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ENGINEERING EVALUATION/FACT SHEET

B ACKGROUND INFORMATION

Application No.:	R13-3204
Plant ID No.:	003-00010
Applicant:	Department of Veterans Affairs
Facility Name:	Martinsburg VA Medical Center
Location:	Martinsburg
NAICS Code:	622100
Application Type:	Modification
Received Date:	August 14, 2014
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	$2000.00
Date Received:	August 24, 2014
Complete Date:	April 13, 2015
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Applicant Ad Date:	September 9, 2014
Newspaper:	*The Journal*
UTM's:	Easting: 765.90 km Northing: 4,367.69 km Zone: 17
Description:	The application is for the replacement of all of the existing boilers and the installation of three additional emergency generators.

DESCRIPTION OF PROCESS

The Department of Veterans Affairs (VA) owns and operates the Martinsburg VA Medical Center in Bluefield, WV. The Martinsburg VA Medical Center is an existing hospital with three 35 MMBtu/hr Keeler Boilers and 15 emergency generators. The boilers were manufactured in 1973 and primarily fuel with natural gas with fuel oil as a back-up fuel source. All of the generators are used on an emergency basis and operate on ultra-low sulfur diesel fuel. These existing generators range in power output from 1367 brake horsepower (bhp) to 200 bhp.

In 2011, the VA requested to have all 15 generators covered by the G60-C General Permit. This application was later withdrawn by the VA on January 30, 2012. This request was withdrawn for technical and program applicability issues with the application.

The proposed project calls for the existing boilers located in the existing power house to be replaced with three, 23.4 MMBtu/hr York-Shipley Global boilers. The existing boilers were removed in September 2014 and temporary boilers were used on site to provide steam to the medical center while the new units can be placed where the existing boilers were once located in the powerhouse. The temporary boilers are two York-Shipley Global 900 boiler horsepower (hp) with Limpsfield Engineering Model LCN0123 burners. These burners are using flue gas recirculation limits the formation of carbon monoxide (CO) under 10 ppm and oxides of nitrogen (NO_x) to under 30 ppm when firing with natural gas. These burners can utilize fuel oil as well.

These York-Shipley Global boilers were manufactured in 2014 as 700 boiler hp, which can produce 24,000 lb of 200 psig steam per hour. These particular boilers are a four pass, dry back construction using a centerline furnace design configuration. To increase efficiency of these units, on the outlet of the exhaust of each boiler will be an economizer, which the hot exhaust gases will pass through before being discharged to the atmosphere. These economizers are heat exchangers located in the exhaust ductwork that are used to capture some of the heat energy in the exhaust and use it to preheat the feed water to the boiler.

The burners for these new boilers will be Power Flame's LNICM burner which will burn natural gas as the primary fuel and ultra-low sulfur diesel (ULSD) as a back-up source. Flue gas recirculation will be employed with these burners and oxygen trim to minimize CO emissions

The VA has elected to install three additional emergency generator sets to provide electricity in the event that normal electric service to the facility is interrupted. The proposed generators are Kohler Power System 2000REOZMD that produces 2000 kilowatts (kW) of electricity. These units will be equipped with a Mitsubishi S16-R-Y2PTAW2-1 engine, which is a 4-cycle, 16 cylinders, turbocharged, compression ignition engine. This particular engine has been certified by U.S. EPA to meet the emission standards under Part 60 for model 2014, which has been issued an Engine Family No EMVXL65.4BBA.

SITE INSPECTION

On December 13, 2013, Mr. Joseph Kreger, an inspector assigned to the Eastern Panhandle Regional Office, conducted a regular compliance inspection of Martinsburg VA-Medical Center. During this inspection, Mr. Kreger concluded that the facility was operating in compliance with all applicable rules and regulations. Thus, no site inspection of the facility was required for this review.

ESTIMATE OF EMISSION BY REVIEWING ENGINEER

The applicant supplied emissions estimates from the manufacturer for the burner for the new boilers, which is 50 ppm for CO and 30 ppm for NO_x. The Power Flame 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 U.S. EPA Method 19 to 0% oxygen. Since VA 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 estimates using the manufacturer's emissions data:

Table #1 – Potential Emissions from the one 23.34 MMBtu/hr Boiler

Pollutant	Hourly Rate (lb/hr)	Annual Rate (TPY)	Hourly Rate on ULSD (lb/hr)	Annual* Rate on USLD (TPY)
Particulate Matter (PM)/ Particulate Matter Less Than 10 microns (PM_{10})/ Particulate Matter less than 2.5 microns ($PM_{2.5}$)	0.11	0.48	0.34	0.09
Sulfur Dioxide (SO_2)	0.02	0.09	0.02	0.01
Oxides of Nitrogen (NO_x)	0.85	3.72	2.81	0.73
Carbon Monoxide (CO)	0.86	3.77	0.91	0.24
Volatile Organic Compounds (VOCs)	0.59	3.72	0.89	0.23
Total Hazardous Air Pollutants (HAPs)	0.04	0.18	0.0072	0.002
Carbon Dioxide Equivalent (CO_2e)	2,743.61	12,017.01	3,824.31	956.08

* Annual based on 500 hours per year for back-up fuel usage.

Table #2 illustrates the worst case hourly and annual potential from the three new boilers based on the fuel type used.

Table #2 – Maximum Potential Emissions from the three 23.43 MMBtu/hr Boilers

Pollutant	Worst Case Fuel	Hourly Rate (lb/hr)	Annual Rate (TPY)
PM/ PM_{10}/ $PM_{2.5}$	Oil	1.02	0.71
SO_2	Both	0.06	0.26
NO_x	Oil	8.43	12.64
CO	Oil	2.73	11.34
VOCs	Oil	2.67	7.98
Total HAPs	Gas	0.12	0.18
CO_2e	Oil	11,472.93	36,861.56

Table 3 illustrates the potential emission from the two temporary boilers.

Table #3 – Potential Emissions from the Two - 37 MMBtu/hr 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 ($PM_{2.5}$)	0.56	2.45	1.06	2.58
Sulfur Dioxide (SO_2)	0.05	0.22	0.13	0.53
Oxides of Nitrogen (NO_x)	2.69	11.78	10.80	13.81
Carbon Monoxide (CO)	0.55	2.41	2.70	2.95
Volatile Organic Compounds (VOCs)	0.41	0.61	0.14	1.73
Total Hazardous Air Pollutants (HAPs)	0.14	0.61	0.02	0.12
Carbon Dioxide Equivalent (CO_2e)	8,665.25	12,017.01	12,078.50	38,807.11

* Annual based on 500 hours per year for back-up fuel usage.

The VA proposed to install three new emergency generators sets that utilize compression ignition engines to drive them. The engines are rated at 2,923 hp at 1,800 rpm. The application provided the engine manufacturer's engine certificate data to determine the emission potential from the engines using ultra low sulfur diesel fuel. The potential emissions from these engines are illustrated in Table 4.

Table #4 – Emissions from the New Generator Engines				
Pollutant\Sources	Single Engine		Three Engines	
	lb/hr	tpy	lb/hr	tpy
Oxides of Nitrogen (NO_x) plus Hydrocarbons*	25.74	8.63	77.22	19.31
Carbon Monoxide (CO)	2.88	0.13	8.64	2.16
Sulfur Dioxide (SO_2)	0.03	0.01	0.09	0.02
Particulate Matter (PM)/ PM less than 10 microns (PM_{10})/ PM less than 2.5 microns ($PM_{2.5}$)	0.82	0.21	2.46	0.62
VOCs	0.54	0.14	1.62	0.41
Carbon Dioxide Equivalent (CO_2e)	3,711.76	927.94	11,135.28	2,783.82
Total Hazardous Air Pollutants (HAPs)	0.10	0.03	0.30	0.08

The existing three boilers are 34 MMBtu/hr which are configured to burn natural gas as the primary fuel with fuel oil as a backup fuel. The facility currently uses ULSD as backup fuel oil. The potential emissions from these existing units are presented in Table #5.

Table #5 Potential Emission from Existing Boilers

Pollutant	Hourly Rate NG (lb/hr)	Hourly Rate on ULSD (lb/hr)	Annual Rate (TPY)
$PM/PM_{10}/PM_{2.5}$	0.77	1.46	3.55
Sulfur Dioxide (SO_2)	0.06	0.16	0.29
Oxides of Nitrogen (NO_x)	10.18	14.56	45.68
Carbon Monoxide (CO)	8.56	3.64	36.26
Volatile Organic Compounds (VOCs)	0.56	0.18	2.36
Total Hazardous Air Pollutants (HAPs)	0.19	0.03	0.79
Carbon Dioxide Equivalent (CO_2e)	11,944.00	16,648.75	53,490.91

Prior to this project, the medical center had 15 other existing emergency generators. The emissions for these 15 generator sets were determined as if the facility was or was not a major source under the Prevention of Significant Deterioration (PSD) Program and/or Title V (45 CSR 30). The sum of emissions from these generators sets is presented in Table #5, which indicates the facility is a non-major source under PSD or Title V.

Table #6 – Potential Emissions from the Existing Generators

Pollutant	Potential From Existing Generators		Emissions from the New Generators (tpy)	New Potential from the Generators (tpy)
	Hourly Emissions (lb/hr)	Annual Emissions (tpy)		
PM	6.86	1.72	0.62	2.34
PM_{10}	6.86	1.72	0.62	2.34
$PM_{2.5}$	6.86	1.72	0.62	2.34
SO_2	2.32	0.58	0.09	0.67
NO_x	111.4	27.85	19.31	47.16
CO	24.1	6.03	2.16	8.19
VOCs	11.73	2.93	0.41	3.34
Total HAPs	0.05	0.01	0.08	0.09

Table #7 illustrates the changes in potential emissions from the medical center, which indicates that the facility will remain as a non-major source under PSD and Title V. The trigger threshold for being major under PSD is 250 tpy of any criteria pollutant, which excludes HAPs; and 100 tpy threshold values for criteria pollutants and 10 tpy of a single HAP or 25 tpy of total HAPs under Title V.

Table #7 – Changes to the Facility Potential Emissions

Pollutant	Existing Potential (tpy)	Emissions from the New Boilers & Generators (tpy)	Removal From Existing Boilers (tpy)	Facility New Potential (tpy)
PM	5.27	1.33	3.55	3.05
PM_{10}	5.27	1.33	3.55	3.05
$PM_{2.5}$	5.27	1.33	3.55	3.05
SO_2	0.87	0.29	0.29	0.87
NO_x	73.53	31.95	45.68	59.80
CO	42.29	13.50	36.26	19.53
VOCs	5.29	8.39	2.36	11.32
Total HAPs	0.80	0.26	0.79	0.27

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 from 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 facility's natural gas supply or a natural gas curtailment. The applicable SO_2 standard for the 23.4 MMBtu/hr boilers is 74.9 pounds per hour per boiler. The use of ULSD creates a margin of compliance of 99.9%. The units would be subject to the sulfur dioxide standard Subpart Dc of 40 CFR 60, which establishes an alternative standard that limits the sulfur content of the fuel oil to 0.5% by weight (wt.). Operating under the backup fuel situation, the units are burning 15 ppm (0.0015% by wt.) sulfur diesel which meets the applicable alternative SO_2 standard under Subpart Dc of 0.5% by wt. and the Rule 10 allowable.

NSPS

New Source Performance Standards (NSPS) apply to certain new, modified, or reconstructed sources meeting criteria established in 40 CFR 60.

Subpart IIII

Subpart IIII (Standard of Performance for Stationary Spark Ignition Internal Combust Engines) applies to stationary spark ignition engines manufactured after July 1, 2007. These generator sets will be equipped with a compression ignition engine manufactured after July 1, 2007.

To comply with this subpart, the VA has elected to purchase certified engines as allowed under 40 CFR §60.4243(b)(1) and operate such engines according to the manufacturer's emission-related written instructions as required in 40 CFR §60.4243(a)(1). The model engine proposed in this application is certified for the 2014 model year under the following Engine Family and Certificate Number that was issued by U.S. EPA:

Table #8 U.S. EPA Certificate Numbers for Part 60 Compliance			
Engine Model	Engine Manufacture	Engine Family	Certificate Number
S16R-Y2PTAW2-1	Mitsubishi	EMVXL65.4BBA	EMVXL65.4BBA-011

Department of Veterans Affairs prepared and submitted a complete application, paid the filing fee, paid the NSPS fee, and published a Class I Legal ad in *The Journal* on September 9, 2014.

As part of this application, the VA has identified several emergency generator sets that should have obtained a permit prior to being installed. These generator sets are identified as EG-1, EG-8, EG-10, and EG-12. Each of these engines has a potential greater than 144 pounds of NOx per day. EG-1 is certified compliant engine to Subpart IIII of Part 60. EG-8, EG-10, and EG-12 were installed in 2005 which was prior to the affected source date of Subpart IIII.

The VA does not operate or intentd to be obligated to operate any of the emergency generators for emergency demand response. Under EPA's Guidance Regarding Definition of Residential, Commercial, and Institutional Emergency Stationary RICE in the NESHAP for Stationary RICE, the medical center meets the classification of an institutional facility. Therefore, all of the existing emergency generators at the medical center are excluded from the RICE MACT (See 40 CFR §63.6585(f).

The emissions from these four engines are presented in Table #9. These emissions were based on an operating schedule of 500 hours per year.

Table #9 – Potential Emissions from the Five Existing Generators						
Pollutant	EG-1 Emissions (tpy)	EG-8 Emissions (tpy)	EG-10 Emissions (tpy)	EG-11 Emissions (tpy)	EG-12 Emissions (tpy)	Total Emissions From the Four Engines (tpy)
PM	0.07	0.15	0.11	0.15	0.15	0.63
PM_{10}	0.07	0.15	0.11	0.15	0.15	0.63
$PM_{2.5}$	0.07	0.15	0.11	0.15	0.15	0.63
SO_2	0.14	0.03	0.02	0.03	0.03	0.25
NO_x	3.13	2.09	1.55	2.08	2.09	10.94
CO	0.36	0.45	0.34	0.45	0.45	2.05
VOCs	0.85	0.17	0.12	0.12	0.17	1.43
Total HAPs	0.004	0.001	0.001	0.001	0.001	0.008

Seven of the remaining 11 existing generators were installed before 1994, when 45 CSR13 excluded internal combustions engines. The three remain engines don't have the potential to emit more the modification threshold of 144 pounds per day and therefore are not required to be permitted under 45 CSR 13. The applicant was able to find manufacturer's emissions related data to support their case for these engines because all three of these engines are certified Subpart IIII compliant engines.

The VA Medical Center 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 do 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. However, the new boilers are subject to NSPS that does not exclude units subject to the regulation from Part 70 Permitting Requirement. Therefore, the medical center will become a non-major source subject to fee requirement and certified emission statement (CES) submittals under 45 CSR 30 and be deferred from the permitting requirements as a deferred source.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

The potential release of hazardous air pollutants from the facility is less than 1 ton 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:

- Total fuel usage (natural gas & diesel) for each month consumed by the boilers and determined the total 12 month rolling heat input. Fuel usage recordkeeping 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 boilers and engines not exceeds 0.0015 % sulfur by weight (15 ppm).

- Hours 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.

- The hours of operation and purpose of the operation for the certified engines (EG-1, EG-16, EG-17, EG-18) shall be recorded to demonstrate the engine does not exceed the 100 hours per year of non-emergency operation limit set be Subpart IIII.

- Monitor the hours of operation for the non-certified engines (EG-8, EG-10, & EG-12), which would be used to determine compliance with the annual emission limits.

RECOMMENDATION TO DIRECTOR

The applicant proposed to remove the temporary boilers by June 6, 2015. Thus, the writer recommends not including any requirements on those units because the permit would be issued after that date.

The information provided in the permit application indicates the proposed modification 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 Department Veterans Affairs a Rule 13 modification permit for the proposed changes at the VA Medical Center – Martinsburg, which is located in Martinsburg, WV.

Edward S. Andrews, P.E.
Engineer

June 18, 2015
Date