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**west virginia** department of environmental protection

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## **ENGINEERING EVALUATION / FACT SHEET**

### BACKGROUND INFORMATION

Application No.: R13-2608D  
Plant ID No.: 051-00005  
Applicant: Ohio Power Company  
Facility Name: Mitchell Plant  
Location: Moundsville, Marshall County  
NAICS Code: 221112  
Application Type: Modification  
Received Date: September 26, 2012  
Engineer Assigned: Steven R. Pursley, PE  
Fee Amount: \$2,000.00  
Date Received: September 28, 2012  
Complete Date: October 3, 2012  
Due Date: December 31, 2012  
Applicant Ad Date: September 21, 2012  
Newspaper: *Moundsville Daily Echo*  
UTM's: Easting: 516.00 km      Northing: 4,409.00 km      Zone: 17  
Description: Modification to increase permitted CO limit.

### DESCRIPTION OF PROCESS

On September 18, 2012, WVDAQ issued a permit to Ohio Power Company to reconstruct an auxiliary boiler. Shortly before issuance of the permit, Ohio Power discovered that their CO emissions would likely be higher than they originally proposed in their permit application and they therefore might not be able to meet the CO limit which was included in the permit. This application was submitted to increase both the hourly and annual CO emission limit. No other changes are proposed. The following is the description of the entire boiler rebuild project as stated in Engineering Evaluation R13-2608C.:

*“The facility has a 663 mmBTU/hr fuel oil fired auxiliary boiler that is used to provide auxiliary steam for startup, chemical cleaning and building heating services.*

*Over the past several years, this auxiliary boiler has seen performance degradation. The boilers steam production has degraded from about 355,000 pounds per hour to 300,000 pounds per hour. The primary reasons for the reduced steam production include tube wall corrosion, tube failures, plugged tubes, failed baffling in the drums and other corresponding operational limits.*

*As a result of the degraded performance of the auxiliary boiler, Mitchell has recently experienced delays in start-up of the main units. The risk of future start-up delays, deviations from start-up procedures, and/or inability to support plant heating are likely until the aux boiler is rebuilt or replaced.*

*In addition to unit performance risks, the water wall tube corrosion and resulting external leaks pose potential safety risks to operations personnel.*

*The rebuild includes:*

- \* All new water and steam tubing/headers.*
- \* New steam/mud drum shells and internal components*
- \* Full replacement of pneumatic controls*
- \* New Low NO<sub>x</sub> burners*
- \* Flue Gas Recirculation*
- \* New induced draft fan*
- \* New insulation, refractory, casing, lagging and seals*
- \* New ammonia chemical feed system.*

*All other existing components will be reused to the fullest extent possible including the external utilities piping, access platforms, stack, forced draft fans, ductwork etc.”*

## SITE INSPECTION

No site inspection was performed by the writer. The facility is an existing well known source to DAQ. Al Carducci of DAQs Northern Panhandle Regional Office performed a full, on site inspection on September 22, 2011. The facility was found to be in compliance.

## ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

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The modification proposed by permit application R13-2608D effects only CO emissions.

CO emissions from Aux Boiler will be as indicated below. Note that these emissions are simply the existing PTE (pre-permit R13-2608C), PTE proposed in the original(R13-2608C) application, and change in PTE from the boiler (increase from R13-2608C to R13-2608D, which is the worse case). Note that since even the new increased emissions will be limited to less than 100 tons per year, no netting analysis is necessary for CO.

Existing PTE calculations were performed assuming a 100% capacity factor and CO, emissions are based on the AP-42 emission factors.

Future emissions from the Aux Boiler were performed using a 10% capacity factor (which was be incorporated in the permit via an annual fuel usage limit). CO emissions calculated in R13-2608C were, again, based on AP-42. However, when design of the boiler was finalized, the applicant determined that CO emissions could be higher than what was represented in the original permit application. Therefore, "New Boiler PTE" below is based on the applicants engineering estimate.

Existing Boiler PTE

Pollutant	lb/hr	tpy
CO	23.68	103.71

Boiler PTE as Proposed in R13-2608C

Pollutant	lb/hr	tpy
CO	23.68	10.37

New Boiler PTE

Pollutant	lb/hr	tpy
CO	206.86	90.60

As can be seen from the above tables, the difference in PTE will be as follows:

Pollutant	lb/hr	tpy
CO	183.18	80.23

It should be noted that although the increase over what was permitted in R13-2608C is sizable, it is still a decrease from the existing (pre R13-2608C) PTE.

### REGULATORY APPLICABILITY

The Aux Boiler is subject to the following state and federal regulations:

45CSR2 To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers.

Per §45-2-3.1 visible emission from the source shall not exceed 10% opacity based on a six minute block average. Because the boiler will use fuel oil exclusively, this requirement should be met.

§45-2-4.1.b limits the amount of PM released into the air from the boiler to 59.67 pounds per hour. Actual emissions of PM from the boiler should be less than 15.63 pounds per hour. Therefore this requirement should be met.

45CSR10 To Prevent and Control Air Pollution from the Emission of Sulfur Oxides.

§45-10-3.1.b limits the amount of SO<sub>2</sub> emitted from the boiler to 4,972.5 pounds per hour. Actual emissions of SO<sub>2</sub> from the boiler should be less than 40 pounds per hour. Therefore this requirement should be met.

45CSR13 Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits, and Procedures for Evaluation.

The proposed modification is subject to 45CSR13 because the requested emission increase exceeds 6 pounds per hour and 10 tons per year.

45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration.

### ***Determination of Existing Major Source Status***

The plant is located in an area - Marshall County- classified as "in attainment" with all

National Ambient Air Quality Standards (NAAQS) except for the annual PM<sub>2.5</sub> standard. Therefore, the major source standard for PM<sub>2.5</sub>, and its precursors (NO<sub>x</sub> and SO<sub>2</sub>) is determined by 45CSR19 while status for all other pollutants is determined by 45CSR14. For practical purposes though, in this instance since the facility is a “listed source” (as shown below) the definitions of both “major source” and “major modification” are the same in 45CSR14 and 45CSR19.

The existing plant is a fossil fuel fired steam electric with a capacity of greater than 250 mmbtu/hr. Therefore, the facility is a listed 100 tpy source. The existing unmodified source has a PTE -based on calculations provided by the applicant in their Title V permit application - of well over 250 tons per year of CO, TSP, SO<sub>2</sub>, VOCs and NO<sub>x</sub>. This PTE defines the source as an existing major stationary source under 45CSR14.

### ***Determination of Major Modification***

A “major modification” is defined under section 2.40 of 45CSR14 as a:

. . . physical change in or change in the method of operation of a major stationary source which results in: a significant emissions increase (as defined in subsection 2.75) of any regulated NSR pollutant (as defined in subsection 2.66); and a significant net emissions increase of that pollutant from the major stationary source. [. . .]

The first step in determining whether a change is a “major modification” is determining whether a “physical change in or change in the method of operation of a major stationary source,” is occurring.

The emission increases from this application are due to significant physical changes in the boiler that go beyond the routine maintenance, repair and replacement exclusion of 45CSR14.2.40.a.

Section 3.4 of 45CSR14 provides guidance on the process of determining if proposed changes are a major modification. §45-14-3.4(a) states that:

. . . consistent with the definition of major modification contained in subsection 2.40, a project is a major modification for a regulated NSR pollutant if it causes two types of emissions increases -- a significant emissions increase (as defined in subsection 2.75), and a significant net emissions increase (as defined in subsections 2.46 and 2.74). The proposed project is not a major modification if it does not cause a significant emissions increase. [. . .]

Therefore, for the proposed changes to meet the definition of a major modification, the changes themselves must result in a significant emissions increase. The methodology for calculating the emissions increase under the first step is given under Sections 3.4(b), 3.4(c), 3.4(d) and 3.4(f). The substantive language of each is given below:

[§45-14-3.4(b)]

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The procedure for calculating (before beginning actual construction) whether a significant emissions increase (i.e., the first step of the process) will occur depends upon the type of emissions units being modified, according to subdivisions 3.4.c through 3.4.f.

[§45-14-3.4(c)]

Actual-to-projected-actual applicability test for projects that only involve existing emissions units. -- A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the difference between the projected actual emissions (as defined in subsection 2.63) and the baseline actual emissions (as defined in subdivisions 2.8.a and 2.8.b), for each existing emissions unit, equals or exceeds the significant amount for that pollutant (as defined in subsection 2.74).

[§45-14-3.4(d)]

Actual-to-potential test for projects that only involve construction of a new emissions unit(s). – A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the difference between the potential to emit (as defined in subsection 2.58) from each new emissions unit following completion of the project and the baseline actual emissions (as defined in subdivision 2.8.c) of these units before the project equals or exceeds the significant amount for that pollutant (as defined in subsection 2.74).

[§45-14-3.4(f)]

Hybrid test for projects that involve multiple types of emissions units. -- A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the emissions increases for each emissions unit, using the method specified in subdivisions 3.4.c through 3.4.d as applicable with respect to each emissions unit, for each type of emissions unit equals or exceeds the significant amount for that pollutant (as defined in subsection 2.74).

Further, under the definition of “projected actual emissions” - Section 2.63(a)(4), the applicant may use an emission unit’s PTE in lieu of projecting actual emissions.

***PSD Applicability Analysis***

<b>Pollutant</b>	<b>Boiler Proposed Emissions (tpy)</b>	<b>Significant Level (tpy)</b>	<b>Significant?</b>
<b>CO</b>	90.60	100.00	No

“Significant” is defined under §45-14-2.74(a) and §45-19-2.66. As shown in the preceding table, the change in emissions resulting from the proposed modifications does not exceed the definition of “significant”

45CSR16 Standards of Performance for New Stationary Sources.

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The source is subject to 45CSR16 because it is subject to 40 CFR 60 Subpart Dc.

#### 45CSR30 Requirements for Operating Permits.

The source is subject to 45CSR30 because it is subject to 40 CFR 60 Subpart Dc and because the facility is an existing major source. Changes authorized by the permit must also be incorporated into the facility's Title V operating permit.

#### FEDERAL REGULATIONS:

##### 40 CFR 60, Subpart Db: Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units.

The boiler is subject to Subpart Db because it is a steam generating unit of greater than 100 mmbtu/hr and the applicant has acknowledged that this extensive repair meets the definition of "reconstruction" under 60.15(b). It should be noted that Subpart Db and not Da applies because this particular boiler is an auxiliary boiler and as explained above, is not "constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW net-electrical output to any utility power distribution system for sale" as defined in Subpart Da.

Subpart Db contains limits on emissions of SO<sub>2</sub>, PM, NO<sub>x</sub> and opacity.

#### **SO<sub>2</sub>**

40 CFR 60.42b(k)(1) would limit emissions from the boiler to 0.2 lb/mmbtu. However, 40 CFR 60.42b(k)(2) exempts boilers that burn only "very low sulfur oil". "Very low sulfur oil" is defined (for boilers constructed, modified, or reconstructed after February 28, 2005 and not in a noncontinental area) as a fuel with a potential SO<sub>2</sub> emission rate of less than 0.32 lb/mmbtu or contains no more than 0.30 percent sulfur by weight. The applicant has agreed to use fuel oil that contains no more than 0.30 percent sulfur by weight.

Similarly, 40 CFR 60.47b(f) exempts the unit from the CEMS requirement under 40 CFR 60.47b(a) because the unit will only be firing "very low sulfur oil." To qualify for this exemption the permittee must also keep fuel records in accordance with 40 CFR 60.49b(r).

#### **PM/Opacity**

40 CFR 60.43b(h)(1) would limit PM emissions from the boiler to 0.03 lb/mmbtu.

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However, 40 CFR 60.43b(h)(5) exempts boilers that burn only “very low sulfur oil”. “Very low sulfur oil” is defined (for boilers constructed, modified, or reconstructed after February 28, 2005 and not in a noncontinental area) as a fuel with a potential SO<sub>2</sub> emission rate of less than 0.32 lb/mmbtu or contains no more than 0.30 percent sulfur by weight. The applicant has agreed to use fuel oil that contains no more than 0.30 percent sulfur by weight.

40 CFR 60.43b(f) limits opacity to 20% (6-minute average), except for one 6 minute period per hour of not more than 27% opacity. It should be noted that this limit is less stringent than the 10% opacity limit of 45CSR2.

40 CFR 60.48b(a) requires installation of a COMS. However, if the unit burns only liquid fuel with a potential SO<sub>2</sub> emission rate of no more than 0.06 lb/mmbtu, 40 CFR 60.48b(j)(2) exempts the unit from this requirement. If the permittee decides to combust only fuel that meets this requirement, they must keep fuel records in accordance with 40 CFR 60.49b(r)(1). If COMS are installed, only an initial Method 9 test is required to determine compliance with the 20% opacity limit. If the COMS are not installed, subsequent Method 9 and/or Method 22 tests will be required as determined by 40 CFR 60.48b(a).

## **NO<sub>x</sub>**

40 CFR 60.44b(a)(1)(i) limits NO<sub>x</sub> emissions from the boiler to 0.10 lb/mmbtu. In its regulatory discussion section of the permit application, Ohio Power stated that 40 CFR 60.44b(c) exempts the boiler from this limit if the permittee agrees to limit the units “annual capacity factor” to no greater than 10%. “Annual capacity factor” is defined as the ratio between the actual heat input to a steam generating unit during a calendar year and the potential heat input to the steam generating unit had it been operated 8,760 hours that calendar year at the maximum steady state design heat input. However, in the writers opinion 60.44b(c) seems to only apply to facilities that burn coal, oil, natural gas (or any mix of the three) in combination with wood or some other fuel. Since the aux boiler will only fire oil, this exemption would not apply. **However**, based upon a September 8, 2000 letter from EPA (Document control number 0100006) found on EPA’s Applicability Determination Index, the Auxiliary Boiler DOES seem to qualify for NO<sub>x</sub> exemption under 60.44b(c).

40 CFR 60.48b(b) would require the installation of NO<sub>x</sub> CEMs on the unit. However, 40 CFR 60.48b(i) exempts any facility described by 40 CFR 60.44b(j) from this requirement. 40 CFR 60.44b(j) requires a federally enforceable limit of a 10% annual capacity factor AND a federally enforceable limit requiring the unit only combust oil with a nitrogen content of 0.30% (by weight) or less. In order to show compliance with this condition, the permittee must keep fuel records in accordance with 40 CFR 60.49b(e).

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40 CFR 63, Subpart DDDDD: National Emission Standards for Hazardous Air Pollutants  
for Industrial, Commercial and Institutional Boilers and  
Process Heaters

Since the subject boiler will have its capacity factor limited in the permit to 10%, it will be defined as a reconstructed "limited use liquid fuel" boiler. As such, §63.7506 requires the subject boiler to meet the emission limitations in Table 1 of the subpart. Specifically, the table limits PM to 0.03lb/MMBTU, HCl to 0.0009 lb/mmbtu and CO to 400 ppm<sub>v</sub>. The permit will contain those limits. In order to determine compliance with those limits §63.7506(a)(1) and §63.7506(a)(2) require the permittee to document that they burn only non residual oil. The permittee must certify that they burn only non residual oil initially and then semiannually.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This permit modification addresses only CO.

AIR QUALITY IMPACT ANALYSIS

Since this is a minor modification to an existing major stationary source, no modeling was performed.

MONITORING OF OPERATIONS

No additional monitoring above what is already required in R13-2608C is necessary.

CHANGES TO PERMIT R13-2608C

The following changes were made to the existing permit:

- \* Condition 4.1.25 was changed to reflect the new higher CO emission limits.

RECOMMENDATION TO DIRECTOR

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Information supplied in the application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that permit R13-2608D for the modification of a power plant near Moundsville, Marshall County, be granted to Ohio Power Company.

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Steven R. Pursley, PE  
Engineer

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October 3, 2012

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