



October 29, 2014

Virginia Department of Environmental Quality  
Attention: Rob Feagins, Air Permit Manager  
Southwest Regional Office  
355-A Deadmore Street  
Abingdon, Virginia 24210

**Subject: CPV Smyth Generation Company, LLC – Source Registration No. 11750  
Prevention of Significant Deterioration Application  
Response to Preliminary Evaluation Letter**

Dear Mr. Feagins:

CPV Smyth Generation Company, LLC (CPV Smyth) submitted a Prevention of Significant Deterioration (PSD) permit application to the Virginia Department of Environmental Quality (DEQ) that was received by the DEQ on February 4, 2014. The PSD application is for a proposed 700-megawatt (MW) (nominal) natural gas-fired combined-cycle base-load electric power plant, with two Alstom GT24 combustion turbine generators and two heat recovery steam generators (HRSGs). On March 5, 2014, the DEQ completed its initial review and provided a set of comments requesting clarification and additional information on a number of issues. CPV Smyth submitted a response letter to the DEQ on May 27, 2014 providing the requested additional information. On July 16, 2014, the DEQ issued a letter to CPV Smyth that largely accepted the additional information provided in the May 27, 2014 letter. However, the DEQ has highlighted a few remaining items that require further clarification. This letter provides further clarification of these issues.

1. **Comment #3.** The DEQ reiterates that the particulate matter ( $PM_{10}/PM_{2.5}$ ) emission limits in lb/MMBtu in the permit will be expressed as filterable and condensable. CPV Smyth understands that the  $PM_{10}/PM_{2.5}$  emission limits will include both filterable and condensable particulate matter and the proposed limits include both the filterable and condensable fractions.
2. **Comment #3.** The DEQ notes that the  $H_2SO_4$  emission rate of "0.0056 lb/MMBtu" in the May 27, 2014 letter is higher than originally proposed in the application. The rate presented in the May 27, 2014 letter is a typographical error and the correct rate is 0.00056 lb/MMBtu.

3. **Comment #5.** The DEQ has requested the capacity of the proposed circuit breakers to develop the draft PSD permit. The final design of the electrical components of the plant has not yet been completed but CPV estimates that the total SF<sub>6</sub> storage capacity in circuit breakers will be 9,000 pounds.
4. **Comment #5/#15.** The DEQ stated that a 0.5% leakage rate may represent BACT based upon the proposed 525-MW Moundsville Power, LLC project in West Virginia. The proposed leakage rate in the Moundsville Power, LLC project was based upon a paper titled “SF<sub>6</sub> Leak Rates from High Voltage Circuit Breakers – EPA Investigates Potential Greenhouse Gas Emissions Source”, which cites International Electrotechnical Commission (IEC) Standard 62271-1 of 0.5% for new high-voltage switchgear and control gear. Based upon CPV Smyth’s review of these materials, the proposed BACT leakage rate for the Project is 0.5%. At a leakage rate of 0.5% per year and an SF<sub>6</sub> storage capacity of 9,000 pounds, the resulting CO<sub>2</sub>e emissions will be limited to 513 tons per year. This amounts to less than 0.03% of the total CO<sub>2</sub>e emissions for the Project.
5. **Comment #8.** The DEQ contends that BACT for VOC emissions should include 3-hour average limits equivalent to those for the Dominion Warren and Brunswick County plants as well as the 1-hour limits proposed as BACT for CPV Smyth. Alstom was contacted with regard to this issue and has stipulated that its guarantee is on an hourly basis and that they cannot guarantee the 3-hour average limits equivalent to those for the Dominion Warren and Brunswick County plants.

This issue is directly comparable to the issues addressed in the USEPA’s Environmental Appeals Board (EAB) decision on March 14, 2014 regarding the La Paloma Energy Center. The EAB made clear that BACT is determined on a case-by-case basis and different BACT emission limits can be established for different combustion turbine models and that turbine model selection cannot be considered a control technology during the BACT analysis.

The permitted limits for the Dominion Warren and Brunswick County plants are based on the Mitsubishi M501 GAC combustion turbine. Table 5-1 in the application documents numerous comparable recent projects using other turbine models with emission limits equivalent to or greater than the limits proposed for CPV Smyth. In fact, the Green Energy Partners project in Virginia was issued a permit after the Dominion Warren and Brunswick County permits. The permitted VOC limits for the GE 7F.05 combustion turbine for the Green Energy Partners project are equal to or higher than the VOC limits proposed for CPV Smyth. In the La Paloma Energy Center decision, the EAB concluded that the permitting agency was correct in concluding that the “emission levels of the three turbine models proposed by LPEC are within the range that other PSD permitting authorities have established as BACT for other facilities using combined cycle combustion technology.”

Given the EAB’s recent decision in the La Paloma Energy Center case, CPV Smyth does not believe that a permit should be issued with VOC limits less than the equipment vendor’s guarantee as long as the proposed limit falls within the range that other PSD permitting authorities have established as BACT. In fact, the Green Energy Partners

permit provides recent and directly applicable precedent in Virginia for establishing emission limits based upon vendor guarantees with different limits established for different turbine models. As the project will require financing, issuance of a permit with limits less than the vendor guarantee could prevent CPV Smyth from securing financing for the project.

DEQ also notes that the Dominion's Brunswick County plant will also use Alstom HRSGs with its combustion turbines and, therefore, duct firing emissions for CPV Smyth should be comparable to the Dominion's Brunswick County plant. The Dominion's Brunswick County permit shows a 0.9 ppm increase in the VOC emission rate with duct firing, which is directly comparable to the increase of 1.0 ppm with duct firing for the CPV Smyth project. The minor difference of 0.1 ppm is again addressed by the EAB's decision in the La Paloma Energy Center case where the EAB noted that marginal differences in emission rates are acceptable under BACT.

As the proposed limits are equal to or less than the most recently permitted project in Virginia and well within the range of other recently permitted projects, CPV Smyth believes that BACT for VOC emissions from the Alstom GT24 combustion turbine is satisfied by the proposed 1-hour emission limits.

6. **Comment #9.** The DEQ states that monitoring of the sulfur content of natural gas will be required in the permit to demonstrate compliance with the SO<sub>2</sub> limit per Virginia BACT requirements. CPV Smyth shall submit to the DEQ for approval prior to initial operation a custom gas sulfur monitoring schedule in accordance with 40 CFR 60.4370(c).
7. **Comment #10.** The DEQ acknowledges and concurs with the PM<sub>10</sub>/PM<sub>2.5</sub> lb/MMBtu values and the maximum 11.9 lb/hr emission rate with duct firing. The original application identified a maximum PM<sub>10</sub>/PM<sub>2.5</sub> emission rate of 9.4 lb/hr without duct firing. With the lower sulfur content of the natural gas, the revised maximum PM<sub>10</sub>/PM<sub>2.5</sub> emission rate is 7.3 lb/hr without duct firing as noted in Case #15 in the performance data provided with the May 27, 2014 letter.

The DEQ notes that the annual PM<sub>10</sub>/PM<sub>2.5</sub> limit of 36.0 tons per year (tpy) for each combustion turbine provided in the May 27, 2014 letter does not match the maximum PM<sub>10</sub>/PM<sub>2.5</sub> lb/hr emission rates. This is a result of the annual emissions being based upon the average annual temperature of 59°F for operation without duct firing. The 36.0 tpy limit is calculated from 3,000 hours with duct firing at 11.9 lb/hr and 5,760 hours without duct firing at 6.3 lb/hr (Case #11).

8. **Comment #12.** The DEQ questions the proposed 888 lb/MW-hr CO<sub>2</sub>e limit on the basis of gross output and back calculates a different emission rate on a gross output basis by applying a presumed parasitic load. It's important to understand that the performance guarantee provided by Alstom is on a gross output basis and not a net output basis; the gross output performance guarantee is not a movable value. Alstom is not responsible for the balance of plant design and cannot predict what the parasitic load will be. The following table provides a calculation of the CO<sub>2</sub>e emission rate on a gross output basis based upon the Alstom performance guarantee as provided with the May 27, 2014 letter.

Operating Scenario	Alstom Case	Hours Per Year	Gross Generation Rate (kW/hr)	CO <sub>2</sub> e Emission Rate (lb/hr) <sup>1</sup>	Gross Generation (MW/yr) <sup>1</sup>	CO <sub>2</sub> e Emission Rate (tpy)	CO <sub>2</sub> e Emission Rate (lb/MW-hr)
Without Duct Firing	#11	5,760	602,000	468,295	3,467,520	1,348,690	779.3
With Duct Firing	#23	3,000	799,200	642,795	2,397,600	964,190	804.3
<b>TOTAL (new &amp; clean)</b>		<b>8,760</b>			<b>5,865,120</b>	<b>2,312,880</b>	<b>788.7</b>
<b>TOTAL (12% Performance Degradation)</b>							<b>883.3</b>

<sup>1</sup> Emissions and generation are for both turbines combined

The above table yields a CO<sub>2</sub>e limit on a gross output basis that is marginally lower than the 888 proposed in the original application due to minor adjustments in the Alstom performance data provided with the May 27, 2014 letter.

The great majority of CO<sub>2</sub>e limits in comparable projects are in terms of gross output. The Green Energy Partners permit has a CO<sub>2</sub>e limit of 903 lb/MWh on a gross output basis. CPV Smyth requests that the CO<sub>2</sub>e limit be 883.3 lb/MW-hr on a gross output basis consistent with the great majority of other permitted projects.

The DEQ also comments that a lower limit should be considered based upon the Oregon Clean Energy Center. However, the Oregon Clean Energy Center project is based upon an "H" class turbine and is not comparable to the CPV Smyth project. The Alstom GT-24 turbine proposed for the CPV Smyth project is an "F" class turbine that is smaller than an "H" class unit. The proposed CO<sub>2</sub>e limit for the project is well within the range that other PSD permitting authorities have established as BACT for "F" class turbines and lower than the Green Energy Partners project that also proposed an "F" class combustion turbine.

- Comment #15.** The DEQ has requested that information currently listed as "to be developed" in the application be provided, at least a manufacturer name and a rating. The information listed as "to be developed" includes the emergency generator engine manufacturer and model; the emergency fire pump engine manufacturer and model; the SCR manufacturer, model, retention time and pressure drop; and the oxidation catalyst manufacturer, model, retention time and pressure drop.

The emergency generator engine will be a Caterpillar 3512C, or equivalent. The Emergency fire pump engine will be a Clarke JUH6-UFAD98, or equivalent. Vendor specifications for these two emergency engines were provided in Appendix C with the application as they served as the basis for the emission estimates for this equipment. The SCR and oxidation catalysts will be custom designed for the project and the information requested on the DEQ forms cannot be provided or estimated at this time. The SCR and oxidation catalysts will be designed to meet the required BACT emission

rates and, therefore, the emissions from the project will not be impacted by their final design specifications.

10. **Comment #15.** The DEQ has requested toxic pollutant emission rates for the ancillary sources on Form 7 as well as the combustion turbines. This information was not provided in the application as these sources are exempt from Virginia's air toxics regulations in accordance with 5-60-300.C.4 as discussed in Section 4.14 of the application. The instructions for Form 7 state that "for each toxic pollutant listed, which is not exempt by 9 VAC 5-60-300 C.3, 4 or 5, or D, E, or F or 9 VAC 5-80-1105 F of the Regulations, list the total source-wide emissions of that pollutant." Since air toxic emissions from the duct burners, auxiliary boiler, emergency generator engine and emergency fire pump engine are exempt in accordance with 5-60-300.C.4, these emissions are not required on Form 7. The emission calculations in Appendix B provide hazardous air pollutant emission rates for all sources for completeness purposes.
11. **Comment #15.** The DEQ has requested SF<sub>6</sub> emissions from the circuit breakers on Form 7. Provided in Attachment A to this letter is a revised Form 7 page 15 with emissions calculated as described previously (item No. 4) in this letter.
12. **Comment #17.** The DEQ contends that the use of EPA 40 CFR 60, Appendix B, Method 19 (Method 19) to calculate the ammonia emission rate is problematic as ammonia is not a combustion pollutant. The DEQ also questions the emission rate as it is higher than the approved ammonia emission rate for the Dominion Brunswick County project.

The ammonia emission rate in pounds per hour proposed in the permit application is based upon the Alstom performance guarantee at an exhaust concentration of 5.0 ppmvd at 15% O<sub>2</sub> as identified in Appendix C of the permit application and in the May 27, 2014 letter. The Alstom performance guarantee was verified in the May 27, 2014 response letter using USEPA emission calculation procedures specified in Method 19. Provided in Attachment A is a third approach using the exhaust flow rate provided by Alstom. The third ammonia emission rate calculation approach validates the Alstom performance guarantee.

A verification of the Dominion Brunswick County emission rate is not possible as the supporting calculations for the project do not include ammonia emission rate calculations. However, the ammonia emission rate for the CPV Smyth project has now been verified with three separate data points.

13. **Comment #14/#17.** The DEQ contends that appropriate emission limits for ammonia slip are 2 ppmvd on a steady-state basis and 5 ppmvd on a non-steady-state basis as a pollution prevention requirement. Emissions of ammonia from the project are subject to the states BACT requirements. As defined under 9 VAC 5-50-250(C), BACT is an emissions limitation that takes into account economic impacts. CPV Smyth has received a budgetary cost of \$560,000 for the additional SCR catalyst necessary to achieve an ammonia slip emission rate of 2 ppmvd. Based upon a typical catalyst life of 5 years, the cost to reduce ammonia from 5 ppmvd to 2 ppmvd is \$1,747 per ton of ammonia controlled (see Attachment A). CPV Smyth believes that this cost is excessive for ammonia control and that BACT is an ammonia slip of 5 ppm consistent with the Green

Energy Partners limit, which is the most recently permitted combined cycle project in Virginia.

Thank you again for your review of our application materials. If you have any questions regarding this response letter, please do not hesitate to contact me at (240) 723-2307.

Sincerely,

A handwritten signature in black ink, appearing to read "Gener G. Gotiangco", with a long, sweeping horizontal line extending to the right.

Gener G. Gotiangco, P.E.  
Vice President

cc: Mike Gregory – VA DEQ  
Mike Kiss – VA DEQ  
Peter Podurgiel – CPV  
Jon Donovan – CPV  
Fred Sellars – Tetra Tech  
Steven Babcock – Tetra Tech

**PROPOSED PERMIT LIMITS FOR GREENHOUSE GASES (GHGs) ON MASS BASIS: FOR PSD MAJOR SOURCES ONLY**

<b>Company Name:</b> CPV Smyth Generation Company, LLC	<b>Date:</b> 08/08/2014	<b>Registration Number:</b>
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Proposed Permit Limits for GHG Pollutants on Mass Basis														
Unit Ref. No.	CO <sub>2</sub> (Carbon Dioxide)		N <sub>2</sub> O (Nitrous Oxide)		CH <sub>4</sub> (Methane)		HFCs (Hydrofluoro-carbons)		PFCs (Perfluoro-carbons)		SF <sub>6</sub> (Sulfur Hexafluoride)		Total GHGs	
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr
CT1 & DB1	321,071	1,155,266	0.60	2.14	5.96	21.4	N/A	N/A	N/A	N/A	N/A	N/A	321,078	1,155,290
CT2 & DB2	321,071	1,155,266	0.60	2.14	5.96	21.4	N/A	N/A	N/A	N/A	N/A	N/A	321,078	1,155,290
AB	10,802	21,605	0.020	0.041	0.204	0.41	N/A	N/A	N/A	N/A	N/A	N/A	10,802	21,606
EG	2,359	590	0.019	0.0048	0.096	0.024	N/A	N/A	N/A	N/A	N/A	N/A	2,359	590
FP	359	90	0.0029	0.0007	0.015	0.0036	N/A	N/A	N/A	N/A	N/A	N/A	359	90
Circuit Breakers	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0051	0.0225	513
<b>TOTAL:</b>	655,662	2,332,816	1.24	4.33	12.2	43.3						0.0051	0.0225	2,335,702

Estimated Emission Calculations Attached (totals and per Unit Ref. No.)

### Ammonia Cost To Control - 5 ppmvd to 2 ppmvd

NH3 @ 5 ppm	130.3	tpy
NH3 @ 2 ppm	52.1	tpy
NH3 Reduction	78.2	tpy
Additional SCR Cost	\$560,000	additional catalyst
Catalyst Life	5	years
Interest Rate	7%	
Capital Recovery Factor	0.244	
Annualized Additional SCR Cost	\$136,579	
NH3 Incremental Cost To Control	\$1,747	

Parameter	UOM	Variable	Alstom Case #11	
			Value	Calculation
Heat Input	MMBtu/hr	A	1,968	---
Exhaust Flow Rate	lb/hr	B	3,655,834	---
Exhaust Molecular Weight	lb/lb-mol	C	28.35	---
Exhaust %H <sub>2</sub> O	%vol	D	8.98%	---
Exhaust %O <sub>2</sub> (wet)	%vol	E	11.91%	---
Exhaust %O <sub>2</sub> (dry)	%vol	F	13.09%	$E / (1 - D)$
Exhaust Flow Rate	wscfh	G	49,685,814	$B / C \times 385.3^1$
Exhaust Flow Rate	dscfh	H	45,224,028	$H \times (1 - D)$
NH <sub>3</sub> Concentration @ 15% O <sub>2</sub>	ppmvd	I	5.0	---
NH <sub>3</sub> Concentration @ Stack O <sub>2</sub>	ppmvd	J	6.62	$I \times \frac{20.9 - F}{20.9 - 15}$
NH <sub>3</sub> Density at standard temperature and pressure	lb/ft <sup>3</sup>	K	0.0442	---
NH <sub>3</sub> Emission Rate	scfh	L	299.5	$H \times J / 1 \times 10^6$
	lb/hr		13.24	$K \times L$

<sup>1</sup> Molar volume of an ideal gas at standard temperature and pressure (ft<sup>3</sup>/lb-mol), equal to 24.055 L/g-mol (see EPA Method 18)