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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-0760F
Plant ID No.:	049-00019
Applicant:	The Marion County Coal Company
Facility Name:	Marion County Preparation Plant
Location:	Marion County
SIC/NAICS Code:	1222/212112
Application Type:	Modification
Received Date:	March 14, 2016
Engineer Assigned:	Joe Kessler
Fee Amount:	$2,000
Date Received:	March 14, 2016
Complete Date:	May 25, 2016
Due Date:	August 23, 2016
Applicant Ad Date:	May 3, 2016
Newspaper:	*Times West Virginian*
UTM's:	561.6 km Easting • 4,383.9 km Northing • Zone 17
Latitude/Longitude:	39.60263/-80.28249
Description:	Modification to: (1) increase allowable short-term sulfur content of coal combusted in the thermal dryer, (2) lower the hourly heat input of the dryer to 130 mmBtu, and correct several miscellaneous errors in the permit.

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On March 14, 2016, The Marion County Coal Company (MCCC) submitted a permit application to modify the Marion County Preparation Plant. The facility was originally constructed in 1957 by the Consolidation Coal Company (CCC) and called the Loveridge Plant until purchased by MCCC and renamed in 2013. The facility has been the subject of many permitting actions since construction as described below:

- On December 16, 1977, Permit Number R13-0345 was issued to CCC for the installation of a thermal dryer at the Loveridge Plant;

- On August 1, 1985, Permit Number R13-0760 (this permit superceded and replaced R13-0345) was issued to CCC for the replacement of the three (3) existing thermal dryers with one (1) fluidized-bed dryer;

- On November 3, 2003, a "no-permit needed" decision was issued (PD03-108) to CCC for the installation of new equipment to allow for methane co-firing of the thermal dryer;

- On November 20, 2003, a "no-permit needed" decision was issued (PD03-112) to CCC for the installation of three (3) gas fired compressors;

- On September 15, 2006, Permit Number R13-0760A was issued to CCC as a Class II Administrative Update for the addition of raw coal Conveyor 21, a second stacking tube at raw coal Stockpile 1, raw coal reclaim Conveyor 22, and an increase in the capacity of raw coal Stockpile 1 from 300,000 tons to 450,000 tons;

- On September 20, 2006, Permit Number R13-0760B was issued to CCC as a Class II Administrative Update for the addition of clean coal Conveyor 7A, the 10,500 ton Clean Coal Silo 3, and reclaim Conveyor 13A;

- On December 8, 2006, Permit Number R13-0760C was issued to CCC to revise the thermal dryer's emission limits in accordance with consent order CO-R13, 14-96-22;

- On May 12, 2008, Permit Number R13-0760D was issued to CCC to increase in the maximum sulfur content of the coal combusted in the thermal dryer furnace from 2.5% to 3.4%;

- On March 5, 2015, Permit Number R13-0760E was issued to MCCC to add conveyor belt CB8A and batch weigh loadout bin BWL; and

- On April 5, 2016, a "no-permit needed" decision was issued (PD16-023) to MCCC for a thermal dryer burner improvement project.

Additionally, on June 20, 2015, MCCC entered into a Consent Order (CO-R30-E-2015-1) that is relevant to this permitting action. Substantively, the DAQ determined that, based on the currently permitted maximum heat input of 182 mmBtu/hr and the emission rates of NO_x and VOCs measured in the most recent approved stack test in 2011 (0.48 lb-NO_x /mmBtu and 0.95 lb-VOC/mmBtu), the thermal dryer would not be in compliance with the NO_x and VOCs emission limits in the permit.

DESCRIPTION OF PROCESS/MODIFICATIONS

Existing Facility Description

MCCC's Marion County Preparation Plant is a typical large coal preparation plant utilizing a primarily coal-fired thermal dryer. The facility is permitted to process up to 3,000 tons per hour (TPH) and 26,280,00 tons per year (TPY) of raw coal. Raw coal is delivered from an existing mine portal and then sized, cleaned, dried, and processed for delivery to customers. The existing thermal dryer is a fluidized bed thermal dryer, manufactured by ENI Engineering Company, that utilizes a Bigelow-Liptak forced draft burner and has a currently maximum permitted heat input of 182 mmBtu/hr (using a combination of coal and coal bed methane).

Proposed Modifications

MCCC is now proposing to make the following substantive modifications at the Marion County Preparation Plant:

- Increase the allowable short-term sulfur content of coal combusted in the thermal dryer from 3.4% to 3.9% by weight;
- Lower the maximum allowable hourly heat input of the thermal dryer to 130 mmBtu; and
- Correct several miscellaneous errors in the permit.

Thermal Dryer Description

The fluidized bed thermal dryer, manufactured by ENI Engineering Company, utilizes a Bigelow-Liptak forced draft burner and has a currently allowable maximum heat input of 182 mmBtu/hr based on the combustion of 4.35 TPH of coal (limited to providing up to 120 mmBtu/hr) and methane (providing an additional 62 mmBtu/hr). However, as proposed in the modification evaluated herein, the furnace is not capable of achieving a heat input of 182 mmBtu and the permitted heat input limit shall be lowered to a proposed 130 mmBtu.

Directly heated air from the furnace is used to dry the wet coal in the following way: combustion gas from the pulverized coal fired furnace is mixed with ambient air. The resulting hot gas is at a temperature of 900-1050°F and contains roughly 85% air and 15% combustion products (~90,000 dscfm). The hot gas fluidizes the coal in a chamber containing a restriction deck. The fluidized coal travels on and across the bed which promotes evaporation of moisture from the coal. Most of the coal then falls over a weir and into air-lock hoppers, which discharge onto a transfer belt that conveys the dried coal to the dryer product belt. Some of the smaller sized coal is carried by the gas to a bank of four cyclones, which remove all but the finest material. Most of the fines collected by the cyclones discharge (via screw feeders) to the dried coal transfer belt. Some of the fines (~3.6 TPH) are used to fire the dryer furnace. Dryer feed rates range from a normal of 450 dry TPH to a maximum of 600 dry TPH, depending on the slack content of the raw coal feed to the plant. Coal processing rates are dependent on a number of parameters including coal quality, coal size, and contract specifications.

Compliance with the particulate matter emissions from the dryer stack is achieved with a venturi scrubber operating at a pressure drop of 30 to 40" wc. The pressure drop occurs across an annular passage created by a restrictive cone centered in the venturi duct. Clarified overflow water from the preparation plant thickener is injected into the venturi at a rate of about 1,300 gpm. The water is atomized across the annular passage and the droplets come into contact with the particulate matter in the gas. The resulting fines-laden water is then removed from the gas by cyclonic separator located at the base of the stack. The relatively particulate matter free gas leaves the stack saturated, at about 120°F, and containing some mist.

The high-energy gas-liquid contact in the venturi scrubber is designed to remove particulate matter, but it also absorbs SO_2. The amount of SO_2 removed by the venturi scrubber depends partly

on the inlet water alkalinity. The natural alkalinity of the plant water does not provide enough removal to comply with the SO_2 limits at furnace fuel feed rates greater than 110 pounds per hour. Therefore, an SO_2 control system was installed to decrease the SO_2 emission from the unit. This is accomplished by spraying a small amount (up to 3 gpm) of caustic solution (20% NaOH) onto the dryer feed coal just before it enters the drying chamber. The caustic solution reacts with the SO_2 in the coal drying chamber, forming the salt Na_2SO_4, which leaves the drying chamber as a solid with the product coal. A metering pump delivers caustic solution to a spray header at the end of the conveyor belt that delivers feed coal to the dryer.

The thermal dryer is not equipped with equipment to control NO_X, VOC, or CO emissions from the stack. NO_X and CO emissions are minimized by controlling the pulverized coal combustion conditions. VOC emission are minimized by controlling the furnace and dryer chamber temperatures.

SITE INSPECTION

Due to the nature of the proposed modification, the author did not perform a site inspection of the facility for this permitting action. The facility was last inspected by DAQ Compliance/ Enforcement (C/E) Inspector John Moneypenny on June 9, 2014. This inspection found the facility be "Status 10 - Out of Compliance" due to the differential pressure gauge on the venturi scrubber not operating. It is noted that the inspector stated that no opacity or fugitive emissions were noted.

AIR EMISSIONS AND CALCULATION METHODOLOGIES

MCCC included in the permit application calculations for the new hourly SO_2 emissions as based on the increased sulfur content of the coal of 3.9% by weight. No change in any annual potential-to-emit (PTE) was proposed as part of this modification. They also included verification that, based on emission factors obtained during a previous stack test, the emission rates of all pollutants limited under Table 4.1.4 of the permit are in compliance at the lowered maximum furnace heat input of 130 mmBtu/hr.

New SO_2 Emission Rate

As emissions of SO_2 from the combustion of coal are based completely on the assumption that all sulfur in the coal is oxidized into SO_2, MCCC calculated the new hourly SO_2 emission rate by increasing the existing emission rate (195 lb-SO_2/hr) by the same ratio as the sulfur content of the coal is proposed for increase. In this case the increase is approximately 15% (1 - (3.9/3.4). MCCC added a 5% safety factor to calculate a new SO_2 emission rate from the dryer of 235 lb-SO_2/hr. This emission rate is the controlled rate after the exhaust gases are cleaned in the venturi scrubber using, when required, additional caustic as noted above.

At the currently permitted maximum fuel coal throughput of 4.35 TPH and a maximum spot coal limit of 3.9% sulfur by-weight, the new uncontrolled SO_2 emission rate can be calculated by using a mass balance. This mass balance calculation gives an emission rate of 678.60 lb-SO_2/hr. Based on the controlled emission rate as calculated above, the control efficiency of the venturi scrubber would be approximately 65%, which is reasonable for the selected control methodology.

Compliance With Existing Emission Limits

On June 20, 2015, MCCC entered into a Consent Order (CO-R30-E-2015-1) in which the DAQ determined that, based on the currently permitted maximum heat input of 182 mmBtu/hr and the emission rates of NO_x and VOCs measured in the most recent approved stack test in 2011 (0.48 lb-NO_x/mmBtu and 0.95 lb-VOC/mmBtu), the thermal dryer would not be in compliance with the NO_x and VOCs emission limits in the permit: 63.6 and 135.6 lbs/hour, respectively. Therefore, MCCC is requesting a new thermal dryer hourly heat input limit of 130 mmBtu/hr to guarantee compliance with the permitted emission limits at the tested emission rates. It is important to note that MCCC states that 2011 stack test measured NO_x and VOC emission rates of 0.46 lb/mmBtu and 0.38 lb/mmBtu, respectively. MCCC states the discrepancy is due to NO_x rounding and the removal of methane (which is not defined as a VOC) from the VOC emission rate. Based on the new lower heat input limit of the thermal dryer, compliance with the current emission limits should be achieved. MCCC is not proposing to lower any hourly thermal emission limits due to the new lower heat input limit and will accept the higher emission rate as a safety factor.

Emissions Summary

The only emission increase associated with the modifications evaluated herein is the increase in the hourly SO_2 emission rate from the thermal dryer of 40 lb/hr. There is no proposed increase in the facility's annual PTE. Based on information from the most recent Title V (R30-04900019-2014) Fact Sheet, the facility-wide PTE remains as given in the following table:

Table 1: Facility-Wide PTE

Pollutant	tons/year
NO_X	239.40
CO	178.70
VOC	945.40
$PM_{2.5}$	126.60
PM_{10}	159.50
PM	202.30
SO_2	586.00
HAPs	17.70

REGULATORY APPLICABILITY

The following will discuss each rule applicable or potentially applicable to only the modifications evaluated herein.

45CSR5: To Prevent and Control Air Pollution from Coal Preparation Plants, Coal Handling Operations, and Coal Refuse Disposal Operations

The purpose of 45CSR5 is to prevent and control air pollution from the operation of coal preparation plants, coal handling operations and coal refuse disposal areas. Pursuant to the definition given in §45-5-2.4, thermal drying is defined as a part of a "Coal Preparation Plant." Section 4.1(a) of 45CSR5 requires that a thermal dryer built after 1974 meet the requirements of 45CSR16 - which in turn adopts the New Source Performance Standards (NSPS). The applicability and compliance with 40 CFR 60, Subpart Y are discussed below.

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

45CSR10 has requirements limiting in-stack SO_2 concentrations of "manufacturing processes." Previously, the DAQ has regulated thermal dryers as "manufacturing processes" subject to section 4.1 of 45CSR10.

Section 4.1 of Rule 10 requires that no in-stack SO_2 concentration exceed 2,000 parts per million by volume (ppm_v) from any manufacturing process source operation. As noted, the thermal dryer furnace is defined as a "manufacturing process." Based on the estimated maximum revised SO_2 emission rate of the furnace (235 lb-SO_2/hr) and the stack parameters given in the application, the estimated worst-case in-stack SO_2 concentration was calculated to be 137.08 ppm_v or 6.85% of the limit.

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

The proposed changes to the Marion County Preparation Plant have the potential to increase the PTE of the facility in excess of 144 pounds per day of a regulated pollutant and, therefore, pursuant to §45-13-2.17, the changes are defined as a "modification" under 45CSR13. Pursuant to §45-13-5.1, "[n]o person shall cause, suffer, allow or permit the construction, modification, relocation and operation of any stationary source to be commenced without . . . obtaining a permit to construct." Therefore, MCCC is required to obtain a permit under 45CSR13 for the modification of the facility.

As required under §45-13-8.3 ("Notice Level A"), MCCC placed a Class I legal advertisement in a "newspaper of *general circulation* in the area where the source is . . . located." The ad ran on May 3, 2016 in the *Times West Virginian* and the affidavit of publication for this legal advertisement was submitted on May 23, 2016.

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

The Marion County Preparation Plant is an existing major stationary source under 45CSR14 and the proposed increase in the short-term sulfur content of the fuel coal is considered, pursuant to §45-14-2.40, a "physical change or a *change in the method of operation*." As the proposed increase in

sulfur content of the coal is a relaxation of the synthetic minor limit (although the annual limit shall remain at 3.4%) established under Permit Number R13-0760D issued on May 12, 2008, it is appropriate to retroactively review the impact of the change based on the PSD applicability analysis done in 2008. This is based on the language given under §45-14-19.7 that states:

> [§45-14-19.7]
> Any person who owns or operates any particular source or modification which becomes a major stationary source or major modification solely by virtue of a relaxation in any limitation, enforceable by the Administrator or the Secretary, on the capacity of the source or modification otherwise to emit a pollutant (such as a restriction on hours of operation), shall become subject to the requirements of this rule as though construction had not yet commenced on the source or modification.

During that permitting process, the annual SO_2 limit from the thermal dryer was set at 586 TPY (PTE may be used in lieu of projected actual emissions pursuant to §45-14-2.63(a)(4)) - or 39 TPY over the baseline actual emissions (BAE) as calculated at that time. As there is no proposed increase in the annual SO_2 PTE as a result of this relaxation of that limit, the BAE to PTE difference will remain at 39 TPY - or below the 40 TPY threshold that would define the proposed change as a "modification" under 45CSR14.

45CSR30: Requirements for Operating Permits

45CSR30 provides for the establishment of a comprehensive air quality permitting system consistent with the requirements of Title V of the Clean Air Act. The Marion County Preparation Plant, defined under Title V as a "major source," was last issued a Title V permit on January 24, 2014. Proposed changes evaluated herein must also be incorporated into the facility's Title V operating permit. Commencement of the operations authorized by this permit shall be determined by the appropriate timing limitations associated with Title V permit revisions per 45CSR30.

40 CFR 60, Subpart Y: Standards of Performance for Coal Preparation Plants

40 CFR 60, Subpart Y applies to the affected facilities identified in §60.250 which are located at coal preparation plants that process more than 200 tons per day where construction, reconstruction, or modification occurred after October 27, 1974. The thermal dryer at the Marion County Preparation Plant is subject to the requirements established in Subpart Y for dryers constructed, reconstructed, or modified on or before April 28, 2008. Although MCCC is requesting an increased short-term SO_2 emission limit to account for brief periods of elevated fuel sulfur, §60.14(e)(4) excludes the following from the definition of "modification" under Subpart Y:

> Use of an alternative fuel or raw material if, prior to the date any standard under this part becomes applicable to that source type, as provided by §60.1, the existing facility was designed to accommodate that alternative use. A facility shall be considered to be designed to accommodate an alternative fuel or raw material if that use could be accomplished under the facility's construction specifications as amended prior to the change. Conversion to coal required for energy considerations, as specified in section 111(a)(8) of the Act, shall not be considered a modification.

Given that the thermal dyer was designed to accommodate the higher sulfur coal prior to the effective date (April 28, 2008) of the revised Subpart Y (that first included SO_2 emission standards), the unit is not considered "modified" as defined under the NSPS and subject to the SO_2 emission standards. Therefore, the applicability of Subpart Y to the thermal dryer remains unchanged with this proposed modification and is limited to the particulate matter standards given under §60.252.

TOXICITY ANALYSIS OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted from the proposed modification and that are not classified as "criteria pollutants." Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO_x), Ozone, Particulate Matter (PM), Particulate Matter less than 10 microns (PM_{10}), Particulate Matter less than 2.5 microns ($PM_{2.5}$), and Sulfur Dioxide (SO_2). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal and programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) limits promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs were discussed above under REGULMCCCRY APPLICABILITY.

There is no increases in, or changes of, non-criteria regulated pollutants as a result of the proposed modifications.

AIR QUALITY IMPACT ANALYSIS

The proposed modification does not meet the definition of a "major modification" pursuant to 45CSR14 and, therefore, an air quality impact (computer modeling) analysis was not required. Additionally, based on the nature of the proposed modification, modeling was not required under 45CSR13, Section 7.

MONITORING, COMPLIANCE DEMONSTRATIONS, RECORD-KEEPING, AND REPORTING REQUIREMENTS

No substantive changes are being made in the monitoring, compliance demonstrations, record-keeping, and reporting requirements in the draft permit.

TESTING OF OPERATIONS

Due to the proposed increase in sulfur content of the fuel coal (short-term) and the thermal dryer burner improvement project approved under PD16-023, the following new performance testing is required under 4.3.1. of the draft permit:

- Within 60 days of permit issuance, the permittee shall conduct, or have conducted, in accordance with a protocol submitted pursuant to 3.3.1(c), a performance test on the thermal dryer to determine compliance with the emission limits as given under Table 4.1.4. The performance tests will be performed in accordance with the following:

    a. The performance test shall be in accordance with a methodology proposed by the permittee in the protocol so that the test shall take place during firing conditions as close as possible to the maximum permitted furnace parameters as given under 4.1.5;

b. The permittee shall propose in the protocol a methodology for, if needed, scaling the performance test results to be valid for determining compliance with the emission limits given under Table 4.1.4. so as to account for firing conditions not reasonably close the maximum permitted furnace parameters as given under 4.1.5.; and

c. During any required compliance testing, the permittee shall install flow straightening devices in the stack of the fluidized bed thermal dryer to insure that cyclonic flow does not occur.

CHANGES TO PERMIT R13-0760E

The substantive changes made to R13-0760E were limited to:

- The thermal dryer SO_2 emission limit given in Table 4.1.4. was revised to 235 lb-SO_2/hr;
- The maximum combustion rate of methane in the thermal dryer was corrected in 4.1.5(b);
- The maximum sulfur content of the fuel coal combusted in the thermal dryer was revised to 3.90% under 4.1.5(c);
- The maximum heat input of the thermal dryer furnace was revised down to 130 mmBtu in 4.1.5(g);
- The methodology of calculating the annual sulfur content of the fuel coal sulfur was added in 4.2.2.; and
- New performance testing replaced the existing testing language under 4.3.1.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates that compliance with all applicable state and federal air quality regulations will be achieved. Therefore, I recommend to the Director the issuance of Permit Number R13-0898C to The Marion County Coal Company for the above discussed changes to the Marion County Preparation Plant located near Fairview, Marion County, WV.

Joe Kessler, PE
Engineer

6/09/16
Date