



**west virginia department of environmental protection**

Division of Air Quality  
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Earl Ray Tomblin, Governor  
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**ENGINEERING EVALUATION / FACT SHEET**

**BACKGROUND INFORMATION**

Application No.: G65-C552 (Class I Emergency Generator)  
Plant ID No.: 033-00256  
Applicant: Dominion Transmission, Inc. (Dominion)  
Facility Name: Bridgeport General Office Building  
Location: 925 White Oaks Blvd., Bridgeport, Harrison County, WV  
Mailing Address: 925 White Oaks Blvd., Bridgeport, WV 26330  
SIC Code: 8741 - Management Services  
NAICS Code: 551114 - Corporate, Subsidiary, and Regional Managing Offices  
Application Type: Construction  
Received Date: March 20, 2015  
Assigned Date: March 27, 2015  
Engineer Assigned: John Legg  
Fee Amount: \$250.00  
Date Fee Received: March 27, 2015  
Complete Date: March 27, 2015  
Due Date: March 9, 2015  
UTM's: Easting: 566.27 km Northing: 4,354.42 km Zone: 17  
Latitude: 39.336 Longitude: -80.231  
Description: Construction/installation of a natural gas-fueled Cummins GTA50 (750kW/1,098 hp) emergency generator to be used to produce electrical power in the event of an electrical outage at Dominion's Bridgeport General Office located in Bridgeport, WV. Generator/engine equipped with a rich burn selective catalytic reduction (SCR) air pollution control device (APCD). Note that this Class I General Permit required no public notice.

**BACKGROUND INFORMATION**

On March 20, 2015, the Dominion submitted application G65-C552 for the construction of a natural gas-fired Cummins (750 kW/1,098 hp) emergency generator. Dominion's application fee (\$250.00) was received on March 27, 2015. The new emergency generator is to be constructed at Dominion's Bridgeport General Office located at 925 White Oaks Blvd. Bridgeport, WV 26330.

**PROCESS DESCRIPTION**

The emergency generator will be operated in the event of a power failure or during maintenance/testing of the generator. Under the G65-C general registration, the generator/engine will be allowed to operation a maximum of 500 hours per year.

**Table 1: Information on Emergency Generator Set/Engine (1) to be Installed at Dominion’s Bridgeport General Office Building located in Bridgeport, Harrison County, WV.**

Emergency Generator Engine EG-1		
Source ID No.	EG-1	
Generator Manufacturer	Cummins	
Generator Model	Npower GF-series	
Engine Manufacturer	Cummins	
Engine Model	GTA50 CC (750kW)	
Engine Manufactured Date	8/2014	
Manufacturer’s Rated hp/rpm	1,098/1800	
Installation Date	2015	
Is this a Certified Stationary Spark Ignition Engine according to 40 CFR 60 Subpart JJJJ?	No	
Engine Type	RB4S (Rich Burn 4 Stroke)	
APCD Type	Rich Burn with Selective Catalytic Reduction (SCR)	
	Catalyst Converter System	MIRATECH
	Catalyst Model	SP14812 NX-14-08F-EN1
	Catalyst Dimensions	12.933" Dia. X 2.933" THK
	Quantity of Elements Per Engine	2
	Exhaust Temperature Limits	750-1250°F (catalyst inlet) 1350°F (catalyst outlet)
	Reduction (%)	0% - CO 0% - NMHC 77% - NOx

**Table 1: Information on Emergency Generator Set/Engine (1) to be Installed at Dominion's Bridgeport General Office Building located in Bridgeport, Harrison County, WV.**

Emergency Generator Engine EG-1	
Fuel Type	Pipeline Quality Natural Gas (PQ)
H <sub>2</sub> S (gr/100 scf)	20 (tariff)
Operating Hours	≤ 500 hr/yr
BSFC (Btu/bhp-hr)	9,900 (worst case)
Fuel Input	10.87 MM Btu/hr
Fuel Throughput	10,870 ft <sup>3</sup> /hr
	5.44 MM ft <sup>3</sup> /yr
EPA Certificate #	Engine No Certified

### **SITE INSPECTION**

The facility's location is available to DAQ Enforcement who may or may not choose to inspect the facility in the future.

According to the application (General Permit Registration Section, entry 14A, page 2 of 5) the site is located at:

I-79 to Exit 124 which is Jerry Dove Drive, WV-279. Turn West on WV-279 Jerry Dove Drive towards the hospital. Go approximately 0.4 miles and turn right onto White Oaks Blvd. Continue approximately 0.5 miles to the end of White Oaks Blvd. Dominion is the last building on the left.

### **ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER**

The writer checked Dominion's emissions calculations and found them to be corrected. They are summarized below in Table 2.

**Table 2: Emissions from Dominion's Emergency Generator Engine to be Installed at their Bridgeport General Office Building located in Harrison County, WV.**

Pollutant		Emission Factors	(lb/hr) <sup>(3)</sup>	(ton/500 hr)	
NO <sub>x</sub>	Controlled (After SCR; 77% Reduction)	2.00 <sup>(1)</sup>	(g/bhp-hr)	4.84	1.21
	Uncontrolled	8.70 <sup>(1)</sup>		21.06	5.27
Carbon Monoxide (CO)	Uncontrolled	1.10 <sup>(1)</sup>		2.66	0.67
Volatile Organic Compounds (VOC)		0.50 <sup>(1)</sup>		1.21	0.30
SO <sub>2</sub>		0.000588 <sup>(4)</sup>	(lb/MM Btu)	0.00639	0.00160
PM <sub>10</sub>		0.01941 <sup>(4) (5)</sup>		0.10	0.03
Formaldehyde		0.0205 <sup>(4)</sup>		0.023	0.06
Benzene		0.00158 <sup>(4)</sup>		0.0172	0.0043
Toluene		0.000558 <sup>(4)</sup>		0.00607	0.00152
Xylene		0.000195 <sup>(4)</sup>		0.00212	0.00053
Ethyl Benzene		0.0000248 <sup>(4)</sup>		0.00027	0.000068
Total HAPs		—		1.12	0.28
<p>(1) Catalyst Converter System Manufacturer: MIRATECH.  (2) Engine Manufacturer's data (Cummin) at a Standby Power of 50% Load.  (3) lb/hr = g/hp-hr X 1,098 hp X 1lb/453.59 g; where the emergency generator engine is rated at 1,098 hp, or lb/hr = lb/MM Btu X 1,000 Btu/ft<sup>3</sup> X 10,870 ft<sup>3</sup>/hr; where the natural gas combustion rate is 10,870 ft<sup>3</sup>/hr.  (4) From AP-42, Section 3.2., "Natural Gas-Fired Reciprocating Engines," Table 3.2-3 "Uncontrolled Emission Factors for Four Stroke Rich Burn (4SRB) Engines."  (5) PM10 = Filterable + Condensable = (0.0095 + 0.00991) lb/MM Btu = 0.01941 lb/MM Btu.</p>					

**GENERAL PERMIT ELIGIBILITY**

The construction and operation of the engine/generator set meets the applicability requirements as specified in the Class I General Permit G65-C (Section 2.3.1) issued May 21, 2009. Therefore the facility is subject to Sections 1, 2, 3, and 4 (of the Class I General Permit G65-C) and this is stated at the top of page 2 in the general permit registration for G65-C545.

The generator engine is considered to be a reciprocating Internal Combustion Engines (R.I.C.E.), i.e., Section 5 of the Class I General Permit (G65-C) applies and this box is checked at the top of the general permit registration for G65-C545.

G65-C552  
Dominion Transmission, Inc.  
General Office Building  
Bridgeport, Harrison County, WV

The generator is fueled by natural gas delivered from a pipeline and therefore does not require a fuel storage tank. Because of this, Section 6 (Tanks) of the Class I General Permit (G65-C) does not apply and the box is not checked as the top of the general permit registration for G65-C545.

The generator engine is not subject to 40 CFR 60 Subpart IIII because the engine is not a compression ignition engine burning fuel oil, i.e., Section 7 of the Class I General Permit (G65-C) does not apply and the box is not checked at the top of page 2 in the general permit registration for G65-C545.

The generator engine is subject to 40 CFR 60 Subpart JJJJ because the engine is a spark ignition engine, i.e., the indicator box for Section 8 (40CFR60 Subpart JJJJ) is checked in the general registration G65-C545.

### **TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS**

Formaldehyde is emitted at very low levels from the combustion of natural gas:

Formaldehyde, a colorless, pungent-smelling gas, can cause watery eyes, burning sensations in the eyes and throat, nausea, and difficulty in breathing in some humans exposed at elevated levels (above 0.1 parts per million). High concentrations may trigger attacks in people with asthma. There is evidence that some people can develop a sensitivity to formaldehyde. It has also been shown to cause cancer in animals and may cause cancer in humans. Health effects include eye, nose, and throat irritation; wheezing and coughing; fatigue; skin rash; severe allergic reactions. May cause cancer. May also cause other effects listed under "organic gases."

Benzene, ethyl-benzene, and toluene are also emitted at very low levels from the combustion of natural gas.

### **RECOMMENDATION TO DIRECTOR**

Dominion's request for a permit for the installation and operation of a 750 kW emergency generator at their General Office Building located at 925 White Oaks Blvd., Bridgeport, Harrison County, WV 26330 meets the requirements of General Permit G65-C and all applicable rules, and therefore should be granted said General Permit Registration G65-C552.

  
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John Legg, Permit Writer

May 14, 2015  
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Date

G65-C552  
Dominion Transmission, Inc.  
General Office Building  
Bridgeport, Harrison County, WV

**Attachment 1**

**AP-42 Table 3.2-3**

**Uncontrolled Emission Factors for Four Stroke Rich Burn (4SRB) Engines**

Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN  
 ENGINES<sup>a</sup>  
 (SCC 2-02-002-53)

Pollutant	Emission Factor (lb/MMBtu) <sup>b</sup> (fuel input)	Emission Factor Rating
Criteria Pollutants and Greenhouse Gases		
NO <sub>x</sub> <sup>c</sup> 90 - 105% Load	2.21 E+00	A
NO <sub>x</sub> <sup>c</sup> <90% Load	2.27 E+00	C
CO <sup>c</sup> 90 - 105% Load	3.72 E+00	A
CO <sup>c</sup> <90% Load	3.51 E+00	C
CO <sub>2</sub> <sup>d</sup>	1.10 E+02	A
SO <sub>2</sub> <sup>e</sup>	5.88 E-04	A
TOC <sup>f</sup>	3.58 E-01	C
Methane <sup>g</sup>	2.30 E-01	C
VOC <sup>h</sup>	2.96 E-02	C
PM10 (filterable) <sup>i,j</sup>	9.50 E-03	E
PM2.5 (filterable) <sup>j</sup>	9.50 E-03	E
PM Condensable <sup>k</sup>	9.91 E-03	E
Trace Organic Compounds		
1,1,2,2-Tetrachloroethane <sup>l</sup>	2.53 E-05	C
1,1,2-Trichloroethane <sup>l</sup>	<1.53 E-05	E
1,1-Dichloroethane	<1.13 E-05	E
1,2-Dichloroethane	<1.13 E-05	E
1,2-Dichloropropane	<1.30 E-05	E
1,3-Butadiene <sup>l</sup>	6.63 E-04	D
1,3-Dichloropropene <sup>l</sup>	<1.27 E-05	E
Acetaldehyde <sup>l,m</sup>	2.79 E-03	C
Acrolein <sup>l,m</sup>	2.63 E-03	C
Benzene <sup>l</sup>	1.58 E-03	B
Butyr/isobutyraldehyde	4.86 E-05	D
Carbon Tetrachloride <sup>l</sup>	<1.77 E-05	E

Table 3.2-3. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE RICH-BURN ENGINES  
(Concluded)

Pollutant	Emission Factor (lb/MMBtu) <sup>b</sup> (fuel input)	Emission Factor Rating
Chlorobenzene <sup>1</sup>	<1.29 E-05	E
Chloroform <sup>1</sup>	<1.37 E-05	E
Ethane <sup>n</sup>	7.04 E-02	C
Ethylbenzene <sup>1</sup>	<2.48 E-05	E
Ethylene Dibromide <sup>1</sup>	<2.13 E-05	E
Formaldehyde <sup>1,m</sup>	2.05 E-02	A
Methanol <sup>1</sup>	3.06 E-03	D
Methylene Chloride <sup>1</sup>	4.12 E-05	C
Naphthalene <sup>1</sup>	<9.71 E-05	E
PAH <sup>1</sup>	1.41 E-04	D
Styrene <sup>1</sup>	<1.19 E-05	E
Toluene <sup>1</sup>	5.58 E-04	A
Vinyl Chloride <sup>1</sup>	<7.18 E-06	E
Xylene <sup>1</sup>	1.95 E-04	A

<sup>a</sup> Reference 7. Factors represent uncontrolled levels. For NO<sub>x</sub>, CO, and PM-10, "uncontrolled" means no combustion or add-on controls; however, the factor may include turbocharged units. For all other pollutants, "uncontrolled" means no oxidation control; the data set may include units with control techniques used for NO<sub>x</sub> control, such as PCC and SCR for lean burn engines, and PSC for rich burn engines. Factors are based on large population of engines. Factors are for engines at all loads, except as indicated. SCC = Source Classification Code. TOC = Total Organic Compounds. PM10 = Particulate Matter ≤ 10 microns (μm) aerodynamic diameter. A "<" sign in front of a factor means that the corresponding emission factor is based on one-half of the method detection limit.

<sup>b</sup> Emission factors were calculated in units of (lb/MMBtu) based on procedures in EPA Method 19. To convert from (lb/MMBtu) to (lb/10<sup>6</sup> scf), multiply by the heat content of the fuel. If the heat content is not available, use 1020 Btu/scf. To convert from (lb/MMBtu) to (lb/hp-hr) use the following equation:

$$\text{lb/hp-hr} = \text{lb/MMBtu} \times \text{heat input, MMBtu/hr} \div \text{operating HP, 1/hp}$$

<sup>c</sup> Emission tests with unreported load conditions were not included in the data set.

<sup>d</sup> Based on 99.5% conversion of the fuel carbon to CO<sub>2</sub>. CO<sub>2</sub> [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to CO<sub>2</sub>,

- C = carbon content of fuel by weight (0.75), D = density of fuel,  $4.1 \text{ E}+04 \text{ lb}/10^6 \text{ scf}$ , and h = heating value of natural gas (assume 1020 Btu/scf at 60°F).
- <sup>e</sup> Based on 100% conversion of fuel sulfur to SO<sub>2</sub>. Assumes sulfur content in natural gas of 2,000 gr/10<sup>6</sup> scf.
  - <sup>f</sup> Emission factor for TOC is based on measured emission levels from 6 source tests.
  - <sup>g</sup> Emission factor for methane is determined by subtracting the VOC and ethane emission factors from the TOC emission factor.
  - <sup>h</sup> VOC emission factor is based on the sum of the emission factors for all speciated organic compounds. Methane and ethane emissions were not measured for this engine category.
  - <sup>i</sup> No data were available for uncontrolled engines. PM10 emissions are for engines equipped with a PCC.
  - <sup>j</sup> Considered  $\leq 1 \mu\text{m}$  in aerodynamic diameter. Therefore, for filterable PM emissions, PM10(filterable) = PM2.5(filterable).
  - <sup>k</sup> No data were available for condensable emissions. The presented emission factor reflects emissions from 4SLB engines.
  - <sup>l</sup> Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.
  - <sup>m</sup> For rich-burn engines, no interference is suspected in quantifying aldehyde emissions. The presented emission factors are based on FTIR and CARB 430 emissions data measurements.
  - <sup>n</sup> Ethane emission factor is determined by subtracting the VOC emission factor from the NMHC emission factor.