Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060
Web Address: www.dom.com

Dominion®

August 6, 2010

Ms. Amy Owens
Director, Valley Regional Office
Virginia Department of Environmental Quality
4411 Early Road
Harrisonburg, VA 22801

Dear Ms. Owens:

Re: Request for Prevention of Significant Deterioration Permit – Supplemental Information
Virginia Electric and Power Company - Registration No. 81391 - AIRS ID No. VA-187-00041

Virginia Electric and Power Company (Dominion), is pleased to provide this additional information related to the BACT analyses and our responses to questions submitted to DEQ on July 27, 2010 for the three turbine alternatives included in the subject application. The following additional information is being provided pursuant to discussions between Dominion and DEQ during our meeting on August 2, 2010.

Carbon Monoxide

The proposed CO emission limits are different for the Siemens and General Electric F-class turbines based upon the individual manufacturer's emission rate specifications. This engineering performance data necessitates different permit limits. Based on the manufacturer's specific combustion configuration and tuning, Siemens has a slightly lower emission specification at full load when compared to GE, but requires a higher concentration limit at minimum (60%) load operation whereas GE's emission specification is constant over all normal operation (from base to minimum (50%) load). This difference in combustion configuration allows Siemens to achieve a lower CO output at maximum load, but a higher CO output at a higher minimum operating load than GE. The GE turbine has a slightly higher CO output at maximum load, but exhibits a lower CO output down to a broader range down to a lower minimum load compared to Siemens. The oxidation catalyst control device will remove CO at approximately 85% of inlet concentration regardless of turbine choice.

Regardless of turbine manufacturer, carbon monoxide will be determined using continuous emissions monitoring system (CEMS) measurements over a one-hour averaging time.,

Particulate Matter

Particulate matter ($PM/PM_{10}/PM_{2.5}$) is measured in two fractions, filterable and condensable. Filterable particulates are formed from carbon and sulfur combustion products. Condensable particulates are primarily a mixture of various organic materials which are gaseous at stack temperatures, but condense to form particulates at lower temperatures after leaving the stack. Although the two fractions are measured by different methods, the resultant total particulate matter (addition of filterable and condensable) is being sought as a permit limit.

Unlike NO_X, CO, or VOC, there are no demonstrated add-on technologies or design changes that are used for control of particulate matter. Once a facility is operating, there are no operational changes that will bring excess particulate emissions back into compliance. Formation of particulate matter is partially attributable to the sulfur content in the fuel and is also theorized to come from the ambient air which is drawn into the turbine. We have requested a permit for the Warren County project for use of only natural gas fuel. Sulfur-containing fuel oil will not be burned. The natural gas Dominion will receive for the Warren County project will be un-odorized natural gas direct from a transmission pipeline which will not have the typical amount of sulfur containing mercaptans found in natural gas delivered to homes. Using fuel with the lowest sulfur content is the recognized method available for limiting particulate matter from combustion turbines. Intake of particulate matter from the ambient air has also been another prospective cause of high particulate estimates from combustion turbines. Dust particles are drawn in with combustion air to the turbine's compressor which then "passes through" the particles which then exit the stack. Although this re-entrained particulate is not due to operation of the combustion turbine itself, it may be detected by the methods used for stack testing. Dominion will utilize inlet air filters to avoid drawing particulates through the turbine and out the stack.

The specific combustion turbine models Dominion is currently considering for this project are more advanced than each manufacturer's comparable models currently in operation. For example, the GE turbines represent about a 15% increase in power output coupled with a 3% decrease (better) heat rate when compared to previous versions of the same equipment that was available just ten years ago This means that the combustion turbine uses less fuel per kilowatt of power generated. The gain in generation efficiency allows the project to better serve the public by using comparatively less fuel to produce more power. While total fuel use will increase proportionately to the increase output capability of the new machines, the decrease in heat rate means that the gain in electric generation is a greater benefit.

Fuel use is related to particulate matter generation because more fuel mass will equal more particulate mass out, use of the more efficient turbines will generate particulates at a lower rate (on an electrical output basis) than combustion turbines permitted ten years ago in California and other states. Combustion turbines in California have been permitted at very low emission limits for previous

GE and Siemens turbine model versions which Dominion is considering. Dominion is proposing to meet similar limits for the Warren County project. These California permitting efforts have involved state-only particulate nonattainment regions which require the application of LAER and associated costly offsets if required. These permits only cite use of low sulfur containing natural gas as a BACT measure for particulate matter. Some of the initial permit limits were reduced after stack testing for the purpose of financial recovery to reclaim particulate offsets. The low tested values for particulates compared to the permitted values is partially the result of the permit limit representing the worst case conditions which are not likely to occur during an emission test. California has also modified the stack test method for their use, making the results difficult to compare.

Gains in fuel use efficiency are also beneficial to GHG emissions. Carbon dioxide is generated from the oxidation of fuel carbon during combustion where a majority of the fuel carbon is converted to CO_2. Just as efficiencies described previously increase fuel mass which in turn increases particulate matter mass rate, it also increases the CO_2 mass rate, but will decrease CO2 on an energy output basis. Although BACT regulations are not currently in effect for CO_2, the use of efficient combustion technology would satisfy BACT for CO2. We do not believe that a formalized BACT for CO_2 would result in any different conclusion other than BACT is the use of natural gas combined with efficient combined cycle technology.

As mentioned previously, there is no add-on control device for particulate matter however fuel usage does play a role in the mass formation of particulates since the more fuel fed into the turbine, the more particulates are expected to be generated. That is why the proposed particulate emission limit is higher for the larger Mitsubishi turbine than the Siemens or GE turbines. At the maximum rated heat input (natural gas use) the Mitsubishi turbine is approximately 33% larger than the Siemens and GE turbines. This difference in size is reflected in the proposed particulate matter emission limits. The addition of a duct burner to each of the project options will result in the same maximum increase in natural gas usage (and therefore expected particulate emissions) to each project option since it will be in addition to particulates from the combustion turbine.

It is essential that we have an emission limit which we know we can meet on a continuous basis since we will have to certify that we are in continuous compliance. Furthermore, there is no benefit to the public and our ratepayers if the new state of the art natural gas fired combined cycle plant cannot operate in conformance with an artificially low permit limit. In fact there would be a disbenefit if the new facility were not allowed to operate. Stack testing using current EPA test methods will be used to demonstrate compliance.

Dominion is proposing the adjusted emission rates below as BACT for the respective manufacturer and turbine model based on additional input from the turbine suppliers and the California experience. These emission limits may not be guaranteed by each turbine vendor, however we have reviewed applicable testing at comparable facilities and have operating experience within Dominion that allows us to propose these strict limits. The emission limits represent total particulate matter, filterable plus condensable, for the CT only and for the CT and Duct Burner combined.

Prospective manufacturer and turbine model	Emission limit for combustion turbine only	Emission limit for combustion turbine + duct burner
Siemens SGT6-5000F	9 lb/hr	15 lb/hr
Mitsubishi 501GAC	12 lb/hr	18 lb/hr
General Electric 7FA.05	9 lb/hr	15 lb/hr

Ammonia

As with particulate matter, Dominion wants to be compliant with a permit limit which is achievable in practice on a continuous basis. A requirement to meet 2 ppm ammonia slip as a one-hour average may not be achievable for the Warren County project for the following reasons.

Dominion recognizes that combustion turbines in Massachusetts are limited to 2 ppm ammonia slip on a one-hour average basis; however the proposed operation of the Warren County units is different than comparable facility's in Massachusetts. The proposed Warren County project will serve the PJM electric grid as a stabilizing facility capable of covering large swings in electric demand in short periods of time. As part of this process, the PJM system operator will take control of the units in order to meet the continuously changing demand. These load changes will necessitate ramping operation of the combustion turbine and, if necessary, the duct burners up and down to follow load demand. The SCR control equipment will be designed for better than 5 ppm on a one-hour basis by optimizing the ammonia grid and related control system. To be able to continuously maintain that BACT limit, the SCR ammonia injection system will have to adjust to the outlet NO_X conditions in real time. These varying ammonia injection levels will cause some small amounts of ammonia to pass through the catalyst unreacted and be emitted to the atmosphere. The rapid cycling of load which will cause variations in NO_X emissions will cause additional ammonia slip on a one hour basis.
For the reasons described, Dominion is requesting an ammonia limit of 5 ppm on a one-hour average at steady state conditions and all normal (defined as above 60% turbine load for Siemens and Mitsubishi, above 50% for GE) operating loads.

Thank you for your consideration of this supplemental information. Please contact Andy Gates at 804-273-2950 or andy.gates@dom.com, or me at 804-273-3010 if you have questions concerning this information.

Sincerely,

Robert M. Bisha
Director, Environmental Business Support

cc: Mr. Janardan Pandey, Valley Regional Office Air Permits Manager
Ms. Anita Riggelman, Senior Environmental Engineer
Ms. Tamera Thompson, Director, Permitting, DEQ Central Office