west virginia department of environmental protection

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ENGINEERING EVALUATION/FACT SHEET

B ACKGROUND INFORMATION

Application No.:	R13-3185
Plant ID No.:	083-00133
Applicant:	Davis Medical Center
Facility Name:	Davis Memorial Hospital
Location:	Elkins
NAICS Code:	622110
Application Type:	Modification
Received Date:	April 21, 2014
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	$2000.00
Date Received:	Construction
Complete Date:	May 21, 2014
Due Date:	August 19, 2014
Applicant Ad Date:	May 1, 2014
Newspaper:	*The Inter-Mountain*
UTM's:	Easting: 599.4 km Northing: 4,309.5 km Zone: 17
Description:	The application is for the installation of two natural gas fired boilers rated at 10.5 MMBtu/hr with a burner configuration to use distillate oil as a back-up fuel and one 800 kW diesel generator set.

DESCRIPTION OF PROCESS

The Davis Medical Center operates the Davis Memorial Hospital in Elkins, WV. To improve medical services, the Davis Medical Center has added a 74,000 square foot cancer wing to the existing hospital. To heat this new wing, two new hot water generating boilers were installed to provide heat for the structure and one generator set to provide stand-by emergency electric power when there is an interruption of electric service to the hospital.

The boilers are Bryan RW series boilers configured to generate hot water. Each of these boilers has a heat input rating of 10.5 MMBtu/hr on natural gas and distillate oil. Davis Medical Center has elected to operate them on natural gas with the ability to switch to distillate oil as a

back-up supply source during gas curtailments. These boilers are equipped with Webster Low-NO_x JBSX3C-250A burners which can limit the formation of oxides of nitrogen (NO_x) to 30 ppm or less on natural gas.

The generator set is a Cummins QSK23-G7 NR2 with a diesel engine. This particular engine is a 4 cycle, in-line, six cylinder diesel engine with a displacement of 23.1 liters. The engine is rated at 1,220 break horsepower which can generate 800 kW of electricity. The manufactured date of the generator set is September 26, 2012.

SITE INSPECTION

On December 11, 2013, Mr. Gene Coccari of the agency's Small Business Assistance Program and the writer visited the Davis Memorial Hospital. Mr. Steve Johnston, Director of Support Services, and Mrs. Jeri Trippett, P.E., Project Coordinator accompanied Mr. Coccari and the writer during this visit. The main purpose of this visit was to obtain information on the emission sources to assist the applicant in preparing an application for a construction permit.

The hospital is located at 812 Gorman Avenue in Elkins, WV. The new cancer wing extends the hospital towards Martin Street. The boilers are located on the ground elevation floor of the wing with the generator set next to the parking lot northeast of the wing. Given the particular size and location of the emissions units, this site is acceptable for this application.

ESTIMATE OF EMISSION BY REVIEWING ENGINEER

The applicant supplied emissions estimates from the manufacturer for the boilers and generator set. The boiler manufacturer noted that the oxides of nitrogen (NO_x) and carbon monoxide (CO) emissions were corrected to 3% oxygen. The writer corrected these emission rates for these two pollutants using procedures outlined in Method 19 to 0% oxygen. Since Davis Medical Center will only operate the boilers on distillate oil during curtailments and the generator during power outages, the annual emissions are based on 500 hours of operation per year to account for these emergency situations. The emissions listed in the following tables are manufacturer's estimates:

Table #1 – Potential Emissions from the one Bryan Boiler

Pollutant	Hourly Rate (lb/hr)	Annual Rate (TPY)	Hourly Rate on #2 Distillate oil (lb/hr)	Annual Rate on #2 Distillate oil (TPY)
Particulate Matter (PM) /Particulate Matter Less Than 10 microns (PM_{10})/Particulate Matter less than 2.5 microns ($PM_{2.5}$)	0.05	0.22	0.15	0.04

Sulfur Dioxide (SO_2)	0.006	0.026	2.33	0.58
Oxides of Nitrogen (NO_x)	0.38	1.66	1.5	0.38
Carbon Monoxide (CO)	0.77	3.37	1.63	0.41
Volatile Organic Compounds (VOCs)	0.06	0.26	0.045	0.011
Total Hazardous Air Pollutants (HAPs)	0.04	0.18	6.24E-3	0.002
Carbon Dioxide Equivalent (CO_2e)	1,229.53	5,385.34	1713.842	428.461

Table #2 – Potential Emissions from the 800 kW Generator Set		
Pollutant	**Hourly Rate (lb/hr)**	**Annual Rate (TPY)**
Particulate Matter (PM) /Particulate Matter Less Than 10 microns (PM_{10})/Particulate Matter less than 2.5 microns ($PM_{2.5}$)	0.13	0.03
Sulfur Dioxide (SO_2)	0.26	0.07
Oxides of Nitrogen (NO_x)	16.4	4.1
Carbon Monoxide (CO)	0.65	0.16
Volatile Organic Compounds (VOCs)	0.38	0.1
Total Hazardous Air Pollutants (HAPs)	0.03	0.01
Carbon Dioxide Equivalent (CO_2e)	1191.528	297.882

Table #3 – Summary of Potential to Emit	
Pollutant	**Annual Potential Before (TPY)**
Particulate Matter (PM) /Particulate Matter Less Than 10 microns (PM_{10})/Particulate Matter less than 2.5 microns ($PM_{2.5}$)	0.28
Sulfur Dioxide (SO_2)	1.28
Oxides of Nitrogen (NO_x)	8

Carbon Monoxide (CO)	7.28
Volatile Organic Compounds (VOCs)	0.56
Carbon Dioxide Equivalent (CO_2e)	10,454.23

REGULATORY APPLICABLILITY

It is understood that these sources burning natural gas are significantly below the applicable allowable limitations in Rule 2 and Rule 10, which are the State of West Virginia's rules addressing particulate matter (PM) and sulfur dioxide (SO_2) from boilers, regardless of the size of the unit. This understanding is confirmed with the provisions in Rules 2A and 10A, which exempts such sources for conducting periodic testing and monitoring for the purpose of demonstrating compliance with the limitations under these rules.

The applicant proposes to use distillate oil #2 (diesel) as a back-up fuel source when there is an interruption of the hospital's natural gas supply or a natural gas curtailment. The applicable SO_2 standard for the boilers is 33.6 pounds per hour under Rule 10 and 5.25 pounds per hour under Subpart Dc of 40 CFR 60. Even under this situation, the unit is burning 0.2% sulfur diesel which meets the applicable alternative SO_2 standard under Subpart Dc of 0.5% by wt. and the Rule 10 allowable by nearly 93%.

The generator was manufactured after April 1, 2006, which makes it an affected source under 40 CFR 60, Subpart IIII. Davis Medical Center has selected a generator set with an engine that has been certified by the manufacturer to meet the emission standards under this rule. U.S. EPA issued an Engine Family No. of CCEXL023.AAB and a Certificate No. of CCEXL023.AAB-023 for Cummins Engine Model No. QSK23-G7-NR2.

The other applicable requirements for an emergency engine under this rule other than purchasing a certified engine are listed below:

- Use Ultra Low Sulfur Diesel (ULSD)
- Operate the engine in accordance with the manufacturer written specifications
- Non-emergency operating hours cannot exceed 100 hours per year, which includes readiness and maintenance checks

This engine is also subject to Subpart ZZZZ of Part 63 as an area source of hazardous air pollutants (HAPs). Because the engine is subject to the requirements of Subpart IIII of Part 60, 40 CFR §§63.6590(c) and (c)(1) acknowledges that engines subject to Subpart IIII and located at an area source of HAPs have no further requirements under Subpart ZZZZ that apply.

Davis Medical Center prepared and submitted a complete application, paid the filing fee, paid the NSPS fee, and published a Class I Legal ad in *The Inter-Mountain* on May 1, 2014. This proposed modification does not trigger any additional rule or regulations.

The Davis Memorial Hospital is a non-major source as defined in 45 CSR 14 and 45 CSR 30 (i.e. Potential to emit more than 100 tons per year of CO, PM_{10}, PM, and SO_2). These new boilers and generator set does not have the potential to emit of any one of the New Source Review Pollutants above the major source levels as defined in Rule 14. Therefore, no New Source Review is required to be conducted for this project. In addition, this construction will not increase the facility potential to emit to major source level as defined in Rule 30. Thus, the Davis Memorial Hospital will be a non-major source subject to 45 CSR 30 as a "deferred source", which means the facility, will be required to submit "Certified Emission Statements" (CES) and pay annual fees in accordance with the Rule 30.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The potential release of hazardous air pollutants from these sources are 0.12 pounds per hour and 0.37 tons per year, which is significantly below the Rule 13 trigger threshold of 2 pounds per hour or 5 tons per year. Therefore, no information about the toxicity of the HAPs is presented in this evaluation.

AIR QUALITY IMPACT ANALYSIS

The writer deemed that an air dispersion modeling study or analysis was not necessary, because the proposed modification does not meet the definition of a major source as defined in 45CSR14.

MONITORING OF OPERATIONS

The writer recommends the following monitoring requirements:

- Facility total fuel usage (natural gas & diesel) for each month. This is required by Rules 2, 10, and Subpart Dc.

- Maintain records from the "certified fuel supplier" that each shipment of diesel meets the definition of distillate oil and the maximum sulfur content for the diesel used in the generator does not exceeds 0.05 % sulfur by weight and for the boilers does not exceed 0.2% sulfur by weight.

- Hour of operation of the boilers using/firing diesel fuel and reason for usage. Natural gas boilers with distillate oil back-up that do not operate more than 48 hours per year for

maintenance or readiness checks using distillate oil are not affected sources to the 40 CFR 63, Subpart JJJJJ.

- Hour of operation of the generator set and reason for its operation (i.e. emergency, checks, and emergency demand response).

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates the proposed construction of the emission sources will meet all the requirements of the applicable rules and regulations when operated in accordance with the permit application. Therefore, the writer recommends granting Davis Medical Center a Rule 13 modification permit for their Davis Memorial Hospital located in Elkins, WV.

Edward S. Andrews, P.E.
Engineer

June 11, 2014
Date