Supplement #1

LAKE LEVELS AT LAKE ANNA

Lake Level Committee
Lake Anna Civic Association (LACA)
June 2008

CONTENTS

Supplement #1
LAKE LEVELS AT LAKE ANNA

I. WATER LOSS CALCULATIONS

Water is low any time it goes below 250 ft msl and is considered in drought condition when it reaches 248 ft msl or lower. We have reached the 248 level in 5 of the last 8 years. Dominion monitors water level daily. When the water rises above 250 ft , Dominion increases the flow over the dam sufficient to maintain the 250 ft level.

Most analyses of water use are based on millions of gallons per day (MGD). Unfortunately, these figures do not readily depict the impact on water levels in Lake Anna. Hence, throughout this report, we have where possible converted to losses of Lake Anna water levels in inches per month**.**

-Lake Anna consists of 13,000 acres of surface at the normal water level of 250 feet above sea level (includes the cooling lagoons)

-Total volume of water in the lake is about 100 billion gallons.

-One inch of water at the surface is 13,000 (ac.) X 43,560 (sq. ft. /ac.) ÷ 12 (convert inches to ft) = 47,190,000 cu ft/inch.

-At the normal 40 cfs of discharge over the dam, we lose 40 X 60 X 60 X 24=3,456,000 cu ft per day. Therefore we lose one inch of water level every 47,190,000/3,456,000=13.65 days.

-Evaporative loss during the hot summer days has been estimated to be four times the rate of release over the dam. That equates to one inch every 3.4 days or 8.8" per month.

-This figure is used in Section III.B.1 of the Report; the other monthly loss figures were calculated in the same manner.

-Of course we must consider that inflow of water negates some of this loss. Unfortunately, no measure of inflow other than rain has ever been conducted so a precise water flow model cannot be developed. In addition, inflow is very low during dry, hot summer periods of most concern.

II. BACKGROUND INFORMATION ON EXISTING PLANS, PERMITS AND STUDIES

Several studies and plans bear directly on water levels and our ability to make changes that could reduce incidences of low water levels.

A. Lake Level Contingency Plan (LLCP)

On October 25, 2007, the Virginia Department of Environmental Quality (DEQ) reissued the 5-year Virginia Pollutant Discharge Elimination Permit (VPDES) # VA0052451 to Dominion Virginia Power ("Dominion"). In addition to controlling pollutants discharged

into the Waste Heat Treatment Facility (WHTF- the “warm" or "private" side) and into the Reservoir (the “cool" or "public" side”), it contains the Lake Level Contingency Plan (LLCP) which was created after Legislation was introduced by Del. V. Earl Dickenson and others in 2000 and 2001. The LLCP allows reduction of flow over the dam during low water periods (from the previously required 40 cfs to 20 cfs). It has been implemented during the droughts of 2001-2002 and 2007-2008. However, requests by LACA and others to reconsider the original LLCP parameters set by DEQ in 2000 have gone unheeded. (See Section IV)

B. **Instream Flow Incremental Methodology Study (IFIM)**

On 21 Nov 2006, the Virginia Department of Environmental Quality (DEQ) issued its conditional concurrence (See Reference 1.) in the Federal Consistency Certification Certificate (DEQ-05-079F) for the Dominion Early Site Permit Application for a third reactor at the North Anna site. The conditions were that Dominion obtain all other permits required before commencing site preparation and that if the Nuclear Regulatory Commission issue an Early Site Permit, Dominion would conduct a comprehensive Instream Flow Incremental Methodology Study (IFIM). DEQ required the IFIM to “address the unresolved issues and to determine the subsequent implementation of appropriate design and operating standards, conditions and protocols for the referenced project”. The IFIM would “determine impacts of the proposed units 3 and 4 on the fishes, recreation, and aquatic resources of Lake Anna and downstream waters”. It would also address the Lake discharge rates needed to support recreational boating on the lower North Anna River. Dominion has begun the study and held meetings with downstream and Lake stakeholders to discuss the study. Our discussions with Dominion indicate that the draft IFIM study will be competed in June 2008.

It is important to note that IFIM is a specific modeling methodology and simulation software initially developed by the US Geological Survey at Fort Collins Colorado by which stream flows are plotted against aquatic requirements to predict impact of stream flows on aquatic life at various levels. In March 2007 Dominion issued the North Anna IFIM Study Plan (See Ref 2). The study plan generally follows the methodology and then tries to incorporate the added requirements for analysis on the Lake.

Lake analysis is restricted to a wetlands assessment in which selected wetlands will be measured and plant life documented. Observed tolerance for inundation or lack thereof will be used to predict impact of changes in the lake level as a result of operation of the proposed 3rd nuclear reactor. Additionally a dock and boat ramp functionality assessment will be conducted of up to 5 public facilities where measurements will be taken to determine tolerance for lake level changes. Drawings of private docks and limited interviews with owners and users will also occur to determine tolerance for changes in the range of 248 to 251 lake levels (current standard is 250).

DCR has indicated that the study as proposed by Dominion should include the originally requested recreation on Lake Anna including the State Park, on and off lake property owners, day time users, and fishermen. DCR recommended public involvement with the

study and its results as required by National Environmental Policy Act (NEPA). To date this has not been incorporated in the IFIM study.

C. North Anna River Monitoring Plan

On 1 October, Dominion informed DEQ that it was revising its North Anna River Monitoring Plan (See Ref 3) as required by the VPDES permit issued to Dominion for operation of the North Anna reactors 1 and 2 and keeping its 316(a) variance in the Clean Water Act. The monitoring plan describes Dominion activities since 1981 to monitor fish populations in the North Anna River below the dam in low flow conditions. There are 6 monitoring stations where electrofishing and snorkeling are performed to achieve periodic fish counts. Additionally, wetted stream width, water depth, and dissolved oxygen are monitored in times of flow reductions below 40 cfs. Water velocity measurements previously taken by Dominion at four locations are being eliminated from the sampling protocol. These water velocity measurements are now available from the Partlow gauging Station operated by the US Geological Survey. Flow rates over the dam may be reviewed real time by accessing the data taken at the Partlow, VA USGS Station. Go to the USGS web site using the following URL:
http://waterdata.usgs.gov/va/nwis/uv/?site_no=01670400&PARAmeter_cd=00065,00060,62620,00062

D. Environmental Impact Statement for North Anna Site

The US Nuclear Regulatory Commission (NRC) in 2006 issued an environmental impact statement (See Reference 4) that reviewed environmental impacts related to the use of the North Anna site for two more additional nuclear reactors as part of the early Site permit process. The assessment covered site safety, environmental impacts, and emergency planning. Environmental impacts covered a broad range of water related, meteorological, ecological, and sociological topics. It rated impacts as SMALL, MODERATE or LARGE and indicated for each impact whether mitigation measures were required.

The NRC concluded that the ESP should be issued, that alternative sites proposed would not be obviously superior, and that preliminary site preparation construction activities allowed by the permit (not the combined construction and operation permit) would not adversely impact the environment in ways that cannot be redressed.

An updated supplement is being developed by NRC as part of the Combined Operating License which Dominion requested on 27 Nov 2007 for the 3rd reactor. This Draft "supplemental" Environmental Impact Statement (DEIS) is due to be issued in December 2008. The scope of the DEIS includes any unresolved issues that arose in the EIS for the ESP and any areas where new and significant information has become available.

LACA Officers spoke at the 16 Apr 2008 NRC Scoping Meeting to provide areas where NRC should concentrate its efforts on the supplemental EIS. These presentations can be found on the LACA website www.lakeannavirginia.org .

E. North Anna Early Site Permit

On November 27, 2007, the NRC issued an Early Site Permit which concluded that the North Anna site was suitable for a 3rd and 4th reactor. The Combined Construction and Operation License (COL) for the 3rd reactor was submitted to the NRC on November 27, 2007 with a hybrid type of cooling system. NRC has NOT approved the nuclear reactor – but has agreed that the site is suitable for one. Approval of the nuclear reactor is pending. The cooling system itself does not require separate approval but is in the overall environmental impact.

III. BACKGROUND INFORMATION ON PROSPECTS FOR THE FUTURE

A. Dominion's Third Reactor

Dominion has received an Early Site Permit (ESP) for adding two more 4500 MW(t) [1500 MW(e)] nuclear reactors at the North Anna Power Station (NAPS) from the NRC. This permit is valid for the next 20 years. Dominion is proceeding with the request for a Combined Construction and Operating License (COL) from the NRC for one of the two reactors designated Unit 3. Dominion has not publicly committed to building the third unit but it is posturing itself to have all the necessary licenses in place so that they can proceed if the market place is right and they are ready to build.

Excess heat generated by unit 3 would be dissipated through the use of a series of closed-cycle cooling towers that can operate in two modes: Energy Conservation (EC) and Maximum Water Conservation (MWC) modes. This is different from the "once through" cooling used by the existing units 1 and 2. A typical Round Hybrid Wet/dry Cooling Tower is shown below:

The EC mode of rejecting heat would be used when excess water is available from Lake Anna. This is defined as when the lake level is at or above the 250ft MSL elevation. In this EC mode the cooling tower would be operated in a closed-cycle wet cooling mode. Makeup water would be supplied from Lake Anna at a maximum rate 16,695 gpm or 24 MGD. (2.1 inches of lake level height per month)

The MWC mode of operation would be used when the water levels in the lake drop below 250ft MSL. The hybrid cooling tower would be designed so that at full power operation under hot humid conditions, a minimum of one-third of the excess heat from unit 3 would be dissipated by the dry tower system. The remaining two thirds would be dissipated by the wet tower system. Under these conditions the maximum makeup water flow rate from Lake Anna would be 11,532 gpm or 16.6 MGD. (1.4 inches of lake level height per month)

Consumption of water even in the MWC mode by the wet cooling tower would reduce the overall volume of water in the lake over and above the existing two units. Primarily, the effect of the existing units is increased temperature while the primary effect of unit 3 would be increased evaporation resulting in decreased lake level.

In order to describe the effect of this increased evaporation, the NRC calculated that with the addition of unit 3, the percent of time the dam would discharge 20cfs increased from approximately 6 percent (Units 1 and 2 only) to 11 percent. (22 to 40 days). In order to determine what level the lake would be during a drought condition with unit 3 running, the NRC had Pacific Northwest National Laboratory do a study reported in "Report on the North Anna Early Site Permit Water Budget Model (Lake WBT) for Lake Anna by Cook et all, January 2005. (See Reference 5). This study modeled the critical water surface elevation during the period between Jan 1, 2001 and Oct 15, 2003. During this critical period the region experienced a severe drought. By calculating all inputs and outputs the following results were obtained for minimum water surface elevations during the second week of October 2002:

UNITS 1 and 2 (existing/ observed conditions replicated):	245.1 ft
Units 1 and 2 plus Unit 3 using wet/dry cooling tower:	243.3 ft
	---
Difference over 21.5 months	1.8 ft

This works out to 1 inch per month additional lake level reduction due to unit three and other factors. These numbers were independently verified by VDEQ, Division of Water Resources and LACA Water Quality as about 1.4 inches per month due solely to unit 3.

B. <u>Cutalong</u>

Cutalong is the first major water withdrawal request to use Lake Anna or its tributaries. The Virginia Water protection Permit (VWP) needed to allow the withdrawal and other activities is included in a draft Permit Number 07-0860 issued by the Virginia Department of Environmental Quality (VDEQ).

1. Summary of Permit Request

The Cutalong project is a development on Lake Anna of commercial/ residential lots, utilities and infrastructure, an 18-hole golf course, a boat storage facility, clubhouses, a boat common area with 98 boat slips, a water withdrawal from Contrary Creek, and dredging of Contrary Creek/Lake Anna for boat access. Cutalong has already received authorization to manage pollutants under the Virginia Pollution Abatement Permit (VPA00021). This allows for a sewage treatment plant to be phased in from 100,000gpd to a maximum of 500,000gpd. The treated effluent will be used to irrigate the golf course. Until the build-out will supply the necessary effluent, Cutalong has proposed withdrawing water for golf course irrigation from Contrary Creek above the 255ft MSL. When the sewage treatment plant reaches 180,000gpd for any 6 month period, no further water can be removed from Contrary Creek.

Contrary Creek has known problems with low pH (acidity) and heavy metals due to the sulfur and metal contents of acid mine drainage (AMD) from abandoned mining operations. This withdrawal of water from Contrary Creek would require treatment to raise the pH and remove the heavy metals before it could be used to irrigate.

For the first two years of water withdrawal, the maximum withdrawal from Contrary Creek could not exceed 22.3 million gallons in any month (about 500 gallons per minute) with an annual maximum of 96 million gallons. This would mean that for about 4.3 months (December through April when flow is highest), water would have to be extracted at maximum flow rates allowed to reach 96 million gallons. During the other months the flow rate of Contrary Creek could be too low to remove any water. For the third year and until water withdrawal is ended, the maximum withdraw would not exceed 14.8 million gallons per month (330 gallons per minute) or 48 million gallons per year. This is because water requirements will be reduced after the first two years of grass grow-in. Further restrictions for the first two years are that no water can be removed from Contrary Creek when Lake Anna is at or below 248.5 ft msl. In the third year and beyond no water can be taken from Contrary Creek when Lake Anna is at or below 249.75ft msl. Also after the third nuclear reactor is operational at NAPS, no water can be taken when the plant is running in the water conservation mode (at or below 250ft msl).

This permit would also authorize the dredging of Contrary Creek/Lake Anna to remove 47,000 cubic yards of dredged material. The permit would be valid for fifteen (15) years from the date of issuance.

2. Surface Water Withdrawals Concerns

LACA reviewed the draft permit and expressed the several concerns. For the first two years of water withdrawal, the maximum withdrawal cannot exceed 96 million gallons annually or 22.3 million gallons in any month. The 22.3 million gallons per month equates to 1.15cfs water not going into Lake Anna. Cutalong (verbally to the LACA BOD March meeting) has proposed to remove water from Contrary Creek in December to April when the lake is likely to be at or above the standard 250' level(thereby not

affecting lake levels) and pH levels are about 5 (thereby minimizing treatment to get the water to about pH 7).

Contrary Creek may not have the necessary water to support irrigation. Historic data from USGS for Contrary Creek indicates that during the winter/spring months, a median flow is only about 4.0cfs during the period December through April (from USGS data 1976-1986). Taking 29% of this median flow during the months of December to April is a risk for the permittee. During the other months the median flow can be as low as 0.5cfs.

VDEQ generally sets minimum instream flow (MIF) requirements to establish flow for aquatic environment protection. Normally this is about 30%. Because this withdrawal is 29% of the median during the high flow months, some control of the amount of water withdrawal may be included by VDEQ in this permit. In order to get an accurate flow rate on Contrary Creek, the permittee should be required to activate the USGS gauging station USGS 01670300 at Rt. 522. Then the permittee and VDEQ can evaluate the amount of water taken versus the flow in Contrary Creek. This would make sure the MIF requirements are met.

The rock "V" notch, plunge pool, and low flow gravity feed show two 30 inch diameter intake pipes. This appears to be entirely too large for a maximum 500gpm withdrawal rate. The second low flow gravity feed with a second 30 inch pipe should be eliminated. This was intended for gravity flow ditches which are not appropriate for this application. When the creek is at low flow conditions (i.e. intake would be less than 30% of stream flow), no water would be taken anyway.

Storage of this 96 million gallons of water is not clear in the draft permit. The plan shows a 4.6 acre water quality treatment pond. Assuming a 20 foot average depth for the pond would only store 30MG. If it were pumped to pond 1 for storage, this would only be another 30MG – 60MG. Storing 96MG needs to be shown on the Cutalong site plan in the permit. The precipitate from this treatment for pH and heavy metals needs to be tested for hazmat and disposed of properly. The Sediment Pond needs to have a liner to protect the ground from penetration of any hazmat materials.

For the first two years, the permittee may not pump water from Contrary Creek when Lake Anna is at or below 248.5 feet above msl. At 248.5 feet the lake is in a severe drought already and water removal from source creeks and rivers should not be taken. No water should be taken from Contrary Creek when Lake Anna is at or below 249.75 feet.

3. Changes to the Draft Permit on Water Withdrawals

Subsequent discussions on 2 May 2008 with the permittee and VDEQ have resulted in proposed changes to the draft permit: Virginia Water Protection Permit VWP No. 07-0860. They are as follows:

a. DEQ is evaluating whether the permit can be changed to remove barriers to taking water from Contrary Creek when LKA levels are high and to reduce total permitted withdrawals when the LKA is below 249.75'. A new provision would limit withdrawal to 0.6cfs or 250gpm when LKA is below 249.75'. Cutalong was to return with information on amounts of withdrawal (i.e. Pump sizes and max withdrawal rates in time of plenty). This withdrawal will replace the amounts in the draft permit for all years of withdrawal but no change the maximum of 96MGY nor will it change the stop of withdrawal when the SWTP is exceeding 0.18 million gallons per day for any six month period.

b. The required staff gage as required by the permit will be put on the Cutalong web site in real time.

4. <u>Dredging Concerns</u>

Dredging requires the establishment of silt barriers to prevent migration of dredged materials beyond the dredge site. Barriers are subject to failure due to storms or other causes. Additional measures to prevent migration of silt should be included in the permit.

The proposed dredging involves both Lake Anna and Contrary Creek. Three of the eleven dredge material testing locations showed high levels of Lead (pb). S-8 had the highest reading of 417mg/kg. The report states "Lead is therefore a minor constituent of concern for the site. The location of the Lead in these sediments is considered localized." The "localized location" appears to be in the area of the wet slips where children could be swimming and not further upstream on Contrary Creek. Some additional testing for Lead should be performed during and after dredging in these areas to protect the public from potential Lead problems. No PCB results of S-1 and S-11 are presented.

5. <u>Changes to Draft Permit for Dredging</u>

Subsequent discussions on 2 May 2008 with the permittee and VDEQ have resulted in proposed changes to the draft permit: Virginia Water Protection Permit VWP No. 07-0860. They are as follows:

a. DEQ will consult with the VHD about the Pb (lead) found in three boring sites near the boat docks before considering LACA request for additional monitoring.

b. PCB information was forwarded to LACA concerning core sites 1 and 11.

c. DEQ will look at requiring only dry dredging as the permitted dredging technique in order to prevent the escape of silt and any contaminants into the stream or LKA.

IV. ADDITIONAL INFORMATION ON THE COMMITTEE'S RECOMMENDATIONS

A. #1 Increase Seasonal Lake Levels

This option has been recommended by several parties listed below during the ESP process. However, who actually controls this decision is unclear.

VEPCO on application for Certificate of the Lake Anna Project to the SWCB on April 4, 1968 proposed an elevation in the submitted Site Plan. The elevation is stated "to **about** elevation 250 MSL or **about** 95 feet above the stream bed." This was approved by the SCC and SWCB. The important fact here is the elevation required is only about 250 MSL. This appears to allow the 250.25 MSL without violating any criteria set by the SCC or SWCB.

During the reissuance of the VPDES permit for NAPS (VA0052451) on October 25, 2007, DEQ stated the following in its response to comments on the permit:

"The draft permit does not require Dominion to maintain the lake at 250'. If Dominion can and chooses to maintain this additional level [250.25'], they may do so without any consequence to the draft permit"
It is apparent from this statement and the lack of a required elevation in the VPDES permit that this decision is in the hands of Dominion. The problem is that Dominion has stated that "If DEQ instructs us that the normal lake level will be 250.25', then Dominion would comply".

The various documents that suggest higher seasonal lake levels include:
-7 Jul 2006 DGIF letter to DEQ during the ESP process, which recommended a 3" elevation to 250.25"
-Page 5-31 of Supplement 1 of the DEIS by NRC (July 2006), NRC stated that DEQ raised the possibility of raising the lake level from 6 to 12 " to mitigate impact on NAR flows. It also concluded that the "authority to raise the lake level rested with the Commonwealth of Virginia."
-Page 5-10 of the same document indicates that NRC concluded that a 10" increase was necessary to mitigate the impacts
-In response to a 3/2/06 letter to NRC, Dominion indicated that a 7" elevation in the normal elevation would be necessary to offset the effects of Unit 3. (Serial No. 06-275, Docket NO. 52-008, Rev. 6, Page 25)
-On page 3 of Appendix 1 of the FCC under the CZMA (Nov. 21, 2006), DGIF suggested a controlled flow regime for implementing MWC mode of Unit 3 to make the 3" increase: 225 cfs in March-April, 175 cfs in May, 120 in June and 90 cfs in July-October, provides such flows exist.

B. #2-Slow Releases over the Dam and #3 Adhere to Discharge Rates

Both practices are governed by the VPDES permit and the Lake Level Contingency Plan (LLCP) contained therein. The LLCP specifies the procedure that Dominion is to follow to discharge water over the dam, especially during periods of low water levels. The LLCP legislative and regulatory history is so lengthy that a separate Appendix 1 is included in this report.

1. LLCP Provisions

Prior to the LLCP, Dominion was required to maintain at least 40 cfs of flow over the dam at all times, even in drought conditions as the lake level continued to drop. The 248.1' level of 1999 seems so draconian that Dominion and others sought alternatives to the 40 cfs requirement to provide relief for Lake Anna users.

DEQ began the process of developing the LLCP in 2000, which was incorporated in VPDES Permit # VA0052451 on December 13, 2000. It was clear that the legislative sponsors, LACA and others were not pleased with the LLCP. Objections were raised by Delegate Dickinson, Senator Houck, LACA and the Louisa Board of Supervisors, among others. LACA requested that the trigger elevation be anything below 250' and that downstream users be required to implement water conservation plans. Delegate Dickinson even introduced more legislation in 2001 to rectify the situation.

The LLCP provisions are:
-maintain a minimum 40 cfs release until the Lake reaches 248'

-at 248', begin reducing the flow in 5 cfs increments no more frequently than 72 hours; releases shall not drop below 20 cfs

-releases return to 40 cfs when lake rises above 248' in 5 cfs increments every 24 hours (thus returning to 40 cfs in 4 days)

-Four specific downstream users shall be notified 72 hours prior to flow reductions (Hanover utilities, Bear Island Paper, Engel Farms and the Pamunkey Indian Government) A fifth party, DGIF was added in the 2007 permit renewal.

-if any of the five downstream users identifies an "adverse effect" (inability to draw or discharge water or impaired water quality), the flows will be returned to 40 cfs in 5 cfs increments each 24-hours

As noted in Appendix 1, neither the original 1969 SCC license nor any of the four (4) separate 2000 or 2001 General Assembly actions set the 20 cfs quantity, the 248' trigger point, the increments or the notified parties as well as precisely 250'msl elevation.

2. Requests for Changes in the LLCP by LACA and Others

To date, LACA has made no less than five (5) definitive requests for changes to the LLCP during related regulatory processes.

-Sept. 15, 2000- LACA President Hayden to DEQ (LLCP)
-August 15, 2006- LACA Director Murphey to NRC (ESP) and August 16 to DEQ (CZM)
-July 18, 2007- LACA W.C. Chair Remmers to DEQ (VPDES)
-April 16, 2008- LACA Director Murphey and LACA L.L. Chair Smith to NRC (COL)

In addition, others involved in the process expressed their concerns. All are discussed in Appendix 1.

-October 26, 2000- Sen. Edd Houck
-November 6, 2000- Del. Earl Dickenson
-November 20, 2000- Louisa County Board of Supervisors

DEQ re-issued the VPDES permit on October 25, 2007 with the LLCP parameters unchanged, except for adding DGIF to the existing list of downstream users to be notified of pending flow reductions. DEQ explained that the LLCP was not changed because:

"The conditions in this draft permit are those that were derived through stakeholder meetings in 2000. Staff believes the set of conditions in the permit are an adequate compromise amongst the stakeholders and no changes are recommended without a consensus amongst all parties". DEQ further stated: "The draft permit does not require Dominion to maintain the lake at 250'. If Dominion can and chooses to maintain this additional level [250.25'], they may do so without any consequence to the draft permit"

DEQ further stated: "The 40 cfs…and the 20 cfs are both above the 7Q10 flow that existed in the river [North Anna] prior to construction of the dam"

V. WATER SUPPLY INFORMATION

A. Hanover County Comprehensive Plan RE: Water Resources

The following is excerpted from the Hanover County 2007 Comp Plan:

"In Doswell, Hanover County owns the 4.0 million gallon per day (MGD) [6.2cfs] Doswell Water Treatment Plant, which uses the North Anna River as its source." Note - In 2007 Hanover removed and average of 3.5MGD. "The plant serves the Doswell area, including three major water users: Bear Island Paper Company, Paramount's Kings Dominion, and the Doswell Limited Partnership Cogeneration Power Plant. The Doswell Water Treatment Plant is interconnected with the Suburban Service Area, which enhances cost effectiveness and operating reliability, efficiency, and flexibility. In the Ashland area, the County owns the 2.0 MGD South Anna Water Treatment Plant, which has the South Anna River as its source. The plant is currently not in service and would require substantial upgrades to return it to service. In the Route 33 area, the County provides water service to Tyson Foods and a limited number of residential and

commercial customers via a water purchase agreement with Henrico County. In the Route 301 corridor, the Suburban Service Area utilizes the Richmond waterline as its source through a water purchase agreement with the City of Richmond. The County's current available capacity from Richmond is 15 MGD. In the Mechanicsville area, the County owns the 0.17 MGD Harris Court well facility and the 0.65 MGD Garthright well facility. The Garthright well facility is currently not in service. In the Hanover Courthouse area, the County owns 3 wells with a capacity of 0.16 MGD. The Courthouse system primarily serves the County's government complex, the Pamunkey Regional Jail, and a small number of residential and commercial customers.

In the 1980s Hanover County proposed to construct a cross-stream impoundment of Crump Creek, downstream of the Pollard Creek confluence, with a river skimming intake facility on the Pamunkey River, as a means of providing the Suburban Service Area with an adequate water supply. The County submitted an application to the U.S. Army Corps of Engineers for review in 1992. The raw water supply to the reservoir would be provided by a river skimming intake facility and pumping station located on the Pamunkey River and by runoff from the Crump Creek watershed. Water was estimated to be pumped from the Pamunkey River at a rate of 25 MGD. When the Crump Creek application was made, the EPA and other environmental agencies took strong exception to projects which eliminate wetlands. The proposed Crump Creek project had wetland impacts so the County pursued an alternative connection with the City of Richmond for utilization of Richmond's excess capacity, which resulted in the Richmond Water Contract that was entered into on July 1, 1994. Through its contract with the City of Richmond, the County will have 20 MGD of water available to it in 2010. Currently 15 MGD of water is available from Richmond. It is estimated that the 20 MGD capacity of this contract, when combined with other supply sources available to the County, will meet the County's average and peak day demands to sometime during period 2020-2025, depending on growth within the Suburban Service Area.

In addition to the interconnection with the City of Richmond, the County has recently evaluated more cost effective and environmentally compatible alternatives to the Crump Creek Reservoir Project. In 2001, the County initiated a "Long-Range Water Resources Planning Study" to identify sources of water available to the County for meeting projected water demands after 2020-2025. It developed and evaluated water supply alternatives capable of meeting projected needs after 2020. The study recommended that the County retain the following two alternatives for incorporation into the Comprehensive Plan.

Alternative 1: Verdon Quarry with WTP at Verdon Quarry This alternative involves use of raw water storage in the Verdon Quarry and treatment at a plant adjacent to the quarry. This alternative includes:

- 28 MGD (estimated) water treatment plant adjacent to the Verdon Quarry
- 50 MGD (estimated) river intake and raw water pump station at Little River
- 30 MGD [42.7cfs](estimated) river intake and raw water pump station at North Anna River
- 28 MGD (estimated) reservoir intake and raw water pumping station at Verdon Quarry
- 28 MGD (estimated) finished water pump station at water treatment plant
- 42-inch (estimated) raw water main from Little River to Verdon Quarry (approximately 400')
- 42-inch (estimated) raw water main from Verdon Quarry to North Anna River (approximately 6,000')
- 36-inch (estimated) finished water main from water plant to the Suburban Service Area (approximately 62,000')

Alternative 2: Verdon Quarry with WTP in Suburban Service Area This alternative involves use of raw water storage in the Verdon Quarry and treatment at a plant in the southern central portion of the County. This alternative includes:

- 28 MGD (estimated) water treatment plant in the southern central portion of the County
- 50 MGD (estimated) river intake and raw water pump station at Little River

• 50 MGD (estimated) river intake and 78 MGD raw water pump station at South Anna River
• 28 MGD (estimated) reservoir intake and raw water pump station at Verdon Quarry • 28 MGD (estimated) finished water pump station at water treatment plant
• 42-inch (estimated) raw water main from Little River to Verdon Quarry (approximately 400')
• 42-inch (estimated) raw water main from Verdon Quarry to South Anna River (approximately 39,000')
• 42-inch (estimated) raw water main from South Anna River to water treatment plant (approximately 30,000')
• 36-inch finished water main from water plant to the Suburban Service Area (approximately 12,000')

In 2010, it is recommended that the County initiate implementation of the water supply project by selecting a consultant to conduct further studies of the water supply facilities.

B. Other Down-river uses

NONE of the water intakes on the NAR, SAR or Little River have permits. All are so old they were "grand fathered". The Hanover Water Plant (grand fathered) does serve Bear Island and Diamond Energy (so no separate intakes) and Engals has several intakes on the NAR and SAR but they are "agriculture uses" and don't need permits. Kings Dominion has grand fathered withdrawals on the NAR but has stopped. Grand fathered means anyone can withdraw any amount any time; they simply are supposed to notify DEQ, which they rarely do.

VI. REFERENCES

1. Letter dated 21 Nov 2006 from Va. Dept Environmental Quality to Dominion Power re: Federal Consistency Certification under Coastal Zone Management Program: North Anna Early Site Permit Application

2. North Anna IFIM Study Plan, Dominion Resources Services, Inc., Prepared by EA Engineering, Science, and Technology, Inc., 28 March 2007

3. Letter dated 1 Oct 2007 from Dominion to DEQ, revising the North Anna River Monitoring Plan

4. Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site, US Nuclear Regulatory Commission, Office of Nuclear reactor regulation, Washington, D.C. NUREG 1811

5. Application to SWCB for Certificate of Project dated April 04, 1968

6. Letter dated 20 July 2006 from DEQ, Division of Water Resources to DEQ Coastal Consistency Determination with recommendations.

7. Letter dated 11 July 2006 from DGIF to DEQ Coastal Consistency Determination with recommendations.

8. Letter dated 15 September 2005 from VDH to Head DEQ concerning health risks to heated water at LKA.

9. Re-issue of VPDES permit by DEQ to Dominion for discharges from plants one and two 265 October 2007.

10. Environmental Study of lake Anna and the North Anna River – Annual Report, Dominion resources, Environmental Biology Electric Environmental Services, March 2008

VII. APPENDIXES

Attached to and considered part of this Supplement are the following appendices:

1. Lake Anna Lake Level Contingency Plan History
2. LKA Water Level Measurements May 2007 thru April 2008

APPPENDIX 1
Lake Anna Lake Level Contingency Plan History

1. History

When North Anna River dam was licensed in the 1960s, the Virginia State Corporation Commission (SCC) ordered Virginia Electric and Power Company (June 12, 1969, Case No. 18669) to "at all times discharge a flow of water through the dam for low water augmentation in the amount of at least 40 cubic feet per second (40 cfs)". These same limits were place in the 21b Certificate issued to Dominion by the SWCB on February 11, 1972 and the 401 Certificate issued in 1973.

In 2001, Dominion requested that the 40 cfs be stricken from the 1969 license because of the 2000 and 2001 LLCP legislation (see below). In Case No. PUE010515, the SCC ruled on October 1, 2001:

"the requirement…. to maintain a flow of not less than 40 cfs though the North Anna Dam shall be, and hereby is, eliminated from the license"

"all other terms and conditions shall remain in effect".

IMPORTANT NOTE: The Order did not require that any other flow level (20 cfs or otherwise) be maintained, nor were any other terms of a LLCP specified.

Prior to 1999, the resident of Lake Anna had enjoyed years of relative lake level stability as there had been only 2 drought periods since the early 1970s. However, rapid growth around the lake increased the numbers of waterfront facilities, many of which were rendered unusable during the summer of 1999. It was because of this situation that LACA, LAAC and Virginia Power Company requested relief from the minimum 40 cfs requirement stated above. Dominion's first request was for a SWCB Consent Special Order, but the idea was withdrawn in favor of enabling Virginia legislation.

2. Legislative process to Change the 40cfs and Provide for a LLCP

The change required 4 pieces of legislation over a two year period. Bills, amendments and substitutions tried to favor first lake, then downstream users, ending in a 2001 compromise.

In 2000, identical bills were introduced by Del. Earl Dickenson (HB 625) and Sen. Edd Houck (SB 296). The bills stated:

Any Virginia Pollution Discharge Elimination System permit issued for a surface water impoundment whose primary purpose is to provide cooling water to power generators shall include a lake level contingency plan to allow specific reductions in the flow required to be released when the water level above the dam drops below designated levels due to drought conditions, and such plan shall take into account and minimize any

adverse effects of any release reduction requirements on downstream users. This section shall not apply to any such facility that addresses releases and flow requirements during drought conditions in a Virginia Water Protection Permit.

The specific language would allow Va. Power relief from the 40 cfs requirement in the 1969 SCC license (hence the 2001 Case) and required DEQ to include LLCP provisions in the VPDES permit for the cooling lagoons and LKA (first in the 2000 reissuance and then in the 2007 reissuance). NOTE: When the VPDES permit was issued in 2000, the 1972-1973 Certificates mentioned in Section 1 above were revoked.

During the development of the draft LLCP during 2000, the 248' msl and 20 cfs levels were chosen and users downstream of the dam had priority. These parameters did not suit the lake interests. LACA objected to the draft LLCP. 2001 saw additional legislation to try to resolve the impasse.

First, Del. Earl Dickenson introduced HB 2310 which add a single phrase to the 2000 legislation to help lake interests:

…..and minimize any adverse effects of any release reduction requirements on *beneficial uses, as defined in § 62.1-10, within the impoundment, and on* downstream users.
(denotes added language)

The term "beneficial uses" was included to emphasis both uses (lake and downstream) as it is defined as:

"Beneficial use" means both instream and offstream uses. Instream beneficial uses include, but are not limited to, the protection of fish and wildlife habitat, maintenance of waste assimilation, recreation, navigation, and cultural and aesthetic values. Offstream beneficial uses include, but are not limited to, domestic (including public water supply), agricultural, electric power generation, commercial and industrial uses. Public water supply uses for human consumption shall be considered the highest priority.

Then, Del. Frank Hargrove of Hanover County countered by introducing HB 2714 which would have restored the minimum 40 cfs requirement by adding a single sentence:

However, no plans (LLCP) shall be designed or implemented so as to conflict with an existing order issued by the State Corporation Commission establishing a minimum release rate for an impoundment structure.
(denotes added language)

Apparently, there was compromise as Del. Dickerson and Del. Hargrove offered an Amendment for Del. Dickenson's HB 2310 which further specified the priorities:

minimize any adverse effects of any release reduction requirements on *beneficial uses, as defined in § 62.1-10, within the impoundment, and on* downstream users. *The reduction in release amounts required by a lake level contingency plan shall not be implemented to*

the extent they result in an adverse impact to (i) the ability to meet water quality standards based upon permitted discharge amounts, (ii) the ability to provide adequate water supplies for consumptive purposes such as drinking water and fire protection, and (iii) fish and wildlife resources. In the event there is an imminent threat of such an adverse impact, the permit holder and the Department of Environmental Quality shall be notified. Upon such notification, the permit holder may increase release amounts as specified in the permit for up to forty-eight hours or until such time as the Department of Environmental Quality determines whether or not the increase in release amounts is necessary.

(new language added)

Because of the specificity in (i) and (ii) and the notification/increase provisions, clearly downstream users won preference over lake interests.

IMPORTANT NOTE: After all that legislative effort, however, none of the current LLCP triggering or level parameters (248' msl, 20 cfs, 5 cfs increments, etc.) were ever specified in legislation.

3. From Legislation to LLCP and VPDES- 2000

In response to the 2000 legislation, DEQ first proposed a LLCP at a June 7, 2000 Public Meeting at NAPS, followed by a DRAFT LLCP issued on August 1, 2000. The provisions as noted in Chapter V of the Report list the provisions.

It was clear that the legislative sponsors, LACA and others were not pleased with the LLCP:

A. In a comprehensive September 5, 2000 response, LACA President Bill Hayden wrote:

-"the LLCP as presented is unacceptable to LACA"

-the 248' trigger level should be set at 250' and releases should not return to 40 cfs until 250'- "It is unreasonable to wait until we are in the middle of drought conditions to begin taking conservation measures. The 248' level is within 4.8 inches of the lowest level Lake Anna has reached since it was built"

- add a provision for action by downstream users. "As the water from Lake Anna is reduced, downstream users will start implementing water conservation measures as necessary to reduce their requirements for water". The provision for return to 40 cfs due to adverse effect should happen "after approved water conservation measures have been fully implemented and verified by DEQ.

B. On October 26, 2000, legislative co-sponsor Sen. Edd Houck, wrote to SWCB Chairman Hunter Craig stating:

> "it appears that both the LLCP and additional conditions proposed by DEQ would negate the entire effort and intent of the law". " Any plan must take into consideration the needs of all users. I suggest that downstream water users should also be required to have water usage reduction plans in place which can be implemented in stage to reduce their water needs. This, coupled with reduced flow levels from Lake Anna, could then lead to a system which is equitable to all users".

C. At the November 6, 2000 Public Hearing on the LLCP, co-sponsor Del. Earl Dickinson stated that the LLCP did not meet the intent of the law

D. The Louisa County Board of Supervisors voted at it November 20, 2000 meeting to support a LLCP in which impoundment and downstream stakeholders are treated equally in water releases during drought conditions.

E. On December 12, 2000, Del. Earl Dickinson drafted revised language to his 2000 bill to minimize the adverse impacts on "beneficial uses within the impoundment" as well as the downstream users.

DEQ responded in a November 17, 2000 Memorandum to SWCB Members, responding to written comments by LACA and others and from comments at the November 1, 2000 Public Hearing:

- Intent of the LLCP In response to such comments that the LLCP favored downstream users, DEQ responded that the LLCP provisions were taken from the law, that the law requires minimizing adverse affects on downstream users and "the reason that the permit even contains the LLCP is to provide some relief to Lake Anna property owners and recreational users during drought conditions".

- 248' trigger level In response to trigger levels at 250', 249' and trial discharge rates, DEQ responded that Dominion indicated that the lake was below 250' 58% of the time, that 248' occurred approximately every 10 years and that 248' would be consistent with "critical flow" or drought conditions as specified in Water Quality Standards. Also, DGIF and DCR recommended 248' for aquatic biota and North Anna river recreational purposes.

NOTE: Further LACA comments noted that level had reached 248' in 2 or the last 3 years (1999 and 2000) (now 5 of last 8: 1999, 2000, 2001, 2002, 2007). "It is unreasonable to wait until we are in the middle of drought conditions to begin taking conservation measures".

- Adverse Impacts In response that adverse impacts are not defined, adverse affects are defined as the inability to withdraw/discharge water for proper operation of facilities or impairment of water quality.

NOTE: Further LACA comments noted that downstream users can continue to conduct "business as usual" while Lake owners have great difficulty operating their boats.

- Water Conservation Measures In response to calls for such measures by the downstream users as water flows are reduced, DEQ responded that they are not required in the law and that such decisions should be made by local governments.

NOTE: At the time, DEQ's Valley Regional Office in Harrisonburg was in charge of this process. Director Brad Chewing and Water Permit Manager Keith Flower were in charge for DEQ. The responsibility has since been shifted to DEQ's Northern Regional Office in Prince William County.

4. VPDES 2007 Re-issuance

VPDES permits have to be re-issued every 5 years. The process was slowed in 2006 because of the water concerns during the ESP Process for Units 3 and 4 at NAPS. The Draft Permit was released with a Public Hearing on July 18, 2007.

Among the speakers was Dennis Schaible for LACA Water Quality Chairman Ken Remmers. Mr. Schaible requested the following:

-gradually reduce flow in 5 cfs increments at 249', ending at 20cfs at 248'. The end points are the same (20cfs at 248') but gradual changes will leave more water in the Lake and not shock downstream conditions by sudden 5 cfs increments (72 hours) at 248'

-increase seasonal lake level by 3" (250.25') as recommended by DGIF during the ESP process. Maintaining 40 cfs or higher at this level will provide extra seasonal storage to better manage droughts and even annual summer reductions in Lake levels as reported by Dominion (below 250' 58 % of the time).

DEQ Re-issued the VPDES permit on October 25, 2007 with the LLCP parameters unchanged, save for adding DGIF to the existing list of downstream users to be notified of pending flow reductions. DEQ offered 4 pages of explanations in a 20 page Fact Sheet. In its summary of comments received during the Hearing and Public Comment period, DEQ summarized the comments received (Item # 35) and stated:

"The conditions in this draft permit are those that were derived through stakeholder meetings in 2000. Staff believes the set of conditions in the permit are an adequate compromise amongst the stakeholders and no changes are recommended without a consensus amongst all parties".

DEQ further stated:

"The draft permit does not require Dominion to maintain the lake at 250'. If Dominion can and chooses to maintain this additional level [250.25'], they may do so without any consequence to the draft permit'

"The 40 cfs…and the 20 cfs are both above the 7Q10 flow that existed in the river [North Anna] prior to construction of the dam'

There seems to be several opportunities here:

A. It is hard to imagine that the LLCP parameters were derived from compromises amongst stakeholders. It seems that the most important stakeholders (the legislation authors) were not satisfied, nor were other non-state agency entities.
B. The DEQ statement seems to challenge further stakeholder meeting to discuss compromises.
C. The DEQ comments and permit do not rule out the 250.25' idea but puts the responsibility clearly with Dominion's purview
D. The DEQ comments suggest that the 40 and even 20 cfs flows are greater than pre-dam conditions. This would suggest that flows of less than 20 cfs would support pre-dam levels of fishery and recreational boating. Perhaps the existing IFIM effort could study the issue to determine if the 20 cfs drought flow level is appropriate.

5. **Lake Level Height**

VEPCO on application for Certificate of the Lake Anna Project to the SWCB on April 4, 1968 proposed an elevation in the submitted Site Plan. The elevation is stated "to **about** elevation 250 MSL or **about** 95 feet above the stream bed." This was approved by the SCC and SWCB. The important fact here is the elevation required is only about 250 MSL. This appears to allow the 250.25 MSL without violating any criteria set by the SCC or SWCB.

APPENDIX 2
Lake Anna Water Level Measurements May 2007 thru May 2008

DATE	TIME	COOLING LAGOON HT	Hot Side down (in)	RESERVOIR HT	Cold Side down (in)
5/15/2007				***250***	
7/12/2007	8pm	250.6	-4.8	249.3	-8.4
8/9/2007	1251pm	249.8	-14.4	248.7	-15.6
8/12/2007	1332pm	249.9	-13.2	248.6	-16.8
9/10/2007	1230pm	249.3	-20.4	248.1	-22.8
9/13/2007	0924am	248.6	-28.8	248.1	-22.8
9/15/2007				***248***	
9/16/2007	1128am	248.6	-28.8	248.2	-21.6
9/20/2007	825am	248.5	-30	248.1	-22.8
9/22/2007	1349pm	248.6	-28.8	248.1	-22.8
9/26/2007	0940am	248.5	-30	247.9	-25.2
9/29/2007	1209pm	248.5	-30	247.9	-25.2
10/3/2007	1009am	248.2	-33.6	247.8	-26.4
10/8/2007	1036am	248.6	-28.8	247.55	-29.4
10/13/2007	926am	248.5	-30	247.5	-30
10/22/2007	819am	248.5	-30	247.2	-33.6
1/12/2008	1430pm	248.8	-26.4	247.8	-26.4
2/2/2008	900am	249.1	-22.8	248.3	-20.4
2/4/2008				***248***	
2/7/2008	1647pm	249.3	-20.4	248.4	-19.2
2/16/2008	1000am	249.7	-15.6	248.6	-16.8
3/1/2008	0830am	249.7	-15.6	248.7	-15.6
3/6/2008	1525pm	250	-12	248.9	-13.2
3/10/2008	1146am	250.2	-9.6	249.1	-10.8
3/14/2008	900am	250.25	-9	249.2	-9.6
3/21/2008	900am	250.2	-9.6	249.2	-9.6
3/29/2008	900am	250.25	-9	249.25	-9
4/5/2008	908am	250.75	-3	249.4	-7.2
4/14/2008	1013am	250.6	-4.8	249.9	-1.2
4/16/2008	1649pm	250.55	-5.4	249.8	-2.4
4/20/2008				***250***	
4/23/2008	0700am	251.2	2.4	250.2	2.4
4/26/2008	0900am	251.1	1.2	250.2	2.4
5/1/2008	1502pm	251	0	250.05	0.6
5/9/2008	1121am	252.3	15.6	251.2	14.4
5/10/2008	0805am	251.9	10.8	250.9	10.8
5/14/2008	1242pm	251.6	7.2	250.55	6.6