Erin Noakes
P.O. Box 65240
Washington, DC 20035
thewritein@yahoo.com

February 4, 2017

U.S. Nuclear Regulatory Commission
Denise McGovern, Office of the Secretary
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

RE: Docket No. 52-017

Ms. McGovern,

Thank you for the opportunity to file a statement of issues for the Commission to give particular attention to as part of the upcoming uncontested hearing regarding whether the NEPA review conducted by the NRC staff of Dominion's November 26, 2007 application for a COL has been adequate under the applicable statutory and regulatory standards.

I am concerned that the NEPA review conducted by the NRC staff, as reflected in the March 2010 Final Environmental Impact Statement for Combined License (COL) for North Anna Power Station Unit 3 (NUREG-1917) (Adams Accession No. ML 100680117), is inadequate with respect to the staff's analysis and conclusions on the need for power. My concerns fall into three main categories: (I) lack of independent analysis for the base-load demand forecast, (II) lack of adequate consideration of alternatives not requiring new generating capacity, and (III) lack of adequate consideration of alternatives requiring new generating capacity.

I. Lack of Independent Analysis for the Base-Load Demand Forecast

In Section 8.0, "Need for Power," of NUREG-1917, staff states:

> As outlined in NUREG-1555, if the staff finds the independently produced need for power evaluation acceptable, no additional independent review by the NRC may be needed, and the staff may rely upon that evaluation's findings when assessing the applicant's need for power analysis. However, the data may be supplemented by information from other sources such as the Energy Information Agency, Federal Energy Regulatory Commission, and the North American Electric Reliability Council….The NRC staff compared representative load projections for the Dominion Zone in the years 2015, 2016, and 2017 in PJM's 2009 Load Forecast Report (PJM 2009) against the PJM forecast used in Dominion's need for power

> assessment. The staff determined that for all three years there was about a 2 percent decrease from the Dominion reported estimate to the PJM's 2009 estimate for summer peak load in the Dominion Zone. This difference was equivalent to one year's growth in peak load. Therefore the staff concluded there was no need to update the estimates reported to accommodate the impacts of the 2009 recession because such changes would have no impact on the conclusions of this analysis.

However, in Section 8.4.2.1, "Systematic," staff states:

> Because the PJM model did not provide a forecast of base-load demand, Dominion derived an estimate of base-load demand and growth rate that they considered to be fully consistent with the peak demand forecasted by PJM for the Dominion Zone. Dominion estimated the 2006 base-load demand in the Dominion Zone by reviewing historical PJM integrated hourly loads for the zone, sorting the 8760 hourly loads (i.e., 24 hours × 365 days) in declining order to create the load duration curve and selecting the 65th percentile hour load equal to 9538 MW(e) as the proxy for the 2006 base-load demand. Dominion assumed that this base-load demand would continue to grow at a compound annual growth rate of 2.4 percent, equal to the compound annual growth rate observed in historical Dominion weather-normalized average hourly sales over the 5-year period from 2002 to 2006.

To recap, in 2007 staff received an "assumption" of base-load demand from the applicant (and not by an independent source such as PJM), which the applicant developed using historical data from 2002-2006, to project a compound annual growth rate of 2.4 percent. However, staff did not actually assess the validity of this base-load demand figure generated by Dominion (or why only 5 years of historical data were used) when it finalized the SEIS in 2010 – instead, it looked at the 2009 PJM forecast, and compared it with prior PJM forecasts.

Due to the fact that the need for power assessment likely does not meet the requirement of "independently produced," I do not believe that NUREG-1555 was followed. Moreover, the consequences of a lack of an independently produced need for power assessment are serious. Performing a backtest of the assumption provided by Dominion back in 2007 of 2.4% compound annual growth rate reveals the implications of staff's reliance on an assessment that was not independently produced. To perform the backtest, I compared rates of population change and electricity sales over the relevant time period. In 2006, the Commonwealth of Virginia had an estimated population of 7,683,718,[1] and 106,721,241 megawatt hours (Mwh) of electricity were sold in Virginia directly to the consumer of the energy that year.[2] Dominion's application contained the forecast that base-load demand would grow at 2.4% a year from that baseline. Fast forward to 2015, when the Commonwealth of Virginia has an estimated population of

---

[1] *See* Virginia Department of Elections, "Virginia Population and Voter Registration History," available at: http://www.elections.virginia.gov/Files/Media/GREBWorkgroup/VAPopulationData.pdf.

[2] *See* Energy Information Administration, State Electricity Profiles 2006 (11/21/2007) at p. 231, available at: http://www.eia.gov/electricity/state/archive/062906.pdf.

8,382,993,[3] and 112,009,045 Mwh of electricity were sold in Virginia directly to the consumer of the energy that year.[4] The stark difference between Dominion's base-load demand forecast and reality is laid out in the chart below:

	Actual Sale (Mwh)	2.4% Dominion Projection
2006	106,721,241	
2007		109,282,551
2008		111,905,332
2009		114,591,060
2010		117,341,245
2011		120,157,435
2012		123,041,214
2013		125,994,203
2014		129,018,064
2015	112,009,045	132,114,497
Overestimate (compared to 2006) = 20,105,452 Mwh		

If staff had compared what Dominion projected against what had actually come to pass, staff would have been confronted with the fact that the actual demand in 2015 was only 5,287,804 Mwh more than in 2006, despite population growth increasing by 708,993 persons (approx. 9%). Admittedly, the Dominion Zone also covers the northeastern part of North Carolina, which had 133,847,523 Mwh of retail sales in 2015,[5] and 126,698,979 Mwh of retail sales in 2006.[6] However, using the same 2.4% assumption, Dominion's base-load projection would have forecast sales in North Carolina to be at 156,845,739 Mwh for 2015 – far higher than actual sales. Further, the Dominion Zone does not cover any of the fast-growing cities in North Carolina, such as the Durham-Raleigh-Chapel Hill research triangle, so the demand for power in the Dominion Zone is likely much below whatever state-level increase actually transpired.

Further, a quick glance at EIA's "Table 4. Electric Power Industry Capability by Primary Source, 1990 through 2015 Virginia"[7] would indicate that in 2015, from a combination of sources that would qualify as "base-load," (i.e. coal, natural gas, nuclear, petroleum, pumped storage, hydroelectric, wood), Virginia already has the capacity to produce 20,928 MW (which,

---

[3] *See* U.S. Census Bureau, "Quick Facts Virginia," available at: https://www.census.gov/quickfacts/table/PST045215/51.

[4] *See* Energy Information Administration, State Electricity Profiles 2015 (1/17/2017) available at: http://www.eia.gov/electricity/state/virginia/.

[5] *See* Energy Information Administration, State Electricity Profiles 2015 (1/17/2017) available at: http://www.eia.gov/electricity/state/northcarolina/index.cfm.

[6] *See* Energy Information Administration, State Electricity Profiles 2006 (11/21/2007) at pg. 166, available at: http://www.eia.gov/electricity/state/archive/062906.pdf.

[7] *See* Energy Information Administration, State Electricity Profiles 2015 (1/17/2017) available at: http://www.eia.gov/electricity/state/virginia/.

at a capacity factor of 85%, would generate 155,829,888 Mwh). If we added the current capacity figure of 155,829,888 Mwh to what the North Anna Unit 3 target value of 1500 MW(e) electrical output of production would generate (at a conservative capacity factor range of 85%, which amounts to 11,169,000 Mwh), we would arrive at a capacity of 167,655,888 Mwh – representing a capacity of 150% of current demand (which was 112,009,045 Mwh in 2015).

Finally, a closer look at the breakdown of that total Virginia retail sale figure of 112,009,045 is useful. EIA indicates that residential sales in 2015 were pretty comparable to residential sales back in 2007 (45,928,411 Mwh versus 45,480,519 Mwh),[8] despite 9% population growth. Commercial and Transportation sales went up in that time frame (industrial use went down a bit). More information is needed as to whether this per capita decrease in residential consumption is a temporary blip or a lasting trend, or even an accelerating trend.

All of these figures generate significant doubt as to whether staff met the standard of NUREG-1555 (which allows staff to skip the step of assessing for itself the need for power analysis ONLY if the analysis provided by the applicant is independently produced), and especially whether staff met the "hard look" standard required by NEPA.[9] Staff used a 2009 PJM forecast and compared it against a previous PJM forecast submitted by the applicant, but some of staff's discussion under Section 9.2.2, "Alternatives Requiring New Generating Capacity" in NUREG-1917 hinges on whether a reasonable alternative could operate as a base-load plant.[10] Therefore, the base-load projection assumption of 2.4% compounded each year provided by Dominion remains highly relevant to the need for power analysis.

For the reasons above, I strongly urge the Commission to determine that staff's review of the application has NOT been adequate to support the findings in 10 CFR §51.107(a)(2) ("Independently consider the final balance among conflicting factors contained in the record of the proceeding with a view to determining the appropriate action to be taken") in that there has been no independent consideration of the applicant's assertions regarding the need for a certain quantity of base-load power, which have turned out to be unsupported by actual demand data over the last 10 years. Instead, I strongly urge the Commission to request that the applicant refer to a source for a need for power analysis – including base-load power – that is truly independent from the applicant (i.e. no conflicts of interest, financial or otherwise, between the applicant and the source of the need for power analysis). If the applicant is unable to furnish a truly independent need for power analysis, including base-load power, then I urge the Commission to request that staff undergo its own independent analysis, supplemented with current data from EIA and other sources. The Commission should publish this aspect of the staff's update of the EIS for public notice and opportunity for comment.

---

[8] *See* Energy Information Administration, "Table 8. Retail sales, revenue, and average retail price by sector, 1990 through 2015," available at: http://www.eia.gov/electricity/state/virginia/.

[9] *See, e.g.*, Staff's statement dated Jan. 18, 2017 (SECY-17-0009) which stated, "The staff concludes that the environmental findings in the FEIS constitute the 'hard look' required by NEPA and have reasonable support in logic and fact."

[10] *See, e.g.*, Section 9.2.3.2 and 9.2.3.3.

II. Lack of Adequate Consideration of Alternatives Not Requiring New Generating Capacity

In Section 9.2.1, "Alternatives Not Requiring New Generating Capacity," staff considered four alternatives: purchase the needed electric power from other suppliers, reactivate retired power plants, extend the operating life of existing power plants, or implement conservation or demand-side management (DSM) programs.

It's not clear why staff did not analyze these four alternatives in combination with each other, like staff did in Sec. 9.2.4. Also, under the fourth alternative, staff considered conservation programs that serve to reduce peak demand, which, by its own admission (per the cross-reference and discussion in Section 8.4.1), would not be an actual alternative to a new nuclear facility generating 1500 MW of base-load power. Therefore, staff accepted from Dominion a false alternative, which unsurprisingly turned out to be insufficient.

I want to draw your attention to the fact that according to data from EIA, Virginia comes in almost dead-last (48 out of 50 states)[11] for the high percentage of electricity (**10.1%!**) that it loses in transmission. In fact, in 2015, 5,586,277 Mwh were estimated lost[12] (this figure does not include what is 'unaccounted' for). This amount of loss alone is equal to 733 MW of base-load generation (assuming 85% capacity factor), which is almost HALF of the proposed generation of the North Anna Unit 3. EIA estimates that the national average of losses is around 6%,[13] and WV has a transmission loss of 2.4%.[14] Some causes of transmission loss are outside of a utility's control (for example, how densely or sparsely population is located will impact the length of distribution lines), but many other factors that impact loss rates are within Dominion's control to make improvements on: whether the size of conductors is adequate, where distribution transformers are installed, whether Power Factor is low or high, workmanship, feeder phase current and load balancing, the levelness of load factor, transformer sizing and selection, balancing 3-phase loads, and switching off transformers.[15] Some of these factors are even impacted by reductions in peak demand (such as by making load factor more level), and some of these factors can be improved by using energy storage methods (discussed further below in Section III).

---

[11] *See* Jordan Wirfs-Brock, "Lost in Transmission: How Much Electricity Disappears between a Power Plant and your Plug" (Nov. 6, 2015), available at: http://insideenergy.org/2015/11/06/lost-in-transmission-how-much-electricity-disappears-between-a-power-plant-and-your-plug/

[12] *See* Energy Information Administration, State Electricity Profiles 2015 (1/17/2017) available at: http://www.eia.gov/electricity/state/virginia/ (Table 10. Supply and Disposition of Electricity, 1990 through 2015).

[13] *See* Energy Information Administration, "Frequently Asked Questions: How much electricity is lost in transmission and distribution in the United States?" available at: http://www.eia.gov/tools/faqs/faq.cfm?id=105&t=3.

[14] *See* Wirfs-Brock, supra note 10.

[15] For a description of how these factors impact losses, see Jiguparmar, "Total Losses in Power Distribution and Transmission Lines" (Aug. 19, 2013), available at: http://electrical-engineering-portal.com/total-losses-in-power-distribution-and-transmission-lines-1.

I strongly urge the Commission to determine that staff's review of the application has NOT been adequate to support the findings in 10 CFR §51.107(a)(1) ("Determine whether the requirements of Sections 102(2) (A), (C), and (E) of NEPA and the regulations in this subpart have been met") in that Sec. 102(2)(c)(ii) of NEPA was not met ("all agencies of the Federal Government shall— include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on— alternatives to the proposed action"). Instead, I strongly urge the Commission to redirect staff to conduct an assessment of the potential for Dominion to reduce its deplorable levels of transmission loss as a viable conservation alternative under the fourth prong of alternatives considered in Section 9.2.1. Specifically, staff should calculate what amount of Mwh could be recaptured for sale through conservation by making reasonable investments in improving the transmission and distribution of power in the Commonwealth of Virginia, at the very least so that Virginia approaches the national average. Staff should use this amount in order to analyze a combined figure across all four possible alternatives that would not require new generating capacity, AND as part of any combined figure it arrives at under Section 9.2.4 for alternatives requiring new generating capacity. The Commission should publish this aspect of the staff's update of the EIS for public notice and opportunity for comment.

III. Lack of Adequate Consideration of Alternatives Requiring New Generating Capacity

In staff's statement SECY-17-0009, staff concluded that there were no novel issues for environmental review since 2010, when NUREG-1917 was issued. However, since 2010:

- salt water batteries have come into commercial production for application to grids;[16]
- the Bureau of Land Management has contracted for Advanced Rail Energy Storage as a cheap alternative to other energy storage options[17] (which apparently offers efficiency rates of 85%, compared to 70-75% for pumped-hydro storage);

[16] *See, e.g.*, Aquion, "Grid Energy Storage," available at: http://aquionenergy.com/businesses-utilities/grid-energy-storage/ (touting that its salt-water batteries are "well suited for a range of long-duration, grid energy storage applications, including primary uses for bulk energy shifting for large-scale renewables, peak shaving for T&D deferral, and grid resiliency through distributed and dispatchable storage, while also supporting ancillary services.").

[17] *See* Kent Harrington, "California's Newest Grid Storage: Batteries Not Included" (May 5, 2016), available at: https://www.aiche.org/chenected/2016/05/californias-newest-grid-storage-batteries-not-included.

- natural gas combined cycle combustion turbines have achieved efficiency rates in 2015 (at 45%)[18] that are far surpassing efficiencies for nuclear (at 33%),[19] petroleum, and coal, with a race to reach rates of 60% efficiency;[20] and
- battery prices have dropped by 50% in 5 years.[21]

These developments are not adequately discussed (actually, are not discussed at all) in the alternatives section in Section 9.2.2 of NUREG-1917, or in the staff statement SECY-17-0009. For example, battery applications can be useful for more than just the supply of power -- they can supply ancillary grid services such as reserve capacity, surge capacity, load-balancing, or voltage support; support the grid by reducing use of existing infrastructure or deferring the need for new infrastructure; and firm variable generation or time shifting generation to match load[22] – but the only energy storage options considered in Section 9.2.3.2 are pumped-hydroelectric and compressed air energy storage. Additionally, the relatively higher efficiency of natural gas combined-cycle turbines (45% in 2015 compared to 33% for nuclear) means that the comparison in 9.2.2.2 should use an assumption of less than three units with a net capacity of 500 MW(e) per unit to be an apples-to-apples comparison.

Overshadowing all of these points is the fact that any meaningful discussion of alternatives must actually be compared against a more accurate projection figure for demand, and be able to be combined with the potential conservation methods of reducing transmission and distribution losses developed in Section 9.2.1.

Consequently, I strongly urge the Commission to determine that staff's review of the application has NOT been adequate to support the findings in 10 CFR §51.107(a)(1) ("Determine whether the requirements of Sections 102(2) (A), (C), and (E) of NEPA and the regulations in this subpart have been met") in that Sec. 102(2)(c)(ii) of NEPA was not met ("all agencies of the Federal Government shall— include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on— alternatives to the proposed action"). Instead, I strongly urge the Commission to redirect staff to use the independent assessment of need for power (to be developed per the discussion above in Section I) as a baseline against which to assess efficiency-adjusted options (i.e. taking into account that in 2015 combined cycle gas turbines produce 45 MW for every 33 MW that nuclear plants produce),

---

[18] *See* Energy Information Administration, "Table 8.2 Average Tested Heat Rates by Prime Mover and Energy Source, 2007-2015") available at: http://www.eia.gov/electricity/annual/html/epa_08_02.html (calculated by dividing the equivalent Btu content of a kWh of electricity (which is 3,412 Btu) by the heat rate of 7,655).

[19] *See id* (calculated by dividing the equivalent Btu content of a kWh of electricity (which is 3,412 Btu) by the heat rate of 10,458).

[20] *See, e.g.*, Drew Robb, "CCGT: Breaking the 60 Percent Efficiency Barrier" (3/1/2010), available at: http://www.powerengineeringint.com/articles/print/volume-18/issue-3/features/ccgt-breaking-the-60-per-cent-efficiency-barrier.html.

[21] *See* Herman K. Trabish, "Why Battery Storage is 'Just About Ready to Take Off'" (Oct. 13, 2015), available at: http://www.utilitydive.com/news/why-battery-storage-is-just-about-ready-to-take-off/407096/.

[22] *Id.*

including a combination of options that also includes discussion of currently commercially available energy storage options that were omitted from NUREG-1917, along with all of the no-generation alternatives analyzed under Section 9.2.1 (to be developed per the discussion in Section II).

Once the staff report is updated in accordance with the additional analysis performed under Section I, II, and III above, it will be greatly improved, hopefully adequate under the statutory and regulatory requirements, and will afford the Commission with a useful analysis upon which to base its COL decision.

I sincerely appreciate this opportunity to share my personal views on the matter of adequacy of this report, and I thank the staff for all its hard work on the application thus far, which will have long-lasting and profound impacts on ratepayers (and especially the next generation of ratepayers) in the Commonwealth of Virginia.

Sincerely,

Erin Noakes

CC: Representative Patrick A. Hope
Senator Janet D. Howell
Governor Terry McAuliffe
Lt. Governor Ralph S. Northam
Attorney General Mark R. Herring
Division of Public Utility Regulation, State Corporation Commission, Commonwealth of Virginia