



west virginia department of environmental protection

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ENGINEERING EVALUATION/FACT SHEET

B BACKGROUND INFORMATION

Application No.:	R13-3059
Plant ID No.:	041-00026
Applicant:	William R. Sharpe Jr. Hospital (DHHR)
Facility Name:	William R. Sharpe Jr. Hospital
Location:	Weston
NAICS Code:	622210
Application Type:	Modification
Received Date:	March 1, 2013
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	\$2000.00
Date Received:	March 7, 2013
Complete Date:	March 27, 2013
Due Date:	June 25, 2013
Applicant Ad Date:	March 13, 2013
Newspaper:	<i>The Weston Democrat</i>
UTM's:	Easting: 543.6 km Northing: 4,321.4 km Zone: 17
Description:	The application is for the replacement of all of the existing boilers at the hospital with three 10.5 MMBtu/hr Boilers.

DESCRIPTION OF PROCESS

The William R. Sharpe Jr. Hospital is located at 936 Sharpe Hospital Road, Weston, West Virginia. The facility is a health care facility comprised of multiple wings that currently employ three (3) 8.0 million (MM) British Thermal Units (BTU) per hour (hr) for the purpose of providing comfort heating and hot water throughout the facility. In addition, the facility employs two (2) existing emergency generators for the purpose of providing backup electrical power during periods of interrupted electrical service.

The facility is currently undergoing a building expansion that will include the construction of a new wing onto the existing facility. As part of this expansion, the three (3) existing boilers and two emergency generator sets will be demolished and removed from the

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facility. This application proposed the installation of three (3) new 10.5 MMBtu/hr dual fueled boilers and three (3) Generac 600 kW, bi-fuel emergency generators will replace those emission units slated for demolition.

The proposed boilers and generators are based on design prepared by ZDS Design/Consulting Services for the Department of Health and Human Resources (DHHR). These proposed units still has to go through the State of West Virginia competitive bidding process and are subject to change.

Boilers

The new boilers will be Bryan Model 1050-W-FDGO dual fuel boilers fueled primarily by natural gas with the ability to be fuel with No. 2 Fuel Oil (diesel) in the event of a natural gas supply shortage. Each boiler will be equipped with a Webster Model HDSX low NO_x dual fuel burner with a maximum design heat release rate of 10.5 MMBtu/hr. The burners have the capability of utilizing diesel as a back-up fuel in the event of an interruption in natural gas supply. These boilers are designed to produce hot water using Bryan's "Flexible Water Tube" design.

Generators

The new Generac bi-fuel emergency electric generators are each powered by 954 brake horse power (bhp), compression ignition engine. This engine has been designed to operate as a compression engine with the ability to use natural gas to supplement the amount diesel needed for full load conditions. The standard diesel injection system is used and the injector sprays diesel fuel into the cylinder at the correct timing. Natural gas is metered with the combustion air. The diesel fuel is ignited at the compression stroke of the diesel cycle and creates an ignition spark which ignites the natural gas charge that is added with the combustion air. The total power is derived from the combination of natural gas and diesel is a function of several factors, including engine load and intake temperatures.

SITE INSPECTION

This hospital was classified as a source when it operated a medical waste incinerator. During the last inspection of the facility, the medical waste incinerator has been permanently shut down and the only sources at the hospital were the 3 existing boilers. This inspection was conducted on June 9, 2003 by Ms. Laura Crowder of the Enforcement and Compliance of the agency. No site inspection of this facility as part of this permitting action is necessary.

ESTIMATE OF EMISSION BY REVIEWING ENGINEER

The applicant supplied emissions estimates from the manufacturer and used emissions factors from Chapters 1.3 (oil fired) and 1.4 (natural gas fired) of AP-42 to estimate emissions from the new dual fuel fired boilers. The emissions listed in the following table are manufacturer's estimates: The proposed boilers are equipped with Webster HDSX Low NO_x

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burners that are designed for low-NO_x operation. These advanced burners and associated firing controls make the emission estimates using AP-42 factors to estimate PM, NO_x and CO not realistic. Hence, the estimates using the emission data provided by Webster for PM, NO_x and CO are present in the following table.

Pollutant	Hourly Rate on Natural Gas (lb/hr)	Hourly Rate on Fuel Oil (lb/hr)	Worst Case Annual Rate (TPY)
Particulate Matter (PM) /Particulate Matter Less Than 10 microns (PM ₁₀)/Particulate Matter less than 2.5 microns (PM _{2.5})	0.11	0.26	1.14
Sulfur Dioxide (SO ₂)	0.01	0.02	0.09
Oxides of Nitrogen (NO _x)	0.38	1.26	5.52
Carbon Monoxide (CO)	1.05	0.74	4.6
Volatile Organic Compounds (VOCs)	0.06	0.05	0.26
Total Hazardous Air Pollutants (HAPs)	0.04	6.24E-3	0.11
Carbon Dioxide Equivalent (CO _{2e})	1,260	1,680	7,358.4

The worst case potential for the new boilers is to be firing on diesel (fuel oil) expect for CO emissions. The hospital has elected only to fire these units on diesel as a back-up fuel supply only if there is an issue with their natural gas supply. Thus, the maximum annual emission from one of these new boilers on natural gas is expected to be over four and half tons per year for any regulated pollutant other than carbon dioxide equivalent.

The proposed new generator sets will only use ultra-low sulfur diesel and natural gas. The manufacturer has certified the selected model engine in accordance with the U.S. EPA 5-mode test cycle.

Pollutant	Hourly Emissions (lb/hr)	Annual Emissions Based on 500 hours/yr (TPY)	Annual Emission for Non-Emergency Use (100 hours/yr) (TPY)
PM/PM ₁₀ /PM _{2.5}	0.06	0.02	0.003
NO _x + Non-Methane Hydrocarbons (NMHC)	8.56	2.14	0.428
CO	0.08	0.02	0.004
SO ₂	0.90	0.23	0.050
Total HAPs	0.03	0.01	0.001
CO _{2e}	878.31	219.58	43.92

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The existing sources at the facility were not required to obtain a permit either by size of the unit or date of installation. Thus, the potential to emit from those sources was not estimated. The writer summed the worst case potential of the proposed sources into the following table to illustrate the hospital overall potential to emit.

Table #3 – Facility Potential Under this Permit	
Pollutant	Worst Case w/3 Boilers & 3 Generators (TPY)
PM/PM ₁₀ /PM _{2.5}	0.84
SO ₂	0.06
NO _x	22.98
CO	13.86
VOCs	0.78
CO ₂ e	22,205.76

REGULATORY APPLICABILITY

Boilers

According to the DAQ’s policy on Rule 13 Guidance for Natural Gas Combustion Sources, these replacement boilers would not need to obtain a Rule 13 for firing on natural gas. The estimated emissions confirm that none of the hourly emissions are above 6 pounds per hour. However, the burners for these boilers will be capable of being fired with fuel oil as a back-up fuel supply. This voids the application of this policy for this case.

ZDS has sized these boilers based on meeting the hospital’s demand for most situations with only one boiler operating and another in a hot idle condition with the third unit as a back-up unit. Typically a boiler in hot idle condition will have to fire its burner on some sort of frequency to maintain temperature to be brought up on line should the operating unit down without warning.

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 (SO₂) 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.

To meet building code requirements of a health care facility, these boilers must be design, constructed, and operated to be capable of utilizing a back-up fuel source or supply. Thus, the burners for these proposed boilers can utilize fuel oil (diesel) as the back-up fuel. Sharpe Hospital has elected to only burn ultra-low sulfur diesel fuel (distillate oil) as the back-up fuel for these new boilers. Firing on this type of fuel, the replacement boiler would only be 8% of the allowable of 0.05lb of PM per MMBtu under Rule 2 and 0.05% of the allowable of 3.1 lb of SO₂

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per MMBtu under Rule 10. Thus, compliance with the emission limitation in these two rules is met by using ultra-low sulfur diesel without the use of add on controls.

The replacement boilers are subject to the sulfur dioxide standard of 40 CFR 60, Subpart Dc. 40CFR§60.42c(d) allows affected sources to comply with the limitation by use of a fuel with a sulfur content of no greater than 0.5% by weight. Ultra-low sulfur diesel has a maximum sulfur content of 15 ppm by weight, which equates to 0.0015% sulfur by weight. Again, the use of this fuel easily allows Sharpe Hospital to operate in compliance with the standard. Under this rule, the preferred compliance option would be to utilize a certified fuel supplier in accordance with 40 CFR §60.48c(f), which will be incorporated into the permit.

Generators

The proposed generators are using a compression ignition engine and will be manufactured under the 2013 Model Year. Thus, these engines are affected sources subject to the applicable limitations of Standards for Performance for Stationary Compression Ignition (CI) Internal Combustion Engines (40 CFR 60, Subpart IIII). These particular units have been classified as Stationary Emergency Compression Ignition Engine under this rule. Sharpe Hospital has proposed to operate these as such.

40 CFR §60.4211 identifies the compliance requirements for the owner and operators (Sharpe Hospital) of affected engines under this subpart. Under this section, the facility will be required to do the following:

- Operate and maintain the engine and control device according to the manufacturer's emission-related instructions;
- Only change the emission-related settings that are permitted by the manufacturer; and
- Meet the applicable emission standards under Subpart IIII.

The subpart encourages the owner/operator to comply with the applicable emission standard to purchase an engine that has been certified to the emission standards in §60.4205(b). Sharpe Hospital has proposed to purchase these Generac generator sets equipped with an engine manufactured by Doosan Infracore Co that has been certified under Certificate Number DDICL21.99UYA-006 for using diesel. Generac has had this bi-fuel configuration certified using an oxidation catalyst. A certified engine means that the manufacturer has tested particular model year engine in accordance with EPA's procedures and EPA has reviewed and approved the test data. Therefore, a certified engine is understood to meet the applicable emission standards of this subpart.

Subpart ZZZZ – National Emissions Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines establish emissions standards for new and existing internal combustion engines. This regulation does not establish emission standards for new engines that are subject to the New Source Performance Standards of Subpart IIII, which was just discussed in the above section, if certain criteria are met. The William Sharpe Hospital is

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not classified as a major source of HAPs and thus is understood to be an “area source” of HAPs. 40 CFR §63.6590(c)(1) states that engines located at an “area source” of HAPs and meet the requirements of Subpart IIII of Part 60 then it has meet the requirements of Subpart ZZZZ and no further requirements of Subpart ZZZZ apply to that particular engine. Thus, the selected generator/engine set meet the requirements of Subpart ZZZZ by meeting the requirements of Subpart IIII and no further review is necessary.

Sharpe Hospital prepared and submitted a complete application, paid the filing fee, and published a Class I Legal ad in *The Weston Democrat* on March 13, 2013. This proposed modification does not trigger any additional rule or regulations. Under the Area Source Boiler General Achieve Control Technology (GACT) regulation (40 CFR Part 63, Subpart JJJJ), boilers than burn fuel oil such as diesel as a back-fuel due to natural gas curtailments and gas supply emergency are not defined as oil burning sources under the subpart and therefore are not subject to the emission standard. The writer developed specific language and additional monitoring to ensure these replacement boilers do not trigger this subpart.

Because of the facility’s potential to emit is less than 100 tons per year of any regulated pollutant, except for greenhouse gases which is less than 100,000 tons per year, and less than 10 tons per year of any single hazardous air pollutant with a combined total of less than 25 tons per year, then the William R. Sharpe Jr. Hospital is classified as a non-major source subject to 45 CSR 30 as a “deferred source”. These new boilers are subject to a New Source Performance Standard, which bring the facility in to 45 CSR 30. Since the facility is a non-major source under 45 CSR 30, the facility can be classified as a deferred source”. This means that the Sharpe Hospital only has to submit “Certified Emission Statements” and corresponding fees on an annual basis in accordance with 45 CSR 30.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

These replacement boilers and generators will not emit any pollutants that aren’t already being emitted by another emission source at the facility. Therefore, no information about the toxicity of 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:

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- Facility total fuel usage or delivered by fuel type for each month. This is required by Rule 2, 10, and Subpart Dc.
- Certified Fuel Supplier for the diesel fuel delivered to the hospital, which required by Subpart Dc and meets the fuel specification of Subpart III.
- Total number of hours that each boiler operates by diesel fuel as part of readiness check. To ensure the boiler(s) does not trigger the Boiler GACT.
- Conduct visible emission checks if the boiler has operated on diesel fuel for 30 consecutive operating days.
- Hours that the generators operate for non-emergency periods, which required by Subpart III.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application indicates the proposed modification of the William R. Sharpe Jr. Hospital will meet all the requirements of the applicable rules and regulations when operated in accordance with the permit application. Therefore, the writer recommends granting the William R. Sharpe, Jr. Hospital a Rule 13 modification permit for their medical center located in Weston, WV.

Edward S. Andrews, P.E.
Engineer

April 10, 2013
Date

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