



west virginia department of environmental protection

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**GENERAL PERMIT REGISTRATION APPLICATION
ENGINEERING EVALUATION / FACT SHEET**

BACKGROUND INFORMATION

Registration No.: G60-C076
Plant ID No.: 059-00116
Applicant: Williamson Memorial Hospital (WMH)
Facility Name: Williamson Memorial Hospital
Location: Williamson, Mingo County
SIC Code: 8062 - General Medical and Surgical Hospitals
NAICS Code: 622110 - General Medical and Surgical Hospitals
Application Type: Construction
Received Date: April 27, 2015
Engineer Assigned: John Legg
Fee Amount: \$1,500
Date Received: April 30, 2015
Complete Date: May 14, 2015 (Newspaper Affidavit Received)
Applicant Ad Date: April 29, 2015
Newspaper: *Williamson Daily News*
Permit Due Date: June 29, 2015
UTM's: Easting: 387.842 km Northing: 4,170.942 km Zone: 17
Lat/Long: Latitude: 37.679° Longitude: -82.272°
Description: Construction/installation of one (1), diesel-fueled Kohler, Model 500REOZVC, generator/engine set. The generator set is Tier 2 EPA-certified for Stationary Emergency Applications. The engine is a Volvo, Model TAB164 engine rate at 758 bhp/565 kWm at 1800 rpm. The generator will be used to supply power during an emergency and will be operated a maximum of 500 hr/yr.

[General Information: The G60-C general permit is for emergency generators installed at Title V (major) facilities and other facilities having additional point sources of emissions. In their application, the WMH mentioned dual-fired boilers feeding from the same diesel storage tank used to supply the emergency generator. The hospital had no other permits listed in the Airtrak database other than the current application. The G65-C general permit is used for a single emergency generator located at a facility that does not have any other point source emissions.]

On April 27, 2015, the Division of Air Quality (DAQ) received WMH's G60-C general permit registration application for the construction/installation of a Kohler, Model 500REOZVC, diesel-fired engine/generator set to be used to provide temporary power to the WMH located in Williamson, Mingo County, WV facility. WMH paid their \$1,500.00 application fee on April 30, 2015. Their Class I legal advertisement ran in *Williamson Daily News* on April 29, 2015. The original legal affidavit of publication for the newspaper advertisement was received at the DAQ on May 14, 2015. Under this general registration (G60-C076), the generator/engine will be allowed to operation the customary maximum 500 hours per year.

DESCRIPTION OF PROCESS

The following information is provided in Attachment B of the permit application:

WMH installed in 2005 a diesel-fired, standby/emergency generator (EG-1) for the purpose of producing emergency electrical power at WMH located in Williamson, West Virginia.

The Kohler emergency electrical generator is driven by a Volvo, 4-cycle, turbo-charged air-cooled engine as provided in the manufacturer's specifications given below.

There is one, 5000 gallon, above-ground tank which stores diesel fuel to supply the emergency generator (as well as the facility's dual-fired boilers). The generator also has its own 100 gallon diesel fuel day tank.

Table 1: Information on WMH's Emergency Diesel-fired Generator Engine (EG-1) located near Williamson, Mingo County, WV. (See Permit Registration Application G60-C076, Attachment O: Emissions Summary Sheets.)

Emergency Generator Engine (EG-1)	
Source ID No.	EG-1
Generator Manufacturer and Model	Kohler Model 500REOZVC
Engine Manufacturer and Model	Volvo Engine Model TAD1641GE
Manufacturer's Rated bhp/rpm	758/1800
Source Status	Existing Source
Installation Date	October 2005

Table 1: Information on WMH's Emergency Diesel-fired Generator Engine (EG-1) located near Williamson, Mingo County, WV. (See Permit Registration Application G60-C076, Attachment O: Emissions Summary Sheets.)

Emergency Generator Engine (EG-1)	
Engine Manufactured Date	2005
Engine Type	Rich Burn Four Stroke (RB4S)
Air Pollution Control Device	Not Applicable
Fuel Type	#2 Fuel Oil/Diesel
H ₂ S (gr/100 scf)	Not Applicable
Operating bhp/rpm	758 bhp /1800 rpm
Brake Specific Fuel Consumption (BSFC) (Btu/bhp-hr)	9,987
Fuel Type	Diesel
Fuel Firing Rate @ full load (gal/hr)	54.0
Fuel Use @ 500 hr/yr, (gal/yr)	27,000
Operating Hours	≤ 500 hr/yr
Fuel Value for Diesel (Btu/gal)	140,000 Btu/gal
Design Heat Input to Generator	7.56 MM Btu/hr

SITE INSPECTION

A site inspection was deemed unnecessary by the writer. Directions as given in the permit application are as follows:

Application for
General Permit Registration,
Section 1, 14.A:

From the South, take Route 52 North and take a right onto Pike Street. Follow Pike Street which turns into Alderson Street. Follow Alderson Street to the end.

From the North, take Route 52 South and take a left onto Hospital Road. Take a left onto Alderson Street and follow to the end.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

Low levels of toxic/hazardous non-criteria regulated pollutants are emitted from the combustion of No. 2 diesel in the generator engine. WMH calculated HAP emissions (for acetaldehyde, acrolein, benzene, formaldehyde, naphthalene, toluene, and xylene; see permit application G60-C076, Attachment I: Emissions Calculations) for the generator engine using emission factors obtained from AP-42, Section 3.4, Table 3.4-3. Total emissions are low: estimated at 0.01 ton/yr, 0.003 ton/yr based on 500 hrs/yr of operation, and 0.05 ton/yr based on unrestricted hours of operation per year.

CLASS II GENERAL PERMIT G60-C

Eligibility

The requirements and conditions of the G60-C general permit address the prevention and control of regulated pollutant emissions from emergency generators, including emergency generators installed at Title V (major) facilities and other facilities having additional point sources of emissions. The G60-C Emergency Generator General Permit benefits the regulated community by incorporating all air quality regulations into a single general permit. General Permit G60-C was issued May 21, 2009.

The proposed permitting of the emergency generator is eligible for a G60-C General Permit registration, i.e., it does meet the five (5) conditions given in 2.31 of G60-C and given below:

- a. The emergency generator(s) is not a major source as defined in 45CSR14, 45CSR19 or 45CSR30;
- b. The emergency generator(s) is not subject to 45CSR14, 45CSR15, 45CSR19, 45CSR25, 45CSR 27, or 45CSR34;
- c. Each emergency generator is to be operated 500 hours per year or less;
- d. The emergency generator(s) is not located in, nor will it (they) significantly impact, an area which has been determined to be a nonattainment area;
- e. The emergency generator(s) does not require an individual air quality permit review process and/or individual permit provisions to address the emission of a regulated pollutant or to incorporate regulatory requirements other than those established by General Permit G60-C.

Applicable Sections

All registered facilities under the Class II General Permit G60-C are subject to **Sections 1.0, 2.0, 3.0, and 4.0**. This is stated at the top of page 3 in the general permit registration.

WMH (in Attachment G: "General Permit G60-C Registration Section Applicability Form,") selected the following sections of G60-C as seeking registration under:

- WMH's generator engine is a Reciprocating Internal Combustion Engine (R.I.C.E.) and therefore is subject to **Section 5** of the Class II General Permit G60-C. The Section 5 box in the general permit registration (Attachment G) was "Xed" by WMH.

[Section 5 gives the basic requirements for any R.I.C.E. and is always checked regardless if the engine is subject to NSPS or not. G60-C (nor G65-C) does not cover facilities subject to 40 CFR 63, Subpart ZZZZ, "National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines" which gives the requirements for stationary engines at major sources of HAP.]

- The generator engine will burn diesel fuel which is stored in a 5,000 gallon, above-ground tank (which also supplies the hospital's dual-fired boilers). The generator also has its own 100 gallon diesel fuel day tank.

The **Section 6** box (in the permit application, Attachment G) was "Xed" by WMH, but according to G60-C, **Section 6.1.1: tanks that are less than 20,000 gallons should not be permitted emissions, i.e., WMH's diesel storage tanks are too small to have permitable emissions.**

The generator engine is diesel fueled, but is not subject to 40CFR60 Subpart III entitled "Standards of Performance for Stationary Compression Ignition Internal Combustion Engines" because the engine was manufactured before April 2, 2006. WMH did not check the **Section 7** box in Attachment G.

According to Kohler: The generator set (Model 500REOZVC) is "Tier 2 EPA-Certified for Stationary Emergency Applications." This is found in the permit application under "Other Supporting Documentation."

The generator engine (is diesel-fueled and) does not burn gasoline or propane. For that reason, the engine is not subject to 40 CFR 60, Subpart JJJJ entitled "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines." The **Section 8** box in Attachment G was (correctly) not "Xed" by WMH.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Maximum controlled emissions from WMH's emergency generator engine are summarized below. The G60-C076 registration limits the facility to 500 hours per year of operation.

Table 2: Emissions Rates for WMH's 565 kW Emergency Generator (EG-1).						
Reference	Pollutant	Emission Factor		Emissions		
		(g/kW-hr)	(lb/hp-hr)	(lb/hr)	Annual	
					Restricted (tpy) ⁽⁶⁾	Unrestricted (tpy) ⁽⁷⁾
⁽¹⁾ Engine Certification	⁽³⁾ Nitrogen Oxide (NOx)	6.08	---	7.57	1.89	33.2
	Carbon Monoxide (CO)	3.5	---	4.36	1.09	19.1
	⁽³⁾ Volatile Organic Compounds (VOC)	0.32	---	0.40	0.10	1.7
⁽²⁾ AP-42	Sulfur Dioxide (SO ₂)	2.46	----	3.06	0.77	13.4
⁽¹⁾ Engine Certification	PM ₁₀	0.20	----	0.25	0.06	1.1
⁽⁵⁾ AP-42	Formaldehyde	7.89 x 10 ⁻⁵ (lb/MMBtu)	----	⁽⁸⁾ 0.000596	0.000149	0.00261
	Total HAP	----	----	0.01	0.003	0.05

(1) Emission factors for Tier 2 Certified Engines > 560 kW from 40 CFR 80.112.
(2) Emission factor from AP-42, Section 3.4, Tables 3.4-1 and 3.4-2.
(3) The NMHC+NOx Tier2 emission standard has been divided into 95% NOx and 5% VOC.
(4) Sulfur content of diesel fuel 0.5%. Sulfur content of diesel fuel is < 0.5%, per the SDS.
(5) HAP emission factor from AP-42, Section 3.4, Table 3.4-3.
(6) Annual emission rate Restricted based on operating 500 hr/yr.
(7) Annual emission rate Unrestricted based on operating 8,760 hr/yr.
(8) Formaldehyde (lb/hr) = Emission Factor (kg/mmBtu) x 2.205 lb/kg x Heat Content of Fuel (mmBtu/gal) x Oil Firing Rate (gal/hr); Heat Content of Diesel = 140,000 But/gal; Diesel Oil Firing Rate = 54 gal/hr.

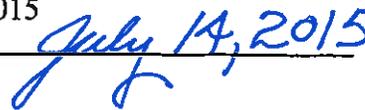
RECOMMENDATION TO DIRECTOR

WMH's request to construct and operate an emergency generator at their Williamson, Mingo County, WV facility meets the requirements of General Permit G60-C and all applicable rules and therefore WMH should be granted said General Permit Registration G60-C076.


John Legg, Permit Writer

July 14, 2015

Date



(1)
40 CFR 80.112.

Table 1.—Emission Standards (g/kW-hr)

Rated Power (kW)	Tier	Model Year ¹	NOx	HC	NMHC + NOx	CO	PM
kW<8	Tier 1	2000	—	—	10.5	8.0	1.0
	Tier 2	2005	—	—	7.5	8.0	0.80
8≤kW<19	Tier 1	2000	—	—	9.5	6.6	0.80
	Tier 2	2005	—	—	7.5	6.6	0.80
19≤kW<37	Tier 1	1999	—	—	9.5	5.5	0.80
	Tier 2	2004	—	—	7.5	5.5	0.60
37≤kW<75	Tier 1	1998	9.2	—	—	—	—
	Tier 2	2004	—	—	7.5	5.0	0.40
	Tier 3	2008	—	—	4.7	5.0	
75≤kW<130	Tier 1	1997	9.2	—	—	—	—
	Tier 2	2003	—	—	6.6	5.0	0.30
	Tier 3	2007	—	—	4.0	5.0	
130≤kW<225	Tier 1	1996	9.2	1.3	—	11.4	0.54
	Tier 2	2003	—	—	6.6	3.5	0.20
	Tier 3	2006	—	—	4.0	3.5	
225≤kW<450	Tier 1	1996	9.2	1.3	—	11.4	0.54
	Tier 2	2001	—	—	6.4	3.5	0.20
	Tier 3	2006	—	—	4.0	3.5	
450≤kW≤560	Tier 1	1996	9.2	1.3	—	11.4	0.54
	Tier 2	2002	—	—	6.4	3.5	0.20
	Tier 3	2006	—	—	4.0	3.5	
kW>560	Tier 1	2000	9.2	1.3	—	11.4	0.54
	Tier 2	2006	—	—	6.4	3.5	0.20

¹ The model years listed indicate the model years for which the specified tier of standards take effect.

(2) (4)

Table 3.4-1. GASEOUS EMISSION FACTORS FOR LARGE STATIONARY DIESEL AND ALL STATIONARY DUAL-FUEL ENGINES^a

Pollutant	Diesel Fuel (SCC 2-02-004-01)			Dual Fuel ^b (SCC 2-02-004-02)		
	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	EMISSION FACTOR RATING
NO _x						
Uncontrolled	0.024	3.2	B	0.018	2.7	D
Controlled	0.013 ^c	1.9 ^c	B	ND	ND	NA
CO	5.5 E-03	0.85	C	7.5 E-03	1.16	D
SO _x ^d	8.09 E-03S ₁	1.01S ₁	B	4.06 E-04S ₁ + 9.57 E-03S ₂	0.05S ₁ + 0.895S ₂	B
CO ₂ ^e	1.16	165	B	0.772	110	B
PM	0.0007 ^c	0.1 ^c	B	ND	ND	NA
TOC (as CH ₄)	7.05 E-04	0.09	C	5.29 E-03	0.8	D
Methane	f	f	E	3.97 E-03	0.6	E
Nonmethane	f	f	E	1.32 E-03	0.2 ^g	E

^a Based on uncontrolled levels for each fuel, from References 2,6-7. When necessary, the average heating value of diesel was assumed to be 19,300 Btu/lb with a density of 7.1 lb/gallon. The power output and fuel input values were averaged independently from each other, because of the use of actual brake-specific fuel consumption (BSFC) values for each data point and of the use of data possibly sufficient to calculate only 1 of the 2 emission factors (e. g., enough information to calculate lb/MMBtu, but not lb/hp-hr). Factors are based on averages across all manufacturers and duty cycles. The actual emissions from a particular engine or manufacturer could vary considerably from these levels. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code.

^b Dual fuel assumes 95% natural gas and 5% diesel fuel.

^c References 8-26. Controlled NO_x is by ignition timing retard.

^d Assumes that all sulfur in the fuel is converted to SO₂. S₁ = % sulfur in fuel oil; S₂ = % sulfur in natural gas. For example, if sulfur content is 1.5%, then S = 1.5.

^e Assumes 100% conversion of carbon in fuel to CO₂ with 87 weight % carbon in diesel, 70 weight % carbon in natural gas, dual-fuel mixture of 5% diesel with 95% natural gas, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and natural gas heating value of 1050 Btu/scf.

^f Based on data from 1 engine, TOC is by weight 9% methane and 91% nonmethane.

^g Assumes that nonmethane organic compounds are 25% of TOC emissions from dual-fuel engines. Molecular weight of nonmethane gas stream is assumed to be that of methane.

$$\frac{8.09 \times 10^{-3} \text{ lb}}{\text{hp hr}} (0.5) \times \frac{453.5929 \text{ gm}}{\text{lb}} \times \frac{758 \text{ hp}}{565 \text{ kW}} = 2.46 \frac{\text{g}}{\text{hr}}$$

(2)

Table 3.4-2. PARTICULATE AND PARTICLE-SIZING
EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES^a

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Filterable particulate ^b	
< 1 μm	0.0478
< 3 μm	0.0479
< 10 μm	0.0496
Total filterable particulate	0.0620
Condensable particulate	0.0077
Total PM-10 ^c	0.0573
Total particulate ^d	0.0697

^a Based on 1 uncontrolled diesel engine from Reference 6. Source Classification Code 2-02-004-01. The data for the particulate emissions were collected using Method 5, and the particle size distributions were collected using a Source Assessment Sampling System. To convert from lb/MMBtu to ng/J, multiply by 430. PM-10 = particulate matter \leq 10 micrometers (μm) aerometric diameter.

^b Particle size is expressed as aerodynamic diameter.

^c Total PM-10 is the sum of filterable particulate less than 10 μm aerodynamic diameter and condensable particulate.

^d Total particulate is the sum of the total filterable particulate and condensable particulate.

(5)

Table 3.4-3. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES^a

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Benzene ^b	7.76 E-04
Toluene ^b	2.81 E-04
Xylenes ^b	1.93 E-04
Propylene	2.79 E-03
Formaldehyde ^b	7.89 E-05
Acetaldehyde ^b	2.52 E-05
Acrolein ^b	7.88 E-06

^aBased on 1 uncontrolled diesel engine from Reference 7. Source Classification Code 2-02-004-01. Not enough information to calculate the output-specific emission factors of lb/hp-hr. To convert from lb/MMBtu to ng/J, multiply by 430.

^bHazardous air pollutant listed in the *Clean Air Act*.