

Air Permit Application Review

Source:	Appalachian Power Company (APCO) Clinch River Plant
Registration No.	10236
CEDS Application No.	24
Facility ID	51-167-00003
Application Date:	July 1, 2016
Application Receipt Date:	July 5, 2016
Permit Issue Date:	[DATE], 2016
Permit Scrivener:	Tom Derting

BACKGROUND AND DESCRIPTION OF PROJECT:

The Clinch River Plant is an electric power generating facility located at Carbo in Russell County, Virginia. The facility originally consisted of three coal-fired units however in 2015 the facility removed Unit 3 from service and converted Units 1 and 2 to natural gas combustion in 2016. Units 1 and 2 are both vertically-fired (downward) and are rated at 2461 MMBtu/hr, each.

The original state operating permit for the Clinch River Plant was issued in January 2009, to incorporate the provisions of a federal consent decree and a Virginia DEQ consent order into a federally enforceable permit. The federal consent decree involved multiple coal-fired facilities in the AEP Eastern System. The decree required the addition of pollution controls at several facilities, placed caps on emissions from the collective group, as well as some emission limits on individual facilities. The Clinch River Plant was identified as one of the affected facilities in the Eastern Group. The consent decree specified that the Clinch River Plant operate low-NO_x burners and selective non-catalytic reduction (SNCR) systems on each unit, but did not limit NO_x emissions. The decree also limited SO₂ emissions from the plant to 16,300 tons/yr, beginning in 2015.

In 2006, the PSD permit application submitted by Dominion Virginia Power for their Virginia City facility included air dispersion modeling results that indicated exceedances of the SO₂ NAAQS that were attributed to the allowable SO₂ emissions from the Clinch River Plant. APCO submitted air dispersion modeling results in January 2008 that indicated exceedances of the SO₂ NAAQS based on both actual and allowable SO₂ emissions. The June 2008 Virginia DEQ consent order limited the SO₂ emissions from the Clinch River Plant to levels that would model in compliance with the NAAQS. Hourly SO₂ emission limits were established based on 1.08 lbs SO₂/MMBtu.

In 2015, a minor NSR permit was issued to APCO to retire Unit 3 and convert Units 1 and 2 from coal to natural gas combustion. The conversion to natural gas combustion was completed in early 2016.

APCO has submitted a state operating permit application to remove the coal combustion-related conditions and provisions pertaining to the operation of Unit 3, from the permit. Since the federal consent decree and the DEQ consent order are still applicable requirements for the Clinch River Plant, the corresponding SO₂ limits will be retained in the permit.

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CALCULATIONS, REVIEW, & AIR QUALITY ANALYSIS:

The definition of “natural gas” in 40 CFR Part 72 specifies that the total sulfur content in natural gas cannot exceed 20 grains per 100 standard cubic feet. The definition of “pipeline natural gas” limits the total sulfur to 0.5 grains/100 scf. The minor NSR permit for the Clinch River plant exclusively specifies natural gas as the approved fuel for Units 1 and 2, and SO₂ emissions were evaluated based on the 20 grain/100 scf specified for natural gas. Both definitions specify that the gross calorific value be between 950 and 1100 Btu/scf.

Potential SO₂ Emissions:

AP-42 Table 1.4-2 provides an emission factor of 0.6 lbs SO₂/10⁶ scf based on a total fuel sulfur concentration of 2000 gr/10⁶ scf (0.2 gr/100 scf). Adjusting this factor for 20 gr/100 scf:

$$20 \text{ gr}/100 \text{ scf} \div 0.2 \text{ gr}/100 \text{ scf} \times 0.6 \text{ lbs SO}_2/10^6 \text{ scf} = 60 \text{ lbs SO}_2/10^6 \text{ scf}$$

Units 1 and 2 are rated at 2461 MMBtu/hr.

Maximum hourly consumption of natural gas:

$$2 \times 2461 \text{ MMBtu/hr} \div 950 \text{ MMBtu}/10^6 \text{ scf} = 5.181 \times 10^6 \text{ scf/hr}$$

Maximum SO₂ emissions:

$$5.181 \times 10^6 \text{ scf/hr} \times 60 \text{ lbs SO}_2/10^6 \text{ scf} = 310.86 \text{ lbs/hr}$$

$$310.86 \text{ lbs/hr} \times 8760 \text{ hrs/yr} \div 2000 \text{ lbs/ton} = 1361.57 \text{ tons/yr}$$

$$310.86 \text{ lbs SO}_2/\text{hr} \div (2 \times 2461 \text{ MMBtu/hr}) = 0.063 \text{ lbs SO}_2/\text{MMBtu}$$

The allowable SO₂ permit limits required by the federal consent decree and the Virginia DEQ consent order are listed in the following table:

SO ₂ Limit	Current SOP	Max Expected Emissions (based on max hourly)	% of Allowable
Hourly	4537.94 lbs/hr	310.86 lbs/hr	6.9%
3-Hour	1.08 lbs/MMBtu	0.063 lbs/MMBtu	5.8%
24-hour	1.05 lbs/MMBtu	0.063 lbs/MMBtu	6.0%
	105,866 lbs/day	7460.64 lbs/day	7.0%
Annual	16,300 tons/yr	1361.57 tons/yr	8.4%

The current SOP requires that the SO₂ emissions be continuously measured and recorded using a continuous emissions monitoring system (CEMS). Since the SO₂ emissions are expected to be substantially reduced by the combustion of natural gas, APCO plans to show compliance with the SO₂ emission limits using calculations based on gas consumption and a sulfur content of not more than 20 gr/100 scf.

PERMIT CHANGES:

- The equipment list will be revised and Condition 1 added to identify Unit 3 (CR3) as having been removed from operation.
- Previous Condition 2 requiring a SO₂ CEM will be removed.
- Coal sulfur and coal sampling requirements (previous Conditions 3 and 4) will be removed.
- Natural gas will be specified as the only approved fuel for Units 1 and 2 (CR1 and CR2).

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- The allowable SO₂ emissions from previous Conditions 5 and 6 will be consolidated into a single condition. The limits for Stack 2 (Unit CR3) will be removed, as well as the plant-wide annual SO₂ limit for the period from January 1, 2010, to December 31, 2014.

DISCUSSION OF AIR QUALITY IMPACTS:

The facility is located in mountainous terrain in Russell County, Virginia. Russell County is considered to be attaining the NAAQS. No anticipated adverse air quality impacts are expected from the proposed changes.

ADMINISTRATIVE AND TECHNICAL PROCESSING; PUBLIC PARTICIPATION:

The original Form 7 permit application was dated May 16, 2016, and the signed document certification form was dated July 1, 2016. These documents were received on July 5, 2016. An Article 3 (federal operating permit) application and an Article 5 (state operating permit) application were also received on July 5, 2016. A single fee payment for all three (3) applications was submitted to the DEQ central office on [DATE], 2016.

APCO provided a revised Form 7 General Information page (Page 8) on July 6, 2016, to clarify that they did not want to combine the provisions of the Article 5 and 6 permits into a single permit document. The Form 7 application was deemed complete on July 6, 2016.

This state operating permit continues to establish federally enforceable emission limits and will include public participation. The public notice ad was placed in the Lebanon Times News on [DATE], 2016, and the appropriate persons listed on the DEQ public notification guidance document (EPA and Tennessee) were notified and provided a copy of the newspaper ad via email on [DATE], 2016.

BOILERPLATE DEVIATIONS:

The current SOP and NSR boilerplates were used. No deviations are noted.