: Addendum 4 – Response to Additional Information Request dated and received July 22, 2011, Part 3, Section 9.3 of ESP application, Revision 9, dated September 2006, and Sections 8 and 9 of Volume 1 of NRC's FEIS (NUREG-1811) for the ESP dated December 2006.

Cooling System Alternatives

The applicant first proposed to cool the new reactor using once-through cooling, the same cooling method used for the existing Units 1 and 2. For Units 1 and 2, once-through cooling water is discharged into the WHTF after it passes through the system, thus requiring a large volume of water to cool the reactors. The originally proposed once-through cooling system for Unit 3 was estimated to withdrawal about 1,640 mgd from Lake Anna. Although all the water would return to the lake, the heat carried with it would result in higher water temperatures in the WHTF. This would cause higher average evaporative losses (consumption) of about 18 mgd. Through coordination with stakeholders, including lake residents, Virginia Department of Conservation and Recreation (DCR), Virginia Department of Game and Inland Fisheries (DGIF), and DEQ, this alternative was dismissed due to concerns related to water usage, thermal impacts and aquatic life effects.

The applicant minimized their proposed use of water by proposing a closed cooling system to cool the proposed third reactor that differs from the existing Units 1 and 2. They demonstrated that a closed cooling system would reduce water consumption, minimize thermal impact to WHTF and Lake Anna, and reduce entrainment and impingement impacts. The applicant reviewed several closed cooling system alternatives to further reduce environmental impacts. For the alternatives reviewed, they evaluated capital cost, operating cost, land use, aesthetic impacts, power generation impacts, and environmental impacts associated with the following closed system cooling alternatives:

1. One Hundred Percent Dry Tower Cooling – This alternative uses no water as all heat is rejected by dry cooling through the use of fans. This alternative was determined to be less efficient and more expensive to implement and operate than wet cooling system alternatives due to limitations in providing sufficiently cooled water during extreme summer temperature conditions that are

necessary for generating plant processes to operate properly. As a result, generation output is limited due to the potential for the unit to be required to shut down completely during extreme summer temperature conditions, which does not meet the project purpose for a base load unit. Specifically, this alternative was demonstrated not to be practicable for the following reasons:

- a. Land area required is 4 times greater (approximately 30 acres) than the selected alternative as this system requires larger size heat exchangers which requires more land.
 - b. Capital costs are approximately 2.5 times greater than the selected alternative.
 - c. Operating cost is 3 times greater than the selected alternative due to the large auxiliary power that the fans consume.
 - d. Reduced power output during hot weather as dry cooling is not as efficient as wet cooling when ambient temperatures are high. Reduced power out does not support the base load generating purpose of the project.
 - e. Expensive development of “first of its kind” technology. Currently, there are no 100 percent dry cooled nuclear power generation units in the world.
2. Two-Thirds Duty Dry/One-Third Duty Wet at Design Conditions – This alternative proposes to reject two-thirds of heat through dry cooling while the remaining one-third of heat would be rejected through wet cooling at design conditions. This alternative was not practicable as the capital cost, operating cost, equipment size and land use was higher than the selected alternative while the water savings was not significantly greater than the selected alternative and has limited potential to reduce frequency in lake level decreases below 248.0 feet above mean sea level (msl). Consumptive water use was not studied in detail since this alternative was not considered to be practicable at an early stage
 3. One-Third Duty Dry/Two-Thirds Duty Wet at Design Conditions (Selected Alternative) – The applicant selected this alternative which proposes to reject one-third of heat through dry cooling and remaining two-thirds of heat rejected through wet cooling at specific design conditions. This alternative allows for operational flexibility to operate the wet tower alone to conserve energy or the dry and wet towers together to reduce water usage when lake levels are below 250.0 feet msl. The selected alternative is discussed in further detail below.
 4. One Hundred Percent Wet Tower Cooling – This alternative proposes heat rejection through a wet cooling tower. The applicant rejected this alternative due to evaporation rates (consumptive water use) higher than the selected alternative, resulting in decreasing lake levels below 248.0 feet msl approximately 11 percent of the time.

The following table summarizes some of the aspects associated with the cooling tower alternatives considered by the applicant.

Summary of Cooling Tower Alternatives Considered				
Wet/Dry Ratio	100 % Dry	2/3 Dry - 1/3 Wet	1/3 Dry - 2/3 Wet*	100 % Wet**
Capital Cost (2006 \$million)	269.9	172.2	102	62.5
Operational Cost (MW)	101	72	46	28
Land Requirement (acres)	39.1	19.4	8.8	4.8
Maximum Daily Consumptive Water Use (cfs)	0	not evaluated	34.2 (22.1 mgd)	36 (23.3 mgd)

* Selected cooling alternative

** 100 percent wet consumptive water usage values based upon proposed hybrid tower. Conventional 100 percent wet tower would result in higher evaporation rates.

See pages 4 through 12 of Addendum 4 – Response to Additional Information Request dated and received July 22, 2011, for additional information regarding the cooling system alternatives reviewed.

Selected Cooling System Alternative (One-Third Duty Dry/Two-Thirds Duty Wet at Design Conditions)

The applicant proposes a closed cooling system that will use a hybrid cooling tower (wet and dry cooling) and a dry cooling tower to minimize the volume of water withdrawn for cooling. Through the IFIM study, operational procedures for the cooling towers were proposed to conserve water for Lake Anna and habitat downstream of the Lake Anna Dam during times of low flow. The IFIM study was conducted by the applicant upon the request of DEQ and the DGIF during their review of the project under Virginia's Coastal Zone Management Act (CZMA) for the applicant's ESP application. It studied the potential affect the consumptive withdrawal volume associated with the selected cooling system alternative for Unit 3 may have on aquatic habitat and recreation in the North Anna and Pamunkey Rivers downstream of the Lake Anna Dam. Staff re-reviewed the IFIM's Final Report dated October 2009 included as Attachment B with the JPA dated December 2010 and received December 20, 2010, and the associated "Handbook: IFIM Data for the North Anna and Pamunkey Rivers, Data Summary" dated October 2009, during the cumulative impact review portion of the application process for Part III of the project.

Below is a description of each cooling system modes of operation:

- Energy Conservation (EC) Mode: Operation of the hybrid tower only, utilizing both the dry cooling and wet cooling components to remove heat.
- Maximum Water Conservation (MWC) Mode: Operation of the dry tower and the hybrid tower. In MWC Mode at design conditions, a minimum of one-third of heat would be removed by dry cooling (the dry tower with the dry section of the hybrid tower) with the remaining heat removed by wet cooling (wet section of the hybrid tower)

EC Mode uses the most water, but is more energy efficient. MWC Mode uses less water but is less energy efficient because energy is consumed to operate fans that would otherwise be available to the electrical grid. The applicant anticipates operating the cooling system in EC Mode from January through July or August and MWC Mode the remainder of the year based upon historical lake levels. As proposed, operating in MWC Mode is estimated to save 686.11 million gallons of water during an average year and 2,166.12 million gallons during a dry year than operating only in EC Mode. Additional information regarding the water use savings provided by MWC Mode is provided in Addendum 5 - Responses to Additional Information Request, dated and received August 12, 2011.

The IFIM study concluded that the proposed consumptive water withdrawal associated with the selected cooling system alternative will increase the occurrence of low flow releases from the Lake Anna Dam (20 cfs) to 6.3 percent, which is 1.7 percent more than the existing condition of 4.6 percent. However, the study further concluded that the affects of the consumptive withdrawal could be mitigated by creating more storage capacity in the lake through an increase in the normal target pool elevation. Through collaboration with state agencies, a lake level increase of 3 inches was agreed upon (see Section 8 for a discussion on water level rise alternatives reviewed). Implementation of a 3 inch rise was determined to reduce the frequency of low flow releases from 6.3 percent to 5.5 percent, approximately 1 percent more

frequent than the existing condition. Overall, the study concluded the selected scenario of the proposed water withdrawal for Unit 3 with a 3 inch rise in water level would have a minimal impact on Lake Anna and downstream aquatic habitat.

The applicant selected this alternative due to the operational flexibility it allows and the water savings over a once-through cooling system or a conventional cooling tower. The proposed Unit 3 cooling system will withdraw approximately 1.62 billion gallons a day less and consume 4 mgd less water than a once-through system like that used in the existing Units 1 and 2 and will consume approximately 7.3 mgd less than the 100 percent conventional wet cooling tower alternative. While the selected alternative will use more water than 100 percent dry cooling, the latter alternative was determined not to be practicable as it does not meet the project purpose due to the costs associated with 100 percent dry cooling. Based upon staff's review of the alternatives analysis conducted by the applicant, the selected cooling system alternative is the least environmentally damaging and most practicable alternative in light of the overall project purpose.

For information on the selected alternative, see the JPA dated December 2010 and received December 20, 2010, pages 1-7 of Addendum 1 – Response to Additional Information Request dated and received April 8, 2011, pages 4-12 of Addendum 4 – Response to Additional Information Request dated and received July 22, 2011, and Addendum 5 – Responses to Additional Information Request dated and received August 12, 2011.

7. Water Withdrawal Volumes and Lake Level Management

Lake Level Management - Cooling System Modes of Operation

Transition between the two cooling system modes (EC Mode versus MWC Mode) during the operation of Unit 3 is based upon the water elevation of Lake Anna and is a condition of the permit to minimize the volume of water withdrawn and consumed (Part I.E.). Through the IFIM study, two cooling system operation modes were proposed to conserve water from Lake Anna and habitat downstream of the Lake Anna Dam during times of low flow. The Unit 3 cooling system is to be operated as follows to reduce water consumed in the cooling of Unit 3 operations (see Section 6 for a description of each mode):

- Lake elevations at and above 250.0 feet msl, operate in EC Mode
- Lake elevations below 250.0 feet msl, operate in MWC Mode.

This set of conditions will insure that the losses in Lake Anna are reduced during times of low lake storage. Based upon staff's review and DEQ's modeling, these conditions are protective of existing beneficial uses.

Lake Anna Dam Flow Releases

Measures are included in the permit (Part I. F) to conserve water levels in the lake and flows downstream of the Lake Anna Dam, which serves to protect beneficial uses in the lake and downstream of the Lake Anna Dam. During the evaluation of this water withdrawal for Unit 3, staff incorporated the release schedule of the existing Virginia Pollution Discharge Elimination System (VPDES) permit for the facility (No. VA0052451) based upon the existing Units 1 and 2 with the necessary modifications and additions to account for the additional withdrawal for Unit 3 proposed in this permit. Prior to initiation of water withdrawal activities authorized by this permit, the applicant shall comply with the Lake Anna Dam flow release conditions in the facility's VPDES permit No. VA0052451.

The Lake Anna Dam release schedule in the permit is as follows:

- Lake elevations at or above 250.25 feet msl, release a minimum of 40 cfs.
- Lake elevations below 250.25 feet msl and above 248.1 feet msl, target a release of 40 cfs.
- Lake elevations at or below 248.1 feet msl, target a release of 20 cfs.

Staff proposes a change to the trigger level from 248.0 to 248.1 feet msl to provide storage for a Flow Augmentation Release (FAR). A Flow Augmentation Release (FAR) of greater than 20 cfs but not more than 40 cfs may be required to alleviate any adverse impact of reduced flows on downstream beneficial uses when dam releases of 20 cfs occur. The following provide guidelines for when a FAR should be considered:

- Lake levels are at or below 248.1 feet msl.
- The 7-day rolling average stream flow at the USGS stream gaging station No. 01671025 on the North Anna River above Little River reads 42 cfs or below.
- The above occurs during June through September.

The FAR will be reserved to be used only when a committee convened once set triggers are met and DEQ decides it is appropriate to increase flows above 20 cfs to address impacts of the reduced releases on downstream beneficial uses. Based upon DEQ's modeling analysis, it is anticipated that the need for a FAR would occur a total of 32 days during a 21 year modeling period (0.4 percent of the time). In addition to the FAR, releases from the Lake Anna Dam may be increased at any time if directed by DEQ to eliminate any adverse impact from reduced flows downstream.

As mentioned under Section 6 of the fact sheet, an IFIM study was conducted that reviewed the potential effects of the consumptive withdrawal on aquatic habitat and recreation of the North Anna and Pamunkey Rivers downstream of the Lake Anna Dam. Through the workgroups associated with the study, DCR provided a recommendation regarding flow releases with the intention of providing better conditions for recreational opportunities on the North Anna River, specifically for paddling. DCR requested recreational flow releases of 177 cubic feet per second (cfs) be provided every Saturday during June and July when the lake level is greater than 250.0 feet msl. The State Water Control Board has consistently required recreational releases for VWP permits for major reservoirs, such as Claytor Lake and Smith Mountain Lake. As a result of staff's modeling analysis, staff proposed recreational flows occur in May and June rather than June and July. By moving the recreational flows to May and June, and triggering when lake elevation is greater than 250.0 feet msl, the mean annual difference in lake elevation as a result of the recreational flows is predicted to be less than 0.08 inches, and would not affect elevations during the drought of record (2002), when recreational releases would not have been triggered. The revised timeframe was coordinated with DCR and DGIF, both of which found the revised timeframe acceptable. Staff included their recommendation as a condition of the VWP permit (Part I.F.5).

Staff Analysis of Applicant's Lake Anna Water Budget Model

Staff evaluated the validity of the applicant's water budget model for the proposed project by reviewing the assumptions included in the applicant's model and comparing it with a model used by DEQ staff to conduct cumulative impact analyses of VWP permits. The applicant's Lake Anna Water Budget Model, developed by the Bechtel Corporation, simulates Unit 3 operations using approximately 29 years of historical data, from October 1978 through October 2007. Since the Unit 3 cooling system is yet to be

built, the expected water use under varying climatic conditions was predicted by employing a numerical model to estimate losses of water due to evaporation and drift. This model produced inflow estimates that matched the observed record of lake elevations, and provided for an estimate of evaporative losses due to Dominion Power operations that would err on the side of overestimating Dominion operational impacts. By overestimating operational impacts, this will better protect the other beneficial uses both in Lake Anna and the North Anna River.

The Bechtel model calculated inflow using a reverse routing procedure that used data from dam releases and storage to determine inflow. This model was used in the preparation of their applications to the NRC for the ESP and Combined Operating License (COL), the IFIM study, and the VWP permit application. During the course of the IFIM study, staff determined this method of calculating inflow was acceptable. For DEQ's modeling analysis, staff extrapolated data from a suitable surrogate watershed to determine inflow. This information was used by staff to verify the estimation tool used by the applicant, and showed that the water-balance model's approach provided a conservative estimate of inflows to the lake.

Impacts associated with the withdrawal were evaluated based on withdrawal volumes estimated by the model, not a set maximum daily or annual volume. The model predicted withdrawals based on cooling tower efficiency scaled to the meteorological conditions and mode of operation as determined by lake level. The consumptive loss calculations were based on a model of cooling tower performance that considered energy demand, daily average temperature and daily average relative humidity.

Staff concluded from their review and modeling analysis that the proposed water usage was acceptable and drafted permit conditions protective of existing beneficial uses.

Permit Withdrawal Limitations

Permit limits were developed with the intent of managing expected water losses to reduce the impacts of Unit 3 operation on water storage in the lake, and the ability of storage to provide for downstream release flows. This permit defines operational procedures for the Unit 3 cooling towers, in addition to limits associated with maximum consumptive and non-consumptive water withdrawal. The withdrawal volumes in the draft permit were determined using the model developed by the Bechtel Corporation. These volumes take into consideration variations in withdrawal and consumptive use that occur based upon cooling system mode of operation (EC Mode versus MWC Mode) and ambient conditions over the 29 year modeling period.

Permit limits on the volume of water that may be withdrawn from Lake Anna are based upon the maximum total withdrawal volumes for all systems, including both consumptive and non-consumptive volumes, and maximum consumptive volumes. Maximum volumes are used to restrict the withdrawal and still allow the applicant to meet the maximum anticipated demand. For this project, the maximum volume is estimated based on EC Mode operating at 100 percent capacity over the 29 year modeling period. Setting a limit based on average volumes is not feasible because long term average values are based on the full modeling period and do not account for extreme events and variability across seasonal and annual time scales.

The maximum daily total (consumptive and non-consumptive) withdrawal of 31.8 mgd is the largest one day withdrawal during the 29 year modeling period. The maximum annual total withdrawal volume is based upon a maximum daily average withdrawal of 26.0 mgd obtained during any 365 day running

period over the modeling period. From this value, the proposed maximum annual volume of 9,490 million gallons ($26.0 \times 365 = 9,490$ million gallons) was obtained.

The maximum monthly and yearly consumptive volumes are based upon the maximum daily average consumptive withdrawal obtained during any 31 day and 365 day running periods over the modeling period of approximately 29 years, which are 22.0 mgd and 18.89 mgd, respectfully. From these values, the proposed consumptive volume limitations for the maximum monthly average of 22.0 mgd and maximum annual volume of 6,884 million gallons ($18.89 \times 365 = 6,884$ million gallons or 6.884 billion gallons) were obtained.

The maximum annual consumptive loss volume of 6,884 million gallons (a mean daily rate of 18.89 mgd) deals with the maximum withdrawal that could result in a single year if inflows were such that lake levels never dropped below full. This maximum is only possible if unusually high inflows to Lake Anna were to occur, resulting in a zero incidence of surface elevation triggers requiring water conservation operations in Unit 3.

Staff elected to limit the total withdrawal (non-consumptive and consumptive volumes) based upon daily and annual (calendar year) volume limitations. A monthly limit was not included as this volume was not significantly different than the daily limit used consecutively for a monthly time period. The majority of the total withdrawal volume is to supply make-up water for cooling in a closed system. Blow down (i.e. discharge, which represents the non-consumptive volume) will not occur each day that a withdrawal occurs. Thus, it will not be possible to verify on a daily basis that the consumptive volume limitation was met for the amount of water withdrawal on the same day. Therefore, staff elected to limit the consumptive volume based upon monthly and annual (calendar year) volume limitations for compliance purposes. Using this approach provides operational flexibility, avoids putting the applicant in unnecessary potential compliance situations, and still protects existing beneficial uses.

The permit includes conditions, in addition to the conservation measures and withdrawal requirements based upon lake level that prevents the applicant from withdrawing the maximum volume without need or reason. To ensure that the actual operational impacts of Unit 3 do not exceed those that were predicted by the Lake Anna Water Budget Model, this permit requires that the applicant to report and compare the predicted consumptive losses from the model to the actual consumptive losses observed during daily operation. Part I.G.6 of the permit requires the applicant to evaluate every three years actual consumptive water usage against modeled consumptive water usage to determine whether actual usage exceeds usages predicted by the model during similar operational schedule and meteorological conditions. Staff elected to require three year evaluation periods to ensure the maximum allowed withdrawal volumes are not taken year after year without need or reason. The intent of this approach is to limit the withdrawal to a condition more reflective of the scenario modeled during the impact assessment completed through the IFIM study and the DEQ's cumulative impact modeling. The permit also includes a condition (Part I.D.5) to ensure the cooling towers operate as modeled, by limiting the maximum rates of evaporation for each mode of operation.

Demonstration of System Performance

Permit condition Part I.H.1 requires the applicant to submit a certificate of conformance from a testing agency certified by the Cooling Tower Institute to demonstrate that the cooling tower will operate according to the modeled evaporation estimates for each mode of operation. The conformance certification shall demonstrate through test and analysis that maximum rates of evaporation during normal

operation at 0.4 percent exceedance ambient conditions are no greater than 16,300 gallons per minute (gpm) for EC Mode and 11,200 gpm for MWC Mode as required by Part I.D.5. The 0.4 percent exceedance ambient conditions are 95 degrees Fahrenheit (F) dry bulb temperature and 79 degrees F wet bulb temperature. Ambient conditions at the site will be less than or equal to these temperatures 99.6 percent of the time.

Drought Response Plan

See the drought response plan submitted under transmittal letter dated and received December 2, 2011, or the most recent DEQ approved plan.

8. Surface Water Impacts:

Staff determined that the actual raising of the normal target pool elevation will not adversely affect the function and values of surface waters. The permit authorizes a change to shoreline wetlands as a result of a permanent increase of 3 inches in the normal target pool elevation of Lake Anna and resulting increase in the water level of the WHTF.

Due to the relationship between Lake Anna and the WHTF, there is not a normal target pool elevation in the WHTF as the operating water level is dependent on the water level in Lake Anna, station operating conditions (such as number of pumps running for the existing Units 1 and 2), and the configuration of stop logs at Dike 3 (where the WHTF discharges into Lake Anna). Therefore, the increase in lake level will result in a shift in the elevation patterns in the WHTF, but will not result in a static water elevation.

Surface water impacts associated with construction of the intake structure for Unit 3 were authorized under VWP Individual Permit No. 10-1256 for Part I of the project.

Water quality impacts are expected to be temporary and minimal provided the applicant abides by the conditions of the permit. A change to state waters may occur. However, the impacts have been avoided and minimized to the greatest extent practicable.

Avoidance and Minimization of Shoreline Wetland Impacts

The IFIM study determined the consumptive water withdrawal will increase the occurrence of low flow releases (20 cfs) from the Lake Anna Dam to 6.3 percent of the 29 year modeling period, which is 1.7 percent more frequent than the existing condition. Therefore, the applicant reviewed several alternatives for increasing lake elevations during the IFIM study to create more storage to mitigate the effects of the consumptive water withdrawal. The scenarios reviewed included a seasonal 3 inch increase, a permanent 3 inch increase, a 6 inch increase and a 7 inch increase in lake levels. The seasonal 3 inch increase was eliminated due to uncertainty regarding the reduction in low flows and predictions regarding future meteorological conditions. The applicant determined any effects of the withdrawal on downstream flows would be eliminated through an increase of 7 inches. However, this alternative, as well as the 6 inch increase alternative, were dismissed due to concerns the applicant received from stakeholders on the potential affect the 6 or 7 inch rise may have on shoreline and existing boat docks and ramp structures. Additionally, the applicant determined that the 6 inch and 7 inch increase alternatives would result in over 13 acres of additional impacts to shoreline wetlands than those associated with a 3 inch increase in lake level.

The selected alternative of a 3 inch increase in water elevation was agreed upon through agency deliberations on the IFIM study. This increase in water level was selected as it will mitigate the effects of the consumptive withdrawal while also minimizing impacts to shoreline wetlands. A 3 inch rise in water levels decrease the occurrence of low flow releases associated with the consumptive withdrawal for Unit 3 from 6.3 percent to 5.5 percent over the 29 year modeling period, resulting in low flows occurring 1 percent more frequently than the existing condition. The selected alternative also addresses the concerns of lake stakeholders. Under existing conditions, the water elevation of Lake Anna is below 250.0 feet msl approximately 35 percent of the time. Staff analysis indicates the proposed 3 inch rise will offset the effects of the major surface water withdrawal and recreational flow release so that there will be no increase in occurrence of water elevations below 250.0 feet msl.

Staff Review of Proposed Three Inch Rise

Based upon staff's review of this proposed activity, the proposed 3 inch increase in water elevation in the normal target pool elevation of Lake Anna and the resulting increase in the water level in WHTF have potential to result in a change in shoreline wetland function and/or acreage. During pre-application coordination, staff requested a desktop analysis to determine an estimated amount of wetlands potentially affected by an increase in water elevation to determine appropriate wetland compensation. As part of the desktop analysis conducted by the applicant, they evaluated shoreline areas for potential wetlands and determined wetland areas with a high potential to be affected by the proposed 3 inch increase in water elevation. Their analysis estimated the increase in water elevation could potentially affect approximately 8.14 acres of wetlands.

A desktop analysis of the potential change to shoreline wetland was appropriate due to the size of the area under review (approximately 272 miles of shoreline) and the nature of the proposed activity. The purpose of the desktop analysis was to: 1) identify potential areas with a high likelihood of being wetland, and 2), wetland areas with potential to experience an increase in inundation. The analysis was not intended to provide a definitive location of impacts. For the purposes of the analysis, determination of the wetland type was not required. Based upon staff's review of the information provided during pre-application coordination and site inspections conducted on July 1, 2009, and November 18, 2009, the wetland acreage with a high potential to be affected by the 3 inch rise due to a change in wetland function and/or acreage were adequately assessed. See the pre-application folder associated with this project for additional information regarding the desktop analysis of shoreline wetlands.

While a change to shoreline wetland may occur due to an increase of 3 inches in water level, the impact is proposed as part of the mitigation for the water withdrawal. Without an increase in water level to provide additional storage volume, the effect from the consumptive water withdrawal will not be mitigated and will result in increasing the amount of time that low flow releases from the Lake Anna Dam occur by approximately 1.7 percent from the existing condition. A 3 inch increase in water level will mitigate the occurrence of low flows by reducing the frequency by 0.7 percent.

Staff determined that the nature of the impact from lake level rise on shoreline wetlands will be temporal in nature as staff anticipates only a temporary change in wetland function and/or acreage may occur. The impacts to shoreline wetlands as a result of the 3 inch rise are considered potential and temporary because 3 inches of additional inundation in a wetland system can affect a wetland in different ways depending on the time of year the inundation occurs, the duration of the inundation, the existing water regime, and the species of plants inundated. Additionally, a wetland system affected by an increase in inundation will shift and reestablish within the modified transition zone between the upland and lacustrine environment.

The applicant proposes to compensate for a change to shoreline wetlands at 8.14 credits through the purchase of wetland credits from an approved wetland bank located within the same or adjacent U.S. Geologic Survey (USGS) Hydrologic Unit Code (HUC) river watershed as Lake Anna or the purchase of credits from the Virginia Aquatic Resources Trust Fund (VATRF). Therefore, staff determined that the benefit gained from increasing the storage volume of the lake by 3 inches to mitigate the effects of the water withdrawal outweighs the possible change to shoreline wetlands.

Staff reviewed the proposed impacts and potential affect these activities may have on the beneficial uses of the lake. Staff determined that an increase of 3 inches in the water level will not prevent the lake from being recreated on or in through the means of boating, fishing or swimming nor will it effect the beneficial use of electrical generation. Therefore, staff determined that the 3 inch rise will not harm the beneficial uses of Lake Anna.

In regards to private property, the applicant submitted information that they own the bottomland and surrounding shore land of Lake Anna and the WHTF, including associated riparian rights, up to 255 feet msl. The legal instruments convey the applicant's right to use the land for the operation of the North Anna Power Station, including the right to raise and lower water levels. See page 9-11 and the associated attachments of Addendum 1 – Response to Additional Information Request dated and received April 8, 2011, for additional information regarding the applicant's ownership of the land.

Based upon staff review, the proposed activities are the least environmentally damaging and practicable alternative, all impacts will be adequately mitigated through the proposed compensation, and beneficial uses will not be impacted by a 3 inch rise in water level.

9. Compensation for Unavoidable Impacts:

Mitigation for the Effects of the Consumptive Water Withdrawal

Impacts due to the consumptive surface water withdrawal are proposed to be mitigated through an increase of 3 inches in the normal target pool elevation of Lake Anna and resulting increase in the water level of the WHTF to provide additional storage volume.

Compensation for a Change to Shoreline Wetlands

Compensation for the change to shoreline wetlands associated with a permanent increase of 3 inches in the normal target pool elevation of Lake Anna and the resulting increase in the water level of the WHTF shall be provided at a ratio of 1:1 (8.14 wetland credits). This compensation ratio was determined to be appropriate as staff anticipates the change may result in a temporary change in wetland function and/or acreage. However, staff anticipates a net increase in wetland acreage because permanent losses in wetland function and/or acreage are not anticipated from a 3 inch rise in water elevation.

Compensation requirement of 8.14 credits shall be provided through one or a combination of the following:

- Purchase of wetland credits from an approved wetland mitigation bank located within the same or adjacent USGS HUC within the same river watershed as Lake Anna. The mitigation bank from which wetland credits are purchased shall be authorized by the Interagency Review Team to sell credits to the permitted impact site.

- Purchase of credits from the VARTF.

The compensation package conforms with the preference hierarchy of the 2008 Compensatory Mitigation Rule issued by the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers (USACE) and DEQ's Guidance Memorandum No. 09-2004 (Applying Compensatory Mitigation Preferences Provided in the EPA Mitigation Rule to Virginia Water Protection Permitting).

Memorandum of Agreement between Dominion and DGIF

This permit incorporates by reference the Memorandum of Agreement (MOA) dated October 28, 2009, between Virginia Electric and Power Company (D/B/A/ Virginia Power) and the DGIF, inclusive of any approved amendments, concerning the mitigation of detrimental impacts to aquatic resources.

10. Site Inspection:

Pre-application site visits were conducted on July 1, 2009 and November 18, 2009, and a JPA site inspection of the Lake Anna Dam was conducted on April 2, 2011. Summaries of the pre-application site inspections are located in pre-application folder filed under VWP Permit No. 10-2001. A summary of the application site inspection is located under file VWP Permit No. 10-2001.

11. Relevant Regulatory Agency Comments:

As part of the application review process, DEQ contacted the required state agencies. Any relevant agency comments were addressed in the VWP individual permit Part I - Special Conditions. Therefore, the staff anticipates no adverse effect on water quality and fish and wildlife resources provided the applicant adheres to the permit conditions.

Summary of State Agency Comments and Actions

By email/letter dated January 18, 2011, comments were requested from the following state agencies: DGIF, DCR, Virginia Marine Resources Commission (VMRC), Virginia Department of Health (VDH), and the Virginia Department of Agriculture and Consumer Services (VDACS). Failure to provide comments within 45 calendar days of the DEQ request for comments infers that the agency has no comments on the project activities. Comments were not received from VDACS.

VMRC

VMRC provided comments by email dated January 24, 2011. They commented that activities within the purview of their program were permitted under Part I, VWP Permit No. 10-1256.

VDH

VDH provided comments by memorandum dated January 25, 2011, and received January 26, 2011. They commented that they reviewed the project for construction related impacts to surface water at Lake Anna in Louisa County and that there are no public water supply raw water intakes located in the vicinity of the facility.

In response to staff's request for comments on Part I (VWP Permit No. 10-1256) of the project, VDH provided comments in a letter dated September 23, 2010, and received September 24, 2010, regarding the areas downstream of Lake Anna. The comments provided were as follows:

- The Doswell Treatment Water Plant (4.0 mgd conventional) in Hanover County has a raw water intake on the North Anna River near Route 30, east of Interstate 95. The intake is more than 15 miles from the Unit 3 project site. VDH recommended that Hanover County Department of Public Utilities be made aware of the proposed project and be provided an opportunity to participate in project discussions as they relate to any potential impacts to river flows to the raw water intake, etc.

Staff sent an email to Hanover County Department of Public Utilities (Attn: Mr. Frank Harksen) on September 15, 2010 (for Parts I and II), and January 31, 2011 (for Part III), providing them with advance notification of the proposed project. The emails included a copy of the riparian landowner notification letter and project summary. Additionally, the applicant had previously responded to comments from Hanover County on the draft IFIM study before it was made final, which addresses the proposed major water withdrawal and potential impacts to river flows.

Staff invited downstream reporting water withdrawal users and stakeholders identified in the LLCP to meet with staff on June 21, 2011. The purpose of the meeting was to provide an opportunity for staff to understand downstream stakeholders' concerns regarding Part III of the project so that staff may better address their concerns during the application process. Representatives from Hanover County attended the meeting.

Staff invited those parties with a history of interest in the proposed project as well as local officials to meet with staff on November 17, 2011. The purpose of the meeting was to provide information to interested parties on the modeling analysis conducted by staff and proposed draft permit conditions. Representatives from Hanover County attended the meeting.

- The 1.9 mgd water treatment plant in Gloucester County is much further away and will not be impacted.
- There are no public water supply facilities in Orange, Spotsylvania, and Caroline Counties (e.g.; raw water intakes, downstream, groundwater sources, treatment units, distribution system components) that will be impacted by the project activities.

DCR

DCR provided comments by memorandum dated March 11, 2011, and received by email dated March 11, 2011. In their memorandum, DCR provided the following comments:

- The Division of Planning and Recreational Resources commented that the North Anna River is one of the most paddled rivers in the region. They support the recommendations in the 2009 IFIM study. Specifically, the recommendation pertaining to providing recreational flow releases of 177 cfs during the peak recreational season, each Saturday in June and July, when lake elevations exceed 250.0 feet msl.

Staff included the recommendation as a condition of the permit (Part I.F.5) that requires recreational flow releases of 177 cfs be provided each Saturday in May and June when lake elevations exceed 250.0 feet msl. Following the conclusion of staff's modeling analysis; recreational flow releases may be more beneficial when provided in May and June when lake

levels are above 250.0 feet msl. The change in the time period was coordinated with DCR, which commented the change was acceptable.

- The Division of Natural Heritage commented that they do not anticipate that the proposed project will adversely impact natural heritage resources or affect any documented state-listed plants or insects. They also commented that their files do not indicate the presence of any State Natural Area Preserves under DCR's jurisdiction in the vicinity of the project.
- The remaining divisions of DCR have no comments regarding the scope of the proposed project.

By email dated May 19, 2011, staff requested DCR provide clarification on the status of comments regarding the 3 inch rise from DCR's Division of State Parks. Clarification was requested because in a letter to DEQ providing comments on federal consistency of the project under CZMA dated January 7, 2011, the Division of State Parks commented that Lake Anna State Park will be impacted by the proposed 3 inch rise in lake elevations and the extent of the impact was not able to be determined. They also requested coordination with Dominion to discuss potential impacts to the park from the proposed lake level rise. However, comments submitted to DEQ-VWP Permit Program in response to staff's request for comments on activities proposed under Part III, VWP Permit No. 10-2001, did not include comments on the proposed 3 inch rise. DCR provided the following comments specific to the 3 inch rise by email dated May 23, 2011:

- Division of State Parks had been coordinated with and DCR has determined that a 3 inch rise will not negatively impact the Lake Anna State Park.

By email dated June 7, 2011, staff requested DCR provide clarification on their recommendation to provide recreational flows. Staff requested details on the time period that recreational releases should be initiated and the duration of the releases, as well as the intent or desire of having the recreational release. Staff also provided a comment received from the Lake Anna Civic Association (LACA), which commented that recreational flows of 177 cfs every Saturday only be allowed when the elevation of Lake Anna is at and above 250.25 feet msl instead of the proposed 250.0 feet msl. As DEQ anticipated receiving the same comment during a public comment period on a draft permit, this comment was coordinated with DCR in case they would like to address it during the application process rather than wait until the public comment period. DCR commented in their memorandum dated June 22, 2011, the following:

- The intent of the recreational release is to meet demand for river access, fishing and canoeing opportunities, and
- The recreational months should be extended from Memorial Day till mid October to meet greater demand later in the season.

By email dated June 28, 2011, staff requested DCR provide further clarification on their recommendation to provide recreational flows, including specific details on the timing and the duration of the flows and the purpose for continuing recreational release in August, September and October. DCR responded via email dated July 5, 2011, providing the following revised comments:

- The length of time for the proposed release should not be changed.
- The time of day should remain as proposed.

- The recreational releases shall remain the same (Saturdays in June and July) when lake levels allow it.

During a phone conversation and in an email dated July 11, 2011, DCR clarified that they no longer proposed that recreational flows be continued in August, September and October, and that DEQ should consider their original comments provided by memorandum dated March 11, 2011 (reiterated in follow-up email correspondence), with the exception that DCR was agreeable to changing the requirement to provide recreational flows when the elevation of Lake Anna is at or above 250.25 feet msl, instead of 250.0 feet msl as originally proposed.

DEQ's modeling analysis of lake levels and cumulative downstream impacts, demonstrated that the original lake level trigger (250.0 feet msl) was far more likely to result in actual recreational releases, particularly in May and June, than the 250.25 level. DEQ's modeling of releases based on the 250.25 trigger virtually eliminated recreational releases from occurring which was inconsistent with the intent to provide recreational releases. An additional benefit of shifting to the May and June timeframe for recreational releases is more stable lake levels during the driest months of the summer and the ability to retain most of the FAR storage should it be needed. By email dated October 12, 2011, staff again re-coordinated the recreational flow releases with DCR. Staff proposed to require that recreational flows be provided every Saturday in May and June when the lake level is above 250.0 feet msl. DCR responded by email dated October 24, 2011, that they did not object to the proposed changes.

DGIF

DGIF provided the following comments listed by proposed activity in their email dated March 4, 2011.

- Lake level rise: DGIF does not anticipate adverse impacts upon resources under their jurisdiction as a result of the proposed activities. They recommended that all impacts upon wetlands associated with the lake level rise be appropriately mitigated.

Staff included in the permit a compensation requirement for the change to shoreline wetlands associated with a permanent increase of 3 inches in the normal target pool elevation of Lake Anna and the resulting increase in the WHTF at a ratio of 1:1 (8.14 wetland credits). This compensation ratio was determined to be appropriate as staff anticipates the change may result in a temporal change in wetland function and/or acreage.

- Major Water Withdrawal:
 - Dam release schedule: DGIF commented they are agreeable to the dam release schedule proposed by Dominion in their December 2010 JPA.
 - Mitigation: DGIF commented they are supportive of the applicant's mitigation measures related to impacts upon downstream aquatic resources. DGIF commented the proposed measures include the development of a Memorandum of Agreement between the applicant and DGIF, implementation of recreational flow releases from the dam, and increasing the lake level by 3 inches.

Staff included a reference to the MOA between DGIF and Dominion in the permit (Part I.I.6) and the requirement to submit documentation indicating compliance with the provisions of the MOA.

- Intake Construction: DGIF recommended conducting any instream activities during low or no-flow conditions, using non-erodible cofferdams or turbidity curtains, blocking no more than 50 percent of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures.

Construction of the intake structure was reviewed and permitted under VWP Permit No. 10-1256. Intake construction activities will occur in Lake Anna and will be conducted in the dry using a sheet-pile cofferdam and turbidity curtain.

By email dated May 18, 2011, staff requested that DGIF provide comments specific to the applicant's proposed specifications for the intake structure of 2 millimeter (mm) mesh screen size and 0.5 feet per second (fps) flow velocity. The applicant indicated in their application that these specifications were recommended by DGIF in a document dated July 7, 2006. DGIF provided the following comments specific to the intake structure in an email dated May 18, 2011:

- DGIF commented they are agreeable to the 2 mm mesh intake screen and no greater than 0.5 fps flow velocity for the major water withdrawal at Lake Anna. They said they understand that the mesh screen size and flow velocity represents a deviation from their standard recommendation of a 1 mm mesh screen and no greater than 0.25 fps flow velocity.

By email dated June 7, 2011, staff requested DGIF provide comments on the request for clarification on DCR's recommendation to provide recreational flow releases each Saturday in June and July. Staff also provided a comment received from the LACA, which commented that recreational flow releases of 177 cfs every Saturday only be allowed when the elevation of Lake Anna is at and above 250.25 feet msl instead of the proposed 250.0 feet msl. As DEQ anticipated receiving the same comment during a public comment period on a draft permit, this comment was coordinated with DGIF in case they would like to address it during the application process rather than wait until the public comment period.

- DGIF commented that DCR should take the lead on answering questions related to the recreational flow releases, but based on their knowledge the recreational releases would not result in adverse biological impacts and could provide recreational benefits. DGIF supported DCR's proposal. DGIF's files indicated that the recreational flow release would begin on Friday evening for a period of up to 18 hours (assuming water is available), making additional water available downstream by Saturday. The purpose of the release, as they understood it, was to provide more water downstream to allow for a preferred recreational experience (less portaging, more paddling).

Staff copied DGIF on the June 28, 2011 email to DCR requesting clarification on their recommendations regarding recreational flows and for continuing recreational release in August, September and October. DGIF provided the following comments regarding the extension of recreational flows in an email dated June 30, 2011:

- DGIF is not in support of the proposal to continue recreational flow releases beyond July.

- DGIF is agreeable to DEQ changing the requirement to provide recreational flows of 177 cfs when the lake level is at or above 250.25 ft msl. Allowing these releases when the lake level is at or greater than 250.0 ft msl is protective of the aquatic habitats and residents, but the proposed change to 250.25 ft msl is also protective, perhaps even more so than the original proposal.

By email dated October 12, 2011, staff re-coordinated the recreational flow releases with DGIF due to changes proposed by staff based upon completion of DEQ's modeling analysis of the proposed releases. Following the conclusion of staff's modeling analysis; staff proposed that recreational releases occur every Saturday in May and June when lake levels are above 250.0 feet msl. DGIF responded by email dated October 24, 2011, that they were agreeable to the proposed changes.

Staff coordinated with DGIF regarding staff's modeling analysis and the proposed flow augmentation release. DEQ staff was able to demonstrate to DGIF that the 250.0 feet msl trigger, combined with moving the release period back to May and June resulted in no significant impact to downstream habitat curves developed from the IFIM and may even improve habitat in a critical spawning period.

By email dated October 7, 2011 and October 11, 2011, staff coordinated with DGIF a preliminary draft permit that included the proposed Lake Anna Dam release schedule based upon staff's modeling analysis and a revised biological monitoring plan for when dam releases of 20 cfs are required. By email dated October 24, 2011, DGIF responded their concurrence with the preliminary draft permit and support for maintaining the biological monitoring requirement.

Summary of Federal Agency Comments and Actions

USACE

The USACE reviewed the change to shoreline wetlands during the application process for Part I, VWP Permit No. 10-1256.

Staff provided the USACE with the opportunity to comment on the proposed activities via email dated January 18, 2011. The USACE provided comments on January 25, 2011, that the USACE is considering all activities within the purview of their program under one application (JPA No. 10-1256), including the change to shoreline wetland associated with the 3 inch rise. The USACE issued a permit for activities within their purview on September 29, 2011.

NRC

The applicant requested federal consistency concurrence from Virginia on the ESP under the CZMA. The Commonwealth issued its conditional concurrence that the proposal in the ESP was consistent with the Virginia Coastal Program by letter dated November 21, 2006. The conditional concurrence that pertained to the VWP Permit Program was to obtain permits and approvals necessary for the proposed activities prior to construction and operation of the proposed unit and the inclusion in the NRC's approval of the ESP application a condition requiring completion of an IFIM study. Additionally, on November 22, 2010, the applicant requested federal consistency concurrence from Virginia on their COL application for the proposed Unit 3. The Commonwealth issued its conditional concurrence that the proposal in the COL application to the NRC was consistent with the Virginia Coastal Program by letter dated May 16, 2011. The conditional concurrence that pertained to the VWP Permit Program was compliance with all conditions of the VWP permits issued for Part I (VWP Permit No. 10-1256) and Part II (VWP Permit No. 10-1496) and conditions of any future VWP permit issued for Part III.

Staff provided the NRC with the opportunity to comment on the proposed activities via email dated January 18, 2011. No comments were received.

12. Public Involvement during Application Process:

Pre-Application

9 VAC 25-210-75 of the VWP Permit Program regulations requires those who intend on submitting an application for a new or expanded major surface water withdrawal provide an opportunity for public comment on the proposed project, and shall assist in identifying public concerns or issues prior to filing a VWP individual permit application. The regulation also says that if the potential applicant receives a request for a public information meeting, at least one meeting must be held.

The applicant public noticed two public informational meetings for the proposed major water withdrawal in two local newspapers, *The Central Virginia* and *Fredericksburg Free Lance Star*. The informational meetings were held in the evening on August 24 and 26, 2010. Transcripts of the sessions were provided to staff under Attachment C-2 of the JPA received December 20, 2010.

During the comment period, the applicant received 16 written/oral comments from individuals and/or individuals representing organizations. The applicant provided those comments under Attachment C-2 of the JPA. Also, the applicant summarized the comments and provided their response to each, which was provided under Attachment C-1 of the JPA.

Riparian/Adjacent Landowner Notification and Local Government

Staff notified landowners by letter dated February 1, 2011, of the agency's receipt of the VWP permit application for Part III. The letters were sent to approximately 3,300 landowners located adjacent to an impact area and within one-half mile downstream in non-tidal areas of proposed intake location. The area of notification included those individuals owning riparian land and/or land adjacent to Dominion's property that provides access to Lake Anna and the WHTF. Staff also sent an email of advance notification to localities (Attn: County Executives), citizens who attended one of two informational meetings hosted by the applicant on August 24 and 26, 2010, citizens who attended the November 15, 2010 meeting hosted by LACA, and stakeholders identified in the LLCP in the VPDES permit for the facility.

Staff received 112 letters returned by the U.S. Postal Service that were marked undeliverable. Staff received 13 responses from 13 citizens from the notifications.

Public Meetings

- On October 20, 2010, staff met with citizens from LACA. The purpose of the meeting, held with three citizens representing LACA, was for LACA to voice their concerns and comments to staff. Also, for staff to address any questions the citizens had and to provide the current status of the applications received at that point.
- On November 15, 2010, staff was invited to and attended a citizen meeting hosted by LACA that was also attended by the applicant. This meeting was one of the biannual informational meetings citizens have with Dominion to obtain information on NAPS and related topics. In addition to citizens from LACA, also in attendance were two members from the Louisa County Board of

Supervisors, Friends of Lake Anna (FOLA), Lake Anna Commerce Commission, and concerned citizens not affiliated with any organization. Staff provided citizens with a status of the applications received by that point (Parts I and II) and a handout summarizing the citizen comments received by staff at that point on all parts of the proposed project and staff's responses to those comments. Staff then addressed any questions or topics the citizens wanted to discuss.

- The public hearing was held jointly for Parts I (VWP Permit No. 10-1256) and II (VWP Permit No. 10-1496) and the comment period for these permits ran from January 12, 2011 through March 4, 2011. During the joint public hearing and comment period, staff received comments on the Part III application. These comments were addressed and included with the State Water Control Board (SWCB) package for their April 2011 meeting to provide a timely response to citizen comments on that application. Staff considered those comments submitted at that time for Part III during the application process for this permit.
- On March 7, 2011, staff met with three citizens representing LACA. The purpose of the meeting was to provide an opportunity for staff to understand LACA's concerns regarding Part III of the project so that staff may better address their concerns during the application process.
- On April 26, 2011, staff met with 2 citizens from FOLA and 1 citizen not identifying himself with FOLA. FOLA also invited the Louisa County Administrator and two members of the Louisa County Board of Supervisors. The purpose of the meeting was to provide an opportunity for staff to understand FOLA's concerns regarding Part III of the project so that staff may better address their concerns during the application process.
- On May 12, 2011, staff was invited to and attended a citizen meeting hosted by LACA that was also attended by the applicant. This meeting was one of the biannual informational meetings citizens have with Dominion to obtain information on NAPS and related topics. Staff provided citizens with a status of the three Parts of the project and the anticipated schedule for Part III. Staff then addressed citizens' questions.

On June 21, 2011, staff met with downstream reporting water withdrawal users and stakeholders identified in the LLC. The purpose of the meeting was to provide an opportunity for staff to provide these stakeholders with a status of the proposed project and to understand downstream stakeholders' concerns regarding Part III of the project so that staff may better address their concerns during the application process.

On November 15, 2011, staff met with two citizens from LACA and FOLA to address questions regarding DEQ's modeling analysis.

- Staff invited those parties with a history of interest in the proposed project as well as local officials to meet with staff on November 17, 2011. The purpose of the meeting was to provide information to interested parties on the modeling analysis conducted by staff and proposed draft permit conditions.
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Throughout the application process, staff received and sought comments from lake and downstream stakeholders on the proposed activities. This allowed staff to better understand these groups' concerns, thus allowing staff to address such concerns during the application process through the initial development of a draft permit. Comments received prior to the public participation process that were incorporated into the public noticed draft permit are summarized below.

- Request to include LACA on the list of those to be notified when the LLCP is implemented (i.e. when lake levels drop to or below 248.0 feet msl).

Staff included this comment as a condition of the permit under Part I.F.3.a.

- During the application for Part II, the minor water withdrawal for construction related activities (VWP Permit No. 10-1496); staff received requests for water withdrawal data to be provided to the public instantaneously via the internet. Staff received a similar request for the major water withdrawal from LACA.

Staff included a permit condition that requires the applicant post their water withdrawal reports on a publicly accessible website (Part I.H.5). Staff determined quarterly reporting of withdrawal data is sufficient to support compliance efforts.

- During the application process for all parts of the project, staff heard concerns that the withdrawal volumes proposed were based upon a model.

All water withdrawal permits are developed based on modeling. Staff included a permit condition (Part I.G.6) that requires the applicant to evaluate every three years actual consumptive water usage against modeled consumptive water usage to determine whether actual usage exceeds usages predicted by the model during similar operational schedule and meteorological conditions. This will allow validation of model estimate and can form the basis for adaptive management in the future. Staff elected to require three year evaluation periods as the time period is sufficient to provide adequate data to conduct such an analysis.

- Staff received comments that lake level monitoring be updated from the applicant's current method of using a staff gauge, to technology that is digital, real-time, and protects against error created by wave action.

Staff included a permit condition, Part I.G.2.a, that requires submittal of a Lake Level Monitoring Plan that includes requirements for automated measurement and, uses technology that minimizes the effects of wave action and electronically transmits the data to a data management system at a frequency of at least hourly.

- During the application period, request that a permit require monitoring of withdrawal volumes through a measuring device versus calculated using pump rate and time.

Part I.G.1.a and b of the draft permit requires that daily withdrawal and discharge volumes be monitored using flow totalizer technology. Part I.G.1.d of the permit requires that the applicant submit a withdrawal monitoring plan that includes the specific monitoring technology to be used.

- Requests during the application period that the 100 hour allowance to operate in MWC Mode with the dry tower fans turned off during periods of high electricity demand have parameters for which this allowance may be used, such as air temperature, humidity or similar.

Staff included a permit condition that places parameters on when the 100 hour allowance to meet high electricity demand may be used. Part I.E.1.b limits usage of the allowance to times when lake levels are above 247.0 feet msl and outside ambient air temperature measured at the site is great than 90 degrees Fahrenheit. This limits the use to times when the air cooling is least efficient.

13. Public Comments received during Comment Period:

The public notice was published in *The Central Virginia, Fredericksburg Free Lance-Star, Hanover Herald Progress*, and *Richmond Times-Dispatch* on December 15, 2011. The public comment period ran from December 16, 2011 to February 9, 2012.

Notification of the draft permit and public hearing and copies of the public notice were sent to the localities in which activities are proposed, all riparian landowners notified of the receipt of the application, and to State Water Control Board members.

Staff received 171 letters returned by the U.S. Postal Service that were marked undeliverable.

During the public comment period, staff received written and oral comments from 75 respondents, which private citizens and 11 non-profit organizations, businesses and/or local government. The non-profit organizations, businesses, and/or local government represented were Coastal Canoeists, Dominion Virginia Power, Friends of Lake Anna (FOLA), Friends of the Rivers of Virginia (FORVA), Hanover County, Lake Anna Business Partnership, Lake Anna Civic Association (LACA), Louisa County Board of Supervisors, Louisa County Chamber of Commerce, Louisa County Water Authority, and White Birch Paper Bear Island LLC Division. Of the comments submitted, 67 comments were in support of the permit, 6 comments were not in support of the permit, 1 comment did not state support or lack of support and 1 comment requesting denial of the permit. Staff also received requests for information from 23 persons.

The public hearing was held January 18, 2012, in the Auditorium of Louisa County Middle School in Mineral, Virginia. Mr. Robert Dunn served as the Hearing Officer. During the hearing, there were 17 speakers.

Summary of All Comments Received

The following is a summary of comments voicing concern that were received during the comment period and are within the purview of the VWP Permit Program:

- Concerns regarding the volume of water proposed to be withdrawn and consumed for the operation of Unit 3, including requests for more dry cooling.
- Concerns that conservation measures were not considered or are not adequate, resulting in too much water being used, affecting the uses of Lake Anna and areas downstream of the Lake Anna Dam.

- Confusion regarding the withdrawal limits in the permit versus volumes requested in the application and belief the permit allows more water than requested.
- Concern from lake users on the potential to increase dam releases to eliminate adverse impacts downstream from flow reductions.
- Concerns regarding the potential impact of dam releases of less than 40 cfs on downstream water intakes and ability to meet water quality flow-based limits of permitted discharges.
- Concerns that recreational flow releases will impact lake users.
- Concern that the recommended recreational flow release of 177 cfs may not provide sufficient flow in the desired recreational reaches of the North Anna River.
- Question how the IFIM study incorporated the WHTF into the analysis. Request the IFIM study be revisited to reflect the WHTF design water levels have not been maintained.
- Concerns of changes in water elevations in Lake Anna despite the proposed three inch increase in the targeted normal pool elevation.
- Request for a comprehensive Lake Anna watershed impact study that evaluates all proposed and future water permits. Concern permits issued without actual inflow into Lake Anna data.
- Statement that Louisa County intends to submit an application for a water withdrawal from Lake Anna and request their need be considered.
- Comments that Lake Anna and WHTF are currently mismanaged and a lake management plan should be developed to better regulate water levels and provide for adequate conservation measures.
- Concerns regarding the 100 hour operational allowance to operate in EC Mode despite lake elevation.
- Concerns that lake recreational uses will be negatively impacted by the withdrawal due to lower lake levels. Request that the uses of recreation and power generation be fairly balanced.
- Question if “state waters” and “surface waters” include the WHTF.
- Request for improvements to current monitoring methods of lake elevation and water temperature in Lake Anna and WHTF.
- Request from the applicant that the permit clarify that the conditions in Part I.E (Modes of Operation) become effective on the date that the Unit 3 begins commercial operation.
- Request the withdrawal be reviewed after one year to determine impacts on the watershed and adjust the limits as necessary, and then annually thereafter.
- Concerns that water permits for the proposed Unit 3 project and for the Lake Anna watershed are being processed in a piece-meal fashion.

A summary of the comments received during the comment period and staff’s responses to those comments, is provided under Attachment A of this fact sheet.

14. Changes in Permit Part I - Special Conditions Due to Public Comments:

Staff added the following permit conditions to the VWP permit to address citizen comments:

- Part I.E.1. Prior to commercial operation of Unit 3, the Unit 3 cooling system may be operated in EC Mode regardless of the water elevation of Lake Anna, while performing tests on the system.
- Part I.F.4.b. When transitioning from dam releases of 20 cfs to 40 cfs, larger release rates than instructed in F.4.a. may be required by DEQ to immediately minimize any adverse impact from the flow reduction.

- Part I.G.2.a.(1). Procedure for daily monitoring and recording of the water elevation at the Lake Anna Dam.
- Part I.G.2.a.(6). The permittee shall fund the installation of at least one monitoring station located in the upper reaches of Lake Anna.

Staff revised the following permit conditions for clarification and/or to address citizen comments (revisions are italicized):

- Part I.C.3. All required notifications and submittals shall include project name and permit number and be submitted to the DEQ office stated below, unless directed in writing by DEQ subsequent to the issuance of this permit: Department of Environmental Quality, Office of ~~Surface and Groundwater~~ Water Supply *Planning*, P.O. Box 1105, Richmond, Virginia 23218.
- Part I.F.3. Lake Level 3: When the water elevation of *Lake Anna* is at or below 248.1 feet msl, the permittee shall target a release of 20 cfs or a Flow Augmentation Release from the Lake Anna Dam in accordance with the following:
 - Part I.F.3.a *Prior to reducing Lake Anna Dam releases from 40 cfs to 20 cfs*, the permittee shall provide a minimum of 72 hours *advance* notice to Office of ~~Surface and Groundwater~~ Water Supply *Planning*, P.O. Box 1105, Richmond, Virginia 23218, downstream users and lake stakeholders identified below ~~prior to reducing Lake Anna Dam releases to 20 cfs~~:
 - Part I.F.3.c. The permittee shall increase releases from the Lake Anna Dam at any time if directed by DEQ to ~~eliminate~~ *minimize* any adverse ~~effect~~ *impact to existing downstream beneficial uses* from the flow reduction. *Downstream beneficial uses are as defined in § 62.1-44.3 of the Code of Virginia.*
 - Part I.F.4. *Transition between releases of 40 cfs and 20 cfs* from the Lake Anna Dam ~~in accordance with Part I.F.3~~ shall be conducted as follows:
 - Part I.F.4.a. When transitioning between dam releases ~~in accordance with Part I.F.3~~ *of 40 and 20 cfs*, the releases shall be stepped down in increments of approximately 5 cfs with at least a 72-hour period following each incremental change, and prior to any subsequent reduction. Releases shall be stepped up in approximate 5 cfs increments with a 24-hour period between each increase.
 - Part I.F.5. The permittee shall provide recreational flows every Saturday during May and June of every year when the water elevation of Lake Anna is above 250.0 feet msl through a minimum release of 177 cfs from the Lake Anna Dam. Recreational flow releases will be provided for a particular Saturday when the daily lake level reading during the morning of the preceding Friday is greater than 250.0 feet msl. The recreational flow releases shall be implemented for a minimum of 17 hours, unless otherwise approved by DEQ. *DEQ may direct the release rate and timing be adjusted if determined necessary to provide sufficient recreational releases. Any adjustments shall not result in a daily average release of greater than 177 cfs, unless the Lake Anna Dam is already releasing at a higher rate in accordance with dam operating procedures at any time when a recreational release is required.*

- Part I.G.1.b. During and after the on-load of nuclear fuel, the permittee shall monitor the daily withdrawal volume at the intake location using flow totalizer technology. Such meters shall produce volume determinations within plus or minus 10% of actual flows. A defective meter or other device must be repaired or replaced within 30 days. A defective meter is not grounds for not reporting the withdrawals. During any period when a meter is defective, generally accepted engineering *practice methods* shall be used to estimate withdrawals and the period during which the meter was defective must be clearly identified in the report.
- Part I.G.2.a. ~~The permittee shall monitor and record the water elevation of Lake Anna daily.~~ A Lake Level Monitoring Plan shall be submitted to DEQ for review and approval prior to initiating the authorized water withdrawal. The plan shall include, at a minimum, the following:
- Part I.H.2. The permittee shall submit the plans for the stream gage stations required by Part I.G.4 to DEQ for review and approval prior to installation of the gage. ~~The stream gages shall be installed and operational prior to the initiation of the authorized water withdrawal.~~ The permittee shall notify DEQ within thirty (30) days of the gages being installed and operational.
- Part I.H.3. The permittee shall notify DEQ of ~~their~~ its intention to begin authorized withdrawal activities thirty (30) days prior to the initiation of the authorized withdrawal of surface waters.

15. State Water Control Board Meeting Summary:

The project was presented before the State Water Control Board (SWCB) on April 5, 2012. DEQ staff presented the proposed issuance of a Virginia Water Protection Individual Permit for Part III – Major Surface Water Withdrawal for Operational Activities and Lake Level Rise (VWP Permit No. 10-2001) of the project. Following staff's presentation, the SWCB heard from the following seven speakers from the public:

1. Ms. Kim Lanterman represented the applicant. Ms. Lanterman's statement included thanking the SWCB for hearing the permit, addressed the reason for the application, outlined the commitments in the proposed permit, and requested issuance of the permit.
2. Mr. Ken Remmers represented LACA. Mr. Remmers' comments included concerns regarding the following topics: stakeholders other than lake users benefit from the proposed permit, requested three monitoring stations for lake level, water temperature and cooling system mode of operation (acknowledged lake level monitoring stations in two of the desired locations already a requirement of the permit) and data made accessible to all, requested specifics on how temperature limit for the 100 hour annual allowance to operate in EC Mode would be implemented, requested funding for a water quality program.
3. Mr. Ray Jurgel, a private citizen, provided comments that included the following concerns: suggested dry cooling would not actually be used, discussed design limitations of dry cooling, concerns about increase in water temperatures and affect on public health and safety, concern about the 100 hour annual allowance, and concern the model did not include actual inflows but estimations.

4. Mr. Burton M. Marshall, a private citizen, was a former Dominion employee. Mr. Marshall commented that the applicant had a consistent record of environmental protection and was in support of the permit.
5. Mr. John Farmer, a private citizen, was a former Dominion employee. Mr. Farmer commented that the three inch rise was a minimal but necessary impact and the proposed combined cooling system was more efficient than a conventional wet tower. Mr. Farmer also said he supported the permit and the project as it will address the power deficiency in Virginia.
6. Sterling Rives represented Hanover County as their County Attorney. Mr. Rives noted that the County operates a withdrawal for public drinking water and a discharge that serves several area businesses. Mr. Rives commented that the County was not opposed to the proposed permit but were concerned regarding the proposed LLCP provisions in the permit. Commented that despite measures in the permit, a reduction in dam releases below 40 cfs would result in impacts to the 7Q10 flows. Such a reduction would impact their VPDES permit, which was not the intention of the LLCP law. Recommended a revision to the permit to include language that said an adverse impact included any potential modification to a VPDES permit that results from a change to a 7Q10 resulting from reduced dam releases.
7. Mr. Jim Ryan represented Bear Island Paper Company. Mr. Ryan endorsed Hanover County's comments as the Company shares a discharge permit with the County. Mr. Ryan commented the Company does not oppose the proposed permit but recommended changes, such as recommended by Hanover County. Mr. Ryan also requested the permit be revised to allow the three inch rise to occur now prior to initiating the withdrawal to supplement downstream releases. Mr. Ryan requested that the SWCB not rush judgment on the permit.

One citizen, Ms. Ginny Newton, who signed up speak chose not to when her opportunity was presented.

After hearing from the citizens, the SWCB asked questions of staff. During this period, Chairman Miles provided comments regarding concerns about sufficient water in the watershed for the new unit. Mr. Dunn, the SWCB member who served as the hearing officer at the public hearing, also provided his observations. Following conclusion of questions from members of the SWCB, Chairman Miles requested staff present their recommendation.

Staff recommended that the SWCB find that:

- The permit had been prepared in conformance with the applicable statutes, regulations and agency practices;
- The proposed activity is consistent with the provisions of the Clean Water Act and State Water Control Law;
- The proposed permit addressed avoidance and minimization of surface water impacts to the maximum extent practicable;
- The proposed activities will not cause or contribute to significant impairment of state waters or fish and wildlife resources;
- All public comments relevant to the permit have been considered; and
- The limits and conditions in the permit have been established to ensure the proposed activities are performed in a manner that protects beneficial uses.

Staff recommended that the SWCB approve the permit as presented in their SWCB package and authorize the Director to issue the permit as approved by the SWCB.

The SWCB, based on the SWCB book material and presentation at the meeting, unanimously:

1. Found that the permit had been prepared in conformance with the applicable statutes, regulations and agency practices, all public comments to the permit have been considered, and the limits and conditions in the permit have been established to ensure the proposed activities are performed in a manner that protects beneficial uses;
2. Approved the findings contained in the fact sheet for the permit;
3. Approved the permit as presented; and
4. Authorized the Director to issue the permit as approved by the Board.

Staff revised the fact sheet on April 6, 2012, to include this section summarizing the SWCB meeting and to correct a typographical error under Section 7, top of page 11.

16. Special Conditions:

The following conditions were developed to protect instream beneficial uses, to ensure compliance with applicable water quality standards, to prevent significant impairment of state waters or fish and wildlife resources, and to provide for no net loss of wetland acreage and function through compensatory mitigation.

Section A Authorized Activities

No. 1 addresses the water withdrawal activity authorized by this permit.

No. 2 addresses the change to shoreline wetland authorized by this permit.

No. 3 states that the authorized activities shall be conducted in accordance with the application materials and any subsequent materials received during the application process.

No. 4 requires the applicant to notify DEQ of any changes to the authorized activities or of new activities which require a VWP permit.

Section B Permit Term

Nos. 1 and 2 addresses the permit term and re-issuance process to ensure that all permit conditions are completed. Re-issuance of the permit will only be necessary to continue the authorized water withdrawal. Re-issuance will not be required to address lake level rise and change to shoreline wetlands, if these activities are completed within the original 15 years of permit issuance. Completion of activities associated with the change to shoreline wetlands due to a 3 inch rise are a onetime occurrence.

Section C Standard Project Conditions

No. 1 addresses the requirement for the minimization of adverse impacts to instream beneficial uses.

No. 2 prohibits the violation of Water Quality Standards in surface waters as a result of project activities.

Nos. 3 through 7 set forth all reporting requirements concerning construction, monitoring, compensation, and restoration as required by current law and regulations.

Section D Surface Water Withdrawal Conditions

No. 1 restricts water withdrawal usage to those uses described in Section 5 of this fact sheet.

No. 2 states the total withdrawal limitations prior to the on-load of nuclear fuel for the initial fill and testing of the new unit. A consumptive use limitation is not included for initial fill and testing as this process will not result in consumptive loss of water. Consumptive losses for the authorized activity will occur primarily through heat rejection, which begins after the on-load of nuclear fuel.

Nos. 3 and 4 states the total withdrawal and consumptive use volume limitations for during and after the on-load of nuclear fuel. The annual limits are based upon calendar year. See Section 7 of this fact sheet for more information.

No. 5 ensures that maximum evaporation rates for the cooling towers will not exceed the modeled evaporation estimates for each mode of operation by limiting the maximum rates of evaporation for each mode of operation.

No. 6 ensures that intake structure specifications and monitoring protect aquatic wildlife resources. DGIF commented that the applicant's proposed specifications for the intake structure for mesh screen size and flow velocity were acceptable. Staff included DGIF's comments as a condition of the permit.

No. 7 requires that the applicant implement a drought response plan to conserve water during times of drought.

No. 8 requires that the applicant implement mandatory conservation measures that are applicable to the proposed uses of the withdrawal when a drought emergency is declared by the Governor or the Virginia Drought Coordinator in Louisa, Orange, or Spotsylvania Counties.

Section E Modes of Operation

No. 1 clarifies that this section, Part I.E, becomes effective on the date that the Unit 3 begins commercial operation. The applicant requested this clarification during the public comment period to allow for the necessary testing period of the cooling system in both modes of operation, EC Mode and MWC Mode, to proceed without delays that may result if lake levels drop below 250.0 feet msl. Staff determined that the applicant's request is acceptable and will not result in significant environmental harm as the proposed cooling tower testing period will be a onetime event, will be of short duration and the water withdrawal and consumption will be limited to the authorized volumes.

No. 2 addresses how the applicant shall operate the cooling system modes of operations (MWC Mode versus EC Mode) when the water elevation of Lake Anna is below 250.0 feet msl to conserve water.

Part I.E.2.a.(1) includes the required transition time between the two cooling system operational modes. The applicant requested 5 days before the switch from EC Mode to MWC Mode must be completed to allow time to ensure the lake elevation was stable below the trigger level and to cause the operational transition.

Part I.E.2.a.(2) allows the applicant to transition from MWC Mode back to EC Mode once lake levels are at or above 250.0 feet msl. The condition does not require that the applicant transition from MWC Mode to EC Mode as it's the intent of staff to allow the applicant flexibility to operate in MWC Mode at any time despite lake level as this mode conserves water. The condition allows the applicant to operate in EC Mode after lake levels increase to or above 250.0 feet msl without a waiting period as an increase in lake level is typically stable because it is generally caused by a rain event. However, the condition does provide a 5 consecutive day window from when the lake level increase to or above 250.0 feet msl during which if the lake level does go below the trigger, the applicant must transition back to MWC Mode within 24 hours. After 5 consecutive days of lake levels being at or above 250.0 feet msl, the applicant may complete the operational transition and the transition requirement of Part I.E.1.a.(1) applies.

Part I.E.2.b provides an allowance of 100 hours to operate in MWC Mode with the dry cooling tower fans off despite lake level to meet high electricity demands. High electricity demand typically occurs during peak demand situations in summer months. The applicant requested this allowance to allow them to meet high electricity demands, which would otherwise require an expensive off-system purchase of electricity and use of the most expensive generating units to meet demand. This allowance will be limited to times when the temperature is high (greater than 90 degrees Fahrenheit), and when MWC Mode is least efficient. The allowance will provide approximately 16 megawatts to the grid that would otherwise be required to operate the cooling tower fans. To conserve water in times of drought, this allowance will only be allowed if lake levels are above 247.0 feet msl. Based upon staff's analysis of the requested allowance, this allowance would potentially lower the water elevation by less than 0.05 inches.

Section F Lake Level Management and Lake Anna Dam Instream Flow Release Conditions

A LLCP was included in the VPDES permit for the facility (No. VA0052451) upon its reissuance in 2001. The LLCP requires that a defined amount of water be released from the Lake Anna Dam, based upon lake elevation, during periods of low flow to provide flow to downstream users while conserving lake levels for users of Lake Anna. The conditions in LLCP are based on the water withdrawals and operation of Units 1 and 2. During the evaluation of this water withdrawal for Unit 3, staff incorporated the release schedule of the existing VPDES permit with the necessary modifications and additions to account for the additional withdrawal proposed in this permit. Prior to initiation of water withdrawal activities authorized by this permit, the applicant shall comply with the Lake Anna Dam flow release conditions in the facility's VPDES permit No. VA0052451.

No. 1 requires the applicant release a minimum of 40 cfs from the Lake Anna Dam when lake elevations are above 250.25 feet msl.

No. 2 requires the applicant target a release 40 cfs from the Lake Anna Dam when lake elevations are above 248.1 feet msl and below 250.25 feet msl.

The release of 40 cfs from the Lake Anna Dam has been in effect since the construction of the dam in 1971. The existence and operation of the dam has become the normal or baseline conditions of the North Anna River. The flow regime and frequencies of the North Anna River changed as a result of the dam by a decrease in median flows and elimination of extreme flows. Staff does not propose a change to the previously accepted flow release rate of 40 cfs.

The intent of this condition is for the applicant to operate the Lake Anna Dam such that 40 cfs is the target flow release when the lake is between normal target pool elevation (250.25 feet msl) and 248.1 feet msl. However, staff understands that fluctuations in dam releases will occur given the level of uncertainty in controlling actual releases due to meteorological events and difficulty in achieving sensitive gate adjustments.

No. 3 requires the applicant target a release of 20 cfs from the Lake Anna Dam when lake elevations are at or below 248.1 feet msl.

The selection of 20 cfs as the release rate and the incremental reduction were based upon historical drought flows and the need to protect downstream beneficial uses. Staff does not propose a change to the previously accepted flow release rate of 20 cfs.

The intent of this condition is for the applicant to reduce dam releases from 40 cfs to 20 cfs and then to operate the dam such that 20 cfs is the target flow release. However, staff understands that fluctuations in dam releases will occur given the level of uncertainty in controlling actual flow releases due to meteorological events and difficulty in achieving sensitive gate adjustments.

Staff proposes a change to the trigger level from 248.0 to 248.1 feet msl to provide storage for a FAR. The FAR will be reserved to be used until a committee convened once set triggers are met decides it is appropriate to increase flows above 20 cfs to address impacts of the reduced flows on downstream beneficial uses. It is anticipated that the FAR releases will only be necessary in extreme climatic events.

Part I.F.3.a requires the applicant give advance notification to stakeholders who could be significantly affected by the release reduction prior reducing dam releases from 40 cfs to 20 cfs. At the request of LACA, staff included this organization in the notification requirement.

Part I.F.3.b and c states that the applicant may be directed to increase dam releases to provide a FAR or if otherwise directed by DEQ to minimize any adverse impact to existing downstream beneficial uses from the flow reduction. In response to public comment, language was added to define the term "adverse impact." DEQ may require dam releases of 20 cfs to be increased if staff determines there is an adverse impact following an investigation after receiving notification from any downstream user of an identified adverse impact at any time during the flow reductions. In determining adverse impacts, DEQ will give the highest priority to protecting Hanover County's drinking water intake on the North Anna River.

No. 4 outlines how the transition in dam releases of 20 cfs and 40 cfs shall occur.

Part I.F.4.a states the required incremental changes in dam release reductions to 20 cfs and increases to 40 cfs. The use of 5 cfs as the incremental change in flow was selected as prudent means to

mitigate any drastic effect. It is also practical considering the level of uncertainty associated with controlling actual flow releases. The 72 hour period during which flows are incrementally decreased allows time for downstream users to assess the lower flows. Similarly, the 24 hour period during which flows are incrementally increased allows time for downstream users to obtain relief from the lower flows but without adversely impacting downstream reaches due to potentially erosive flows.

Part I.F.4.b was included in response to public comment to allow for larger release rates to immediately address any adverse impacts downstream that result from the release rate of 20 cfs. Any larger releases than those prescribed in Part I.F.4.a shall be conducted only at the direction of DEQ.

No. 5 requires the release of recreational flows each Saturday during May and June to provide recreational opportunities downstream of the Lake Anna Dam. The intent is to meet the demand for downstream river access, and fishing and canoeing opportunities. An analysis of the lag time for the releases to reach the fall zone estimated that releases from 2pm Friday to 7am Saturday would produce a 12-hour recreational flow event at the fall zone on Saturday (8am-8pm) discussed in the IFIM study. Staff revised condition Part I.F.5 in response to comments to allow the release to be adaptively managed, as directed by DEQ, should an adjustment of timing and/or peak release rate, not to exceed a daily average of 177 cfs, be determined necessary. The permit allows for flows higher than 177 cfs if the dam is already releasing at a higher rate in accordance with dam operating procedures when a recreational flow is required. However, if dam releases are less than 177 cfs during a time when recreational releases are required, releases cannot be increased any higher than an average daily release of 177 cfs to meet the requirement.

Section G Monitoring and Recordation

No. 1 establishes monitoring and recordation requirements for the water withdrawal to demonstrate compliance with applicable permit conditions and requires the applicant to record daily withdrawal activities.

Part I.G.1.a requires that prior to the on-load of nuclear fuel, the applicant estimate their daily water withdrawal using generally accepted engineering practices. This condition is necessary as during the initial fill and testing process, flow measurement devices will not be accurately calibrated. Staff determined that this method is acceptable as this process will not result in consumptive loss of water. Consumptive losses for the authorized activity will occur primarily through heat rejection, which begins after the on-load of nuclear fuel.

Part I.G.1.b. and c. requires that flow totalizer technology be used to monitor the daily withdrawal and discharge volumes.

Part I.G.1.d requires the applicant submit a withdrawal monitoring plan to DEQ review and approval prior to initiating the withdrawal.

Part I.G.1.e outlines the specific data the applicant must record to document daily Unit 3 water withdrawal activities.

No. 2 establishes monitoring and recordation requirements for the water elevation of Lake Anna and for flow releases from the Lake Anna Dam to demonstrate compliance with application permit conditions. The intent is that lake level monitoring at the Lake Anna Dam will be the water elevation used to govern compliance with lake level and dam release conditions.

Part I.G.2.a requires the applicant submit a Lake Level Monitoring Plan to DEQ for review and approval prior to initiating the withdrawal. The plan shall include a procedure for the daily monitoring and recording of water elevations at the Lake Anna Dam. The plan also requires the applicant update their current lake level method of a staff gauge at the Lake Anna Dam to provide more accurate measurements. This condition was revised in response to public comment to require the applicant fund the installation of one monitoring station in an up-lake area. The intent of Part I.G.2.(6) is for the applicant to provide funding for a third party to install at least one lake level monitoring station in the upper reaches of Lake Anna.

Part I.G.2.b requires that flows from the Lake Anna Dam be measured daily from the USGS stream gauging station No. 01670400 on the North Anna River near Partlow, Virginia located approximately 0.5 mile downstream of the Lake Anna Dam.

No. 3 requires the applicant to record actions taken to comply with modes of cooling system operations and lake level management and flow release conditions in Part I.E and F.

No. 4 requires that the applicant shall contract with the USGS for the installation and operation of two stream gaging stations to monitor inflows into Lake Anna. The purpose of this condition is to gather data on the inflows into Lake Anna as there are no operational stream gauges in the upstream watershed. Data from the flow gages are to be used in the validation and improvement of inflow estimation tools used for managing the water budget used in future evaluations of the Unit 3 withdrawal.

No. 5 requires monitoring activities be conducted in the North Anna River during times when releases from the Lake Anna Dam are decreased to a minimum of 20 cfs to assist in assessing the impact of low flow releases on the downstream aquatic community.

No. 6 requires evaluation of consumptive water withdrawal volumes predicted by the Lake Anna Water Budget Model and comparison of predicted consumptive volumes to the actual consumptive volumes withdrawn after every three years of operation. Staff elected to require three year evaluation periods to ensure the maximum allowed withdrawal volumes are not taken year after year without need or reason.

Section H Reporting

No. 1 requires the applicant to submit a certificate of conformance from a testing agency certified by the Cooling Tower Institute (CTI) to demonstrate that the cooling tower will operate according to the modeled evaporation estimates for each mode of operation. Maximum evaporation rates during normal operation at 0.4 percent exceedance ambient conditions shall not exceed 16,300 gallons per minute (gpm) for EC Mode and 11,200 gpm for MWC Mode. The certificate shall be from a testing agency certified by the Cooling Tower Institute (CTI) and shall be submitted within 180 days of the commercial operation date for the proposed new nuclear unit (Unit 3).

- No. 2 requires submittal of the plans for stream gauges required by Part I.G.4 for DEQ's review and approval. The condition also requires that the permittee notify DEQ within 30 days of the gauges being installed and operational.
- No. 3 requires the applicant to notify DEQ of their intention to begin the authorized water withdrawal 30 days prior to initiating the authorized withdrawal.
- No. 4 requires the applicant to submit water withdrawal model evaluation reports of the results of the evaluation required by Part.I.G.6.
- No. 5 requires the applicant to submit water withdrawal reports to DEQ to demonstrate compliance with applicable permit conditions. The condition establishes the quarterly monitoring periods.
- No. 6 requires the applicant to submit lake level and dam release monitoring reports to DEQ to demonstrate compliance with applicable permit conditions. The condition establishes the quarterly monitoring periods.
- No. 7 requires the applicant to notify DEQ after North Anna River monitoring efforts and submit a report of the monitoring results if such monitoring is required by Part I.G.5.

Section I Compensatory Mitigation

- No. 1 requires that the 3 inch rise in the normal target pool elevation of Lake Anna and resulting increase in the water level in the WHTF be implemented no later than 12 months prior to commercial operation date of the proposed new nuclear reactor (Unit 3). This condition also requires that the applicant notify DEQ prior to and following implementation of the 3 inch rise.
- No. 2 pertains to the documentation of the implementation of the 3 inch rise in the normal target pool elevation of Lake Anna and resulting increase in the level in the WHTF. Staff understands that water levels in the lake fluctuate due to natural events not within the applicant's control such as precipitation and evaporation. Therefore, the intent is that the applicant operates the Lake Anna Dam to achieve a target pool elevation of 250.25 feet msl and compliance will be determined through their operational procedures.
- No. 3 describes the compensatory mitigation required to mitigate for the change to shoreline wetlands.
- No. 4 identifies the bank and required documentation of debited credits to ensure no net loss of wetland acreage and function.
- No. 5 identifies the fund and required documentation of debited credits to ensure no net loss of wetland acreage and function.
- No. 6 requires the submittal of documentation indicating compliance with the provisions of the Memorandum of Agreement between the applicant and DGIF to resolve DGIF's concerns over impacts to fish and other aquatic resources in Lake Anna and the North Anna and Pamunkey rivers.

17. General Conditions:

General Conditions are applied to all VWP individual permits, as stated in the VWP Permit Program regulation.

18. General Standard:

This project may result in minimal, temporary impacts to beneficial uses related to the propagation and growth of aquatic life as defined in the General Standard. Provided the applicant abides by the conditions of the permit, no substances shall enter state waters in concentrations, amounts or combinations that would contravene established standards or interfere with beneficial uses or are inimical or harmful to human, animal, plant, or aquatic life.

19. Staff Findings and Recommendation:

Based on the review of the permit application, the staff provides the following findings.

- The proposed activity is consistent with the provisions of the Clean Water Act and State Water Control Law, and will protect beneficial uses.
- The proposed permit addresses avoidance and minimization of impacts to the maximum extent practicable.
- The effect of the impact will not cause or contribute to significant impairment of state waters or fish and wildlife resources.
- This permit is proposed to prevent unpermitted impacts.
- The draft permit reflects the required consultation with and full consideration of the written recommendations of VMRC, VDH, DCR and DGIF. The staff invited, but did not receive, comments from VDACS.

Staff recommends VWP Individual Permit Number 10-2001 be issued as proposed.