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MEMORANDUM

To: Beverly McKeone, P.E. – New Source Review Program Manager

From: Ed Andrews, Engineer 

Date: November 19, 2015

Subject: Class II Administrative Update of R13-2451D (R13-2451E) for the Charleston Area Medical Center –Memorial Division (039-00076)

On July 31, 2015, the DAQ received a request from the Charleston Area Medical Center (CAMC) to update Permit R13-2451D. This request is for the installation of one additional emergency generator and two new boilers. As part of this project, Boiler #1, #2, and #3 will be removed, which are currently covered in Permit R13-2451D.

The net changes resulting from this project will increase NO_x and VOC emissions from the Memorial Division to be increased by 2.79 and 0.20 tons per year respectively. Thus, CAMC filed a Class II Administrative Update Request in accordance with 45 CSR 13 to be authorized to proceed with this project. The applicant filed a complete application, published a Class Legal Ad in the Charleston Gazette on August 14, 2015, and paid the Class II Update Filing and NSPS fees.

CAMC proposed to replace Boilers #1, #2, and #3 with two new boilers, which will be identified as Boiler #8 and #9. Boiler #8 will be a Victory Energy 500 boiler horsepower (bhp) boiler. Boiler #9 will be a Victory Energy 800 bhp boiler. Both units will be utilizing burners manufactured by Lampsfield which will be configured to use flue gas recirculation with LO NO_x burners.

These new boilers will be replace the existing boilers (#1, #2, and #3) which has a total heat input of 52.3 MMBtu/hr with 54.6 MMBtu/hr while reducing emissions. Permit R13-2451D establishes emission limits by emission points. Boilers #1, #2, and #3 vent to a common stack (Stack 1) with Boiler #4. CAMC proposes to vent Boilers # 4 and #8 to Stack #1. Permit R13-2451D allowed Boilers #1 through #7 to be operated for 5,300 hours per year on fuel oil.

CAMC only operates the boilers on fuel oil when there a natural gas supply interruption of their service to Memorial Division and to conduct readiness checks of the oil delivery system. This approach falls in line with the definition of natural gas fired boiler under Subpart JJJJJJ to

Part 63 (Boiler GACT). Thus, the writer believes that the correct approach to account for the emissions when firing on fuel oil is to determine annual emissions on 500 hours per year under EPA's Guidance for Determine the PTE Emergency Sources for Program Applicability.

The following table illustrates the breakdown of emissions from the boiler changes on worst case bases.

	CO		NO _x		VOC		
	lb/hr	tpy	lb/hr*	tpy	lb/hr	tpy	
Stack #1*	4.41	19.24	7.47	22.91	0.28	1.26	
Boiler #8	0.77	3.39	3.00	3.90	0.12	0.53	
Boiler #9	1.24	5.42	4.80	6.25	0.18	0.79	
Net Change	-2.40	-10.43	0.33	-12.76	0.02	0.06	

* Stack 1 emissions are based on Emission Limits in R13-2451D minus Boiler #4.

The annual emissions for Boilers #8 & #9 are based on 8,260 hours of operation on natural gas and 500 hours on fuel oil. Permit R13-2451D allows the existing boiler to operate 8,760 hours on natural gas and 5,200 hours on fuel oil. CAMC has elected to reduce the hours of operation on fuel oil from the permit to coincide with the Boiler GACT, which will result in a net decrease of SO₂ emissions by 0.09 tons per year.

The additional generator is a Caterpillar diesel generator set rated for 750 kilowatts (kW). This generator set will use a CAT C27 diesel engine that is capable of producing 1,150 brake horsepower (bhp). EPA has certified that this model engine to the emission standard of Subpart III to Part 60 under Certificate Number: DCPXL27.0NZS-028. The emissions from this engine are presented in the following table:

Table #2 Emissions from Generator #6		
Source Name	Generator #6	
Engine Manufacturer	Caterpillar	
Engine Model	CAT C27	
EPA Certificate Number	DCPXL27.0NZS-028	
Model Year	2013	
Fuel Consumption Rate (gal/hr)	53.6	
Brake Horsepower (Bhp)	1150	
Fuel Type	Diesel	
PM/PM ₁₀ /PM _{2.5}	EF ¹ (g/Hp-hour)	0.021
	lb/hr	0.053
	TPY ²	0.01
NO _x	EF ¹ (g/Hp-hour)	5.25
	lb/hr	13.31
	TPY ²	3.33
SO ₂	EF ³ (lb/hp-hr)	0.00001
	lb/hr	0.012
	TPY ²	0.003
CO	EF ¹ (g/Hp-hour)	0.25
	lb/hr	0.63
	TPY ²	0.16
VOC	EF ¹ (g/Hp-hour)	0.03
	lb/hr	0.08
	TPY ²	0.02
CO ₂ e ⁴	EF lb/MMBtu	163.22
	lb/hr	1207.31
	TPY ²	301.83

The other changes at Memorial Division are the removal of all three ethylene oxidize sterilizers, which will result in a decrease in potential hazardous air pollutants (HAPs) of 0.25 tons per year. Conditions 4.1.7 & 4.1.8 of Permit R13-2451D will be removed for the final permit.

As part of this review, CAMC had discovered that the wrong emission factor was used to determine the potential to emit for Generators #1, #2, and #3. These generators each have an engine greater than 600 bhp and therefore the appropriate emission factors should have come from Chapter 3.4 instead of Chapter 3.3 of AP-42. The changes in emission factors results in decrease in emission from these units, which affect the permitted emissions limits.

CAMC adjusted the hourly emissions rate for Generators #1 through #3 and the annual rate for all of the generators based on 500 hours of operation. The following is summary of the annual emissions changes from the existing generators and Generator #6.

Table #3 – Generators Emission Changes at Memorial Division					
	CO	NO _x	VOC	PM	SO ₂
	tpy	tpy	tpy	tpy	Tpy
Generator #1*	0.72	3.12	0.08	0.09	0.002
Generator #2	0.83	3.60	0.10	0.11	0.002
Generator #3	0.83	3.60	0.10	0.11	0.020
Generator #5	2.33	16.47	0.02	0.14	0.01
Generator #6	0.16	3.33	0.02	0.01	0.002
Current Permitted Limits	2.60	14.90	0.11	0.54	0.45
Net Change	2.27	15.22	0.21	-0.08	-0.41

The following table illustrates the net change in permitted emission from the facility:

Table #4 - Facility Net Change in Emissions					
Pollutant	CO	NO _x	VOC	PM	SO ₂
Facility Total under R13-2451D	42.71	62.64	2.99	6.61	0.85
New Total	34.14	65.44	3.18	5.69	0.33
Net Difference	-8.57	2.80	0.19	-0.92	-0.52

The main reasons that this proposed changes results in decrease even though the additional generator was added, hours of operation for the existing generators was increased, and the replacements boilers increased the heat input by 2.3 MMBtu/hr is corrections to the emissions factors, following the Emergency Source guidance for the oil firing operations of the boilers and using best available emission data for the new sources.

Changes that this writer recommends to Permit R13-2451D is to establish restriction based on the natural of the operation of the emission source. For the boilers, restrict the operation for natural gas boilers with fuel oil back as such using the definition of gas fired boiler from 40 CFR §63.11237. This would only allow CAMC to operate the dual fuel boilers on diesel when there is a gas supply interruption and for 48 hours per year for readiness checks. This writer believes that this requirement would be more stringent than the 5,300 hours of operation on diesel per year for each dual fuel boiler.

Permit R13-2451D set annual fuel limits for natural gas and fuel oil in Condition 4.1.2. for the boilers. This writer does not agree with this approach for limiting annual emissions from dual fuel units because the unit could be in compliance with the fuel limit while exceeding the annual emission limit. A better approach is to limit the total heat input from the boiler, which would require the fuel monitoring. Other recordkeeping that is required is to record when and reason the boilers were fired with fuel oil. The Boiler GACT indirectly requires sources to prove the gas-fired boiler is still operated as a gas-fired boiler.

The requirements from Rule 10, Subparts Dc, and IIII were streamlined into one requirement. These rules and regulations either established SO₂ emission or set maximum sulfur content in the fuel. CAMC uses ultra-low sulfur diesel for as the back-up fuel for the boilers and in the generators which meets the requirements of all of these rules. Thus, Conditions 4.1.10, 4.1.11, and 4.1.12.2 were omitted and replace by Condition 4.1.6.

Generator #5 and #6 are subject to Subpart IIII to Part 60. CAMC has elected to purchase certified engines for these two generator sets, which is the preferred means to comply with Subpart IIII and Subpart ZZZZ of Part 63. Condition 4.1.12. from Permit R13-2451D was re-written in as Condition 4.1.2. Permit R13-2451 had emission limits for Generator #5 and required to it to be certified in Condition 4.1.12.6. This writer considers the emission limits to be redundant and recommends omitting the specific emission limits in Condition 4.1.1. for Generator #6.

Permit R13-2451D has emission limits for the other three generator set as well. The writer recommends updating the emission limit based on the correct emission factors and setting the annual emission limits based on 500 hours of operation per year in Conditions 4.1.3., 4.1.4., 4.1.5. Compliance with the annual limits will be satisfied by tracking hours of operation of each generator set, which is required in Condition 4.2.5.

Conditions 4.1.5. and 4.1.6. set limits on the three fuel oil storage tanks, which was 0.1 pound per year for each vessel. These limits are well below what the Director has determined as reasonable emission for vessels without controls. Second, the recommended restriction on the when firing on fuel oil for the boilers and generators would be indirectly restricting the total throughput of fuel oil be satisfy these limits anyway. Thus, the writer recommends omits both conditions from R13-2451E.

This writer revised the visible emission check requirement for the boilers in Condition 4.2.1. to focus on when the boilers are operating on fuel oil. The current condition requires the permittee to conduct visible emission checks regardless of the operation of the boilers. Even Rule 2 acknowledges the visible emission monitoring for gas fired should not be required (See 45 CSR §2-8.4.b. and 45 CSR §2A-3.1.a.). Thus, this writer revised the visible emission check to focus only on periods when the units are operating on fuel oil or any combination of oil with natural gas in Condition 4.2.2.

Permit R13-2451D incorporated the ash handling provisions of Rule 2 in Condition 4.1.9.3. The permitted boilers can only burn gas or gas and oil. These fuels typically have no

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ash content in them. Thus, these types of units do not need to have such ash handling systems to operate on continuous bases. Therefore, this writer omitted Condition 4.1.9.3 from the permit.

The proposed change in Permit R13-2451E would only result in an increase of NO_x and VOC from the facility that is less than the modification threshold level of Rule 13 and the does not allow the permittee to avoid having to comply with any other rule or regulation the facility was already subject to prior to submitting of this application. Thus, this proposed permit meets the criteria of a Class II Administrative Update under Rule 13. Therefore, this writer recommends to the Director to issue Permit R13-2451E in accordance with 45 CSR §13-4.