



COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

SOUTHWEST REGIONAL OFFICE

355 - A Deadmore Street, Abingdon, Virginia 24210

(276) 676-4800 Fax (276) 676-4899

www.deq.virginia.gov

Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

Allen Newman
Regional Director

March 5, 2014

Mr. Peter Podurgiel
Senior Vice President
CPV Smyth Generation, LLC
50 Braintree Hill Office Park, Suite 300
Braintree, MA 02184

Registration No.: 11750

Dear Mr. Podurgiel:

The air permitting section of the Southwest Regional Office of the Virginia Department of Environmental Quality (DEQ) received the PSD permit application dated January 27, 2014, for the CPV Smyth Generation Company, LLC, electric generating facility in Smyth County, Virginia. It was received by the Southwest Regional Office of DEQ on February 4, 2014. A nominal 700 MW natural gas-fired combined-cycle base load electric power plant is proposed, powered by two Alstom GT24 combustion turbine generators and two heat recovery steam generators (HRSGs). The combustion turbines each power an electrical generator, and the HRSGs operate a steam turbine coupled to an electrical generator. Proposed facility emission sources also include an auxiliary boiler fired by natural gas, an emergency diesel generator, an emergency diesel fire pump, and an aqueous ammonia storage tank. Equipment at the facility also includes an air cooled condenser and an electrical switchyard and transformers. The application submittal states that the results of the air quality modeling analysis will be provided after the completion of meteorological monitoring in July of this year. This will include an evaluation of Class II impacts on the surrounding area, which is in attainment with air quality standards, and modeling analyses to evaluate impacts on Class I areas for their respective Federal Land Managers. Based on the air permitting section's initial determination, your facility is subject to the permitting requirements in 9 VAC 5 Chapter 80 Article 6 (Permits for New and Modified Stationary Sources) and 9 VAC 5 Chapter 80 Article 8 (Major Stationary Sources and Major Modifications Locating in Prevention of Significant Deterioration (PSD) Areas). A preliminary evaluation has been performed on the application submittal, resulting in the following comments:

- The discussion of the applicability of Article 6 permitting and best available control technology (BACT) requirements on page 1-1 of the application should be based on the calculation and presentation of uncontrolled emissions of SO₂ and comparison to the corresponding threshold for the pollutant of 40 tons per year for a new source.

Although this threshold is higher than the 25 ton/year threshold possibly used for a modified source, uncontrolled emissions calculations must be performed for maximum operation at 8,760 hours per year for each emissions source (including duct burners). The evaluation of regulated parameters subject to PSD BACT requirements under Article 8 appears to be correct.

- Text preceding Table 3-1 on page 3-2 notes that SO₂ emissions (also H₂SO₄ and partly PM-10/PM-2.5) are based on a maximum natural gas sulfur content of 0.5 grains per 100 standard cubic feet (gr/100 scf). Attached Alstom data sheets presume 0.5 gr/100 scf as the sulfur content of the natural gas. This proposed/presumed value does not represent BACT for this project, as will be addressed in paragraphs below. An existing power plant fired by natural gas in this region has been permitted at significantly lower levels of sulfur in the pipeline natural gas serving as fuel.
- Table 3-1 does not contain the short-term emission rate of 0.00095 lb/MMBtu proposed for sulfuric acid mist (H₂SO₄). It also does not contain the short-term rate proposed for PM/PM-10/PM-2.5 of 0.005 lb/MMBtu. Particulate matter emissions should be characterized as PM-10 and PM-2.5, as all the combustion gas emissions are in this range, and both must include the filterable and condensable fractions as noted in the application.
- Section 3.3 of the application notes that annual emissions delineated in accompanying Table 3-3 for emissions from the combustion turbines are based on 5,760 hours of operation at 100% load without duct burner firing, and 3,000 hours of operation at 100% load with duct burner firing. Annual emissions for the auxiliary boiler are based on 4,000 hours of operation, and the emergency generator and fire pump are each based on 500 hours of operation. These operational constraints must eventually be incorporated as limitations in the development of the draft PSD permit. Annual emissions limits must include start-up and shutdown emissions.
- Facility-wide annual emissions in Table 3-3 should include losses from the aqueous ammonia storage tank for NH₃ total facility emissions. Carbon dioxide equivalent emissions (CO₂e) should include any potential SF₆ emissions as leaks from circuit breakers. Are particulate matter emissions expected from the inlet air cooling equipment? How is the gas compressor powered, and are emissions expected from this unit? What are the sizes of other storage tanks, including any water treatment steps?
- Section 4.14 states that an evaluation of ambient air impacts has been conducted for the potential emissions of three substances from the combustion turbines (acrolein, formaldehyde and cadmium) that are hazardous air pollutants (HAPs), and therefore considered air toxics under 9 VAC 5 Chapter 60 of Virginia's air pollution regulations. Combustion turbine emission rates of these three pollutants exceed the respective toxic exemption thresholds of the regulation. The referenced modeling evaluation is not submitted with this application, which does note that it will be submitted under separate cover with the PSD ambient air modeling analysis. This toxics modeling must consider all emissions of acrolein, formaldehyde and cadmium from the other combustion sources at the proposed facility.

- Proposed BACT for carbon monoxide emissions is 2.0 ppm corrected to 15% O₂ on a 1-hour averaging basis, based on the use of an oxidation catalyst and good combustion practices. Please provide calculations to demonstrate whether this limit compares in stringency on the basis of stipulated operational conditions and averaging period, to the BACT limits established in Virginia for Dominion's Brunswick County and Warren County PSD permits of 1.5 ppmvd at 15% O₂ as a 3-hour rolling average without duct firing, and 2.4 ppmvd at 15% O₂ as a 3-hour rolling average with duct firing. Incorporate into this comparison in some manner, such as a weighted-average, the expected 5,760 hours of operation without duct firing and 3,000 hours with duct firing for the proposed CPV Smyth facility.
- Proposed BACT limits for volatile organic compound (VOC) emissions are 1.0 ppm corrected to 15% O₂ on a 1-hour averaging basis without duct firing, and 2.0 ppm corrected to 15% O₂ on a 1-hour averaging basis with duct firing, based on the use of an oxidation catalyst and good combustion practices. Following comments above, calculations must be provided to demonstrate whether the proposed limits are at least as stringent on the basis of stipulated operational conditions and averaging period as the VOC limits established as BACT in Virginia for Dominion's Brunswick County and Warren County PSD permits. These limits are 0.7 ppmvd at 15% O₂ as a 3-hour rolling average without duct firing, and 1.6 ppmvd at 15% O₂ as a 3-hour rolling average with duct firing.
- The proposed BACT limits for sulfur dioxide (SO₂), sulfuric acid mist (H₂SO₄), and particulate matter (PM/PM-10/PM-2.5) emissions are based proportionately on the proposed sulfur content limit of 0.5 gr/100 scf for the pipeline natural gas to be used as fuel for the facility. However, Wolf Hills Energy in Washington County has operated a peaking power facility with natural gas-fired combustion turbines at permitted annual average sulfur content levels of 0.064 gr/100 scf and 0.3 gr/100 scf in the pipeline natural gas from 2001 to the present. The facility was initially permitted in May 2000 at 0.064 gr/100 scf and complied with the limit. The limit was only raised to 0.3 gr/100 scf in September 2006 to be in concert with a PSD permit issued in 2004 for a proposed combined cycle facility in Wythe County. Although the limit is currently 0.3 gr/100 scf, the annual average sulfur content is significantly below this value. Recent Virginia PSD permits for both Greene Energy Partners/Stonewall LLC and Dominion's Warren County facility include a limit of 0.1 gr/100 scf for sulfur content of pipeline natural gas. Therefore, BACT for the proposed CPV Smyth project must be in the range from 0.1 to a maximum of 0.3 gr/100 scf for gas sulfur content.
- Section 5.2.4 of the application addresses BACT for PM/PM-10/PM-2.5 particulate matter emissions, and proposes limits for combined filterable and condensable fractions of the same at 12.9 lb/hr with duct firing, 9.4 lb/hr without duct firing, and 0.005 lb/MMBtu (at full load with or without duct firing). The proposed 0.005 lb/MMBtu limit exceeds corresponding limits in recent Virginia PSD permits for combined-cycle power plants. In addition, the proposed limits need to be reduced proportionately for the required reduction in the proposed limit for sulfur content of the natural gas fuel noted above. Limits for PM-10/PM-2.5 emissions in Dominion's Warren County permit are 0.004 lb/MMBtu with duct firing and 0.0027 lb/MMBtu without duct firing. Corresponding limits in Dominion's Brunswick County permit (0.4 gr/100 scf sulfur content limit) are 0.0047

lb/MMBtu with duct firing and 0.0033 lb/MMBtu without duct firing. Other permits listed in Table 5-1, such as the Greene Energy Partners/Stonewall permit (0.00334 lb/MMBtu with and without duct firing), will be used in evaluating proposed BACT limits for particulate matter emissions from the CPV Smyth facility.

- The proposed SO₂ and H₂SO₄ BACT emissions limits of Sections 5.2.5 and 5.2.6 also need to be reduced in conjunction with a lower limit on sulfur content of the natural gas. The proposed H₂SO₄ limit of 0.00095 lb/MMBtu is significantly higher than limits in the Warren County PSD permit of 0.00013 lb/MMBtu without duct firing, and 0.00025 lb/MMBtu with duct firing. A continuous emission monitoring system (CEMS) or alternative method per 40 CFR 75 will be required to monitor SO₂ emissions to meet acid rain program monitoring requirements.
- Section 5.2.8 of the application submittal addresses BACT for greenhouse gases. The section does not provide a heat rate value in Btu/kW-hr for comparison to other projects, nor does it provide a figure for net power output for the proposed facility to allow calculation of a greenhouse BACT emission rate on this basis. A BACT emission rate is proposed as 888 lb CO₂e/MW-hr on a gross output basis over a 12-month period. This value also incorporates a proposed overall performance degradation value of 12.0% from design data for the equipment. Justification is not provided as to why this proposal is significantly higher than the 840 lb/MW-hr limit for the Oregon Clean Energy Center in Ohio, which is also on a gross power output basis and includes a 12.8% degradation allowance. The CPV Smyth value is also likely significantly higher than the BACT limit for the Footprint Power Salem Harbor Development project, which is 895 lb CO₂e/MW-hr on a net/grid basis of power delivered to the grid. Gross power output must be cited for the 888 lb/MW-hr limit. The proposed CPV Smyth project must include a CO₂ CEMS on each heat recovery steam generator flue, as required by the Dominion Brunswick County and Greene Energy Partners/Stonewall PSD permits in Virginia.
- Startup, shutdown and malfunction emissions must be included in the annual emissions reported for the combustion turbines. The application notes that continuous emission monitoring systems will be provided for NO_x, CO, and ammonia. A CEMS for CO₂ would be required for each heat recovery steam generator flue, as noted in comments on BACT for greenhouse gases above. Expected startup emissions are tabulated in Table 5-4, and Section 5.2.10 defines operational periods and conditions. These are also compiled for NO_x, CO, and VOC in Table 3-4, with lb/hr emissions rates all less than their respective rates for base load operation. Addendum information received from you by email on February 4, 2014, adds data for start-up and shutdown events, including emissions for particulate matter and sulfuric acid mist. Expected consumption of natural gas fuel required for startups must be incorporated into a fuel consumption value that is also required for each combustion turbine on page 7 of the DEQ Form 7 application included in the Appendix of the application submittal.
- The proposed nitrogen oxides (NO_x) emission limit of 2.0 ppm at 15% O₂ on a 1-hour averaging basis is addressed in Section 5.2.1 of the application. This will be achieved with low-NO_x combustors and a selective catalytic reduction (SCR) control system reducing nitrogen oxides to nitrogen and water with the injection of ammonia as a reagent. An emission limit for ammonia slip of 5.0 ppm at 15% O₂ is proposed in Section 5.2.7 for the SCR control system for NO_x emissions. The control technology and the

proposed NO_x emission limit appear to represent BACT from an evaluation of other projects, if the limit is also applicable on a dry volumetric (ppmvd) basis. Other Virginia PSD sources have permit limits for ammonia slip on the order of 2 to 5 ppmvd of ammonia emissions.

- When will the information be provided that is noted "to be determined" on the pages of the Virginia DEQ Air Permit Application form? Information such as equipment manufacturer, type and model number will be required before the application can be considered complete. A number of corrections need to be made on the DEQ Form 7 application pages serving as part of Appendix A to the submittal. Page 5 of Form 7 should include latitude and longitude coordinates or UTM coordinates for the proposed facility. The box should also be checked on this page for an Article 6 permit, as the permitting action for this project will include both Article 6 and Article 8 (PSD Major Source) components. The expected natural gas consumption for the combustion turbines must be provided on page 7 of the form. The Form 7 page for storage tanks must be completed and emissions losses from the aqueous ammonia storage tank quantified. Emissions of toxic/HAP pollutants must also be revised on page 13, as noted for Appendix B below. Potential emissions of SF₆ must be added for page 15, based on leakage from circuit breakers at the facility
- There are differences in the tabulation of calculated potential (should be uncontrolled) air toxics emissions (HAPs in Virginia). Hourly formaldehyde emissions are noted as 0.499 lb/hr for the combustion turbines on the last page of Appendix B, with annual emissions listed as 1.90 tons. Application of this hourly rate for 8760 hours per year yields 2.19 tons per year of formaldehyde. The same discrepancy in the hourly and annual emissions exists for all other HAPs in the table. The table on the preceding page indicates formaldehyde emission rates for the two combustion turbines and the two HRSGs as 0.433 lb/hr and 0.302 lb/hr, respectively. Adding these values yields 0.735 lb/hr, which multiplied by 8760 hours per year, results in uncontrolled potential emissions for the turbines and HRSGs of 3.22 tons per year (3.51 tons/yr using 0.499 lb/hr for turbines). The basis for the hourly emissions, whether vendor data or EPA's AP-42 emission factors must be clearly identified. Why is the CARB emission factor for formaldehyde of 0.00011 lb/MMBtu chosen over the EPA AP-42 emission factor of 0.00071 lb/MMBtu in the table noting 0.433 lb/hr (should be 0.499 lb/hr) of formaldehyde emissions? Are more conservative metals factors applicable in AP-42? Discrepancies indicate additional HAPs, and also overall higher emissions, exceed respective Virginia toxics exemption levels and are subject to air toxics modeling evaluation. The Green Energy Partners/Stonewall permit is for a facility with similar generating capacity, yet includes state-only enforceable limits for acrolein, formaldehyde, cadmium, chromium and nickel. Exemption levels used by CPV Smyth for nickel and chromium are incorrect.
- Projected emissions of ammonia from the facility are a significant concern from a pollution prevention perspective as precursors of PM-2.5, and possibly with odor concerns. The proposed emissions of ammonia slip from SCR control with the combustion turbines and HRSGs total 130.3 tons per year. In addition, there are potential fugitive emissions of ammonia from the aqueous ammonia storage tank. The ammonia slip emissions are considerably higher than for the other recently permitted combined-cycle power projects in Virginia. Ammonia slip for Dominion's Warren County

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facility is limited to 2 ppmvd, and projected lb/hr emissions are lower for Dominion's larger proposed Brunswick County facility. The 2 ppmvd ammonia slip value is not atypical for current vendor guarantees, and the Warren County plant is scheduled to be completed in the fall of this year. Any potential odor concerns are governed by 9 VAC 5 Chapter 50 Article 2, which does require application of best available control technology.

- The applicant did not sign and date the Local Governing Body Certification Form.

Your permit application does not contain sufficient information to begin the application review process, therefore, the information indicated above needs to be addressed or provided before the engineering staff can continue the review of your application. If upon further review it is found that additional information is required to support your permit application, such information will be requested at a later date.

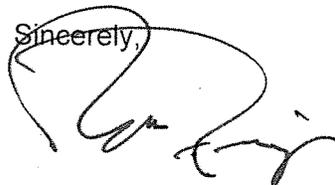
As proposed, this application is for a new major stationary source (as defined in both 9 VAC 5 Chapter 80 Article 6 and 9 VAC 5 Chapter 80 Article 8). Therefore, a 30 day public comment period and a public hearing will be held by the DEQ prior to issuance of an air permit. Additionally, the National Park Service (NPS), and the United States Forest Service (USFS) will be provided with copies of the permit application. The NPS and USFS are allowed 60 days prior to the close of a public comment period to review the draft permit and analyses associated with the application.

In accordance with 9 VAC 5-80-1170 and 9 VAC 5-80-1870, CPV Smyth is required to notify the public of the proposed construction of the source and conduct a briefing. Your public notice of the proposed changes must be approved by the DEQ prior to publication, and the notice must appear in at least one newspaper of general circulation in the affected area, no later than 30 days after your receipt of this letter (9 VAC 5-80-1170 specifies 15 days, but 9 VAC 5-80-1100 H.3. specifies that the provisions of Article 8 prevail if they conflict). At a minimum, the public notice must contain the following information:

- source name, location and type;
- pollutants and the total quantity emitted of each;
- brief statement of the air quality impact of such pollutants;
- control technology to be used at the time of the briefing;
- time and place of an informational briefing to inform the public about the application (9 VAC 5-80-1870); and
- name and telephone number of a contact person, employed by the applicant, who can answer questions about the source.

The public briefing will be conducted by CPV Smyth Generation Company, and DEQ personnel need to be in attendance, so please coordinate scheduling with this office. If you have any questions concerning this matter, please contact Mike Gregory at (276) 676-4834.

Sincerely,



Rob Feagins
Air Permit Manager

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GRF/mg

cc: NPS, Great Smoky Mountains National Park (with Application)
NPS, Shenandoah National Park (with Application)
USFS, James River Face Wilderness Area (with Application)
USFS, Linville Gorge and Shining Rock Wilderness Areas (with Application)
US EPA, Regional Administrator, Region III (with Application)
Mr. Gener Gotiangco, Competitive Power Ventures, Inc.