ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

April 18, 2014

SUBJECT: **Cellco Partnership, dba Verizon Wireless**
18 Abele Road
Bridgeville, PA 15017
Allegheny County

Operating Permit No. 0867

TO: Sandra L. Etzel
Chief Engineer

FROM: Melissa Jativa
Air Quality Engineer

FACILITY DESCRIPTION:

Cellco Partnership, dba Verizon Wireless owns and operates its Bridgeville Mobile Switching Center (MSC) located at 18 Abele Road in Bridgeville, PA. The facility is composed of one 600 kW emergency diesel generator, two (2) 750 kW emergency diesel generator, and one 60 kW emergency diesel generator. The facility is a minor source of nitrogen oxides (NO_X), carbon monoxide (CO), particulate matter, particulate matter < 10 microns in diameter (PM-10), sulfur dioxide (SO_2), volatile organic Compounds (VOCs) and hazardous air pollutants (HAPs) as defined in section 2101.20 of Article XXI.

PERMIT APPLICATION COMPONENTS:

1. Installation Permit application #0867-I001, dated June 13, 2013 (application was for both the installation and operating permit).

EMISSION SOURCES:

I.D.	SOURCE DESCRIPTION	CONTROL DEVICE(S)	MAXIMUM CAPACITY	FUEL/RAW MATERIAL	STACK I.D.
B001	Emergency Generator #1 Spectrum Detroit 600DS	t turbocharger, aftercooler	600 kW	Diesel Fuel	S001
B002	Emergency Generator #2 Katolight D750FRX4	turbocharger, aftercooler	750 kW	Diesel Fuel	S002A & S002B
B003	Emergency Generator #3 Katolight D60FGJ4	turbocharger, aftercooler	60 kW	Diesel Fuel	S003
B004	Emergency Generator #4 MTU 750-XC6DT2	turbocharger, aftercooler	750 kW	Diesel Fuel	S004 & S005

METHOD OF DEMONSTRATING COMPLIANCE:

Compliance with the emission standards set in this permit will be demonstrated by recording emergency generator fuel consumption, operating hours, and maintenance activities, and maintaining fuel certifications from fuel suppliers.

See Operating Permit No. 0867 for the specific conditions for determining compliance with the applicable requirements.

EMISSION CALCULATIONS

Potential to emit for generators is based on 500 hours per year of operation as stated in John S. Seitz memo dated September 6, 1995.

B001 – Emergency Generator #1

Heating Rate:	600 kW
Fuel rate:	47.9 gal/hr
Fuel density:	7.50 lb/gal
Sulfur content:	0.05%
Operation:	500 hrs/year

Emissions of all pollutants except PM and SO_X are based on the manufacturer's "Not to Exceed" data. Emissions of PM are based on Article XXI emission factor. All PM was assumed to be PM_{10}; all PM_{10} was assumed to be $PM_{2.5}$.

Emissions of SO_X (as SO_2) are based on the following equation which assumes all sulfur in the fuel is converted to SO_2:

$$SO_2 \text{ (lb/hr)} = 0.01998 \times \text{Fuel Rate (lb/hr)} \times \%_wS$$
$$SO_2 = 0.01998 \times 47.9 \text{ gal/hr} \times 7.50 \text{ lb/gal} \times 0.05 = 0.36 \text{ lb/hr } SO_2$$

Where $0.01998 = MW_{SO2} \div (MW_S \times 100) = 64.065 \div (32.066 \times 100)$.

Emergency Generator B001 Emissions

Pollutant	Emissions Factor		Short-Term Emissions (lb/hr)	Long-Term Emissions (tpy)
PM	0.28 lb/MMBtu	Article XXI, §2104.02.a.1.B	1.84	0.46
PM_{10}	0.28 lb/MMBtu	Article XXI, §2104.02.a.1.B	1.84	0.46
$PM_{2.5}$	0.28 lb/MMBtu	Article XXI, §2104.02.a.1.B	1.84	0.46
NO_X	8880 g/hr	Manufacturer Guarantee	19.58	4.89
CO	3240 g/hr	Manufacturer Guarantee	7.14	1.79
SO_X		See equation above	0.36	0.09
VOC	166 g/hr	Manufacturer Guarantee	0.37	0.09

GHG Mass and CO_2e Emissions:
Calculations of greenhouse gases (GHG) and CO_2-equivalent (CO_2e) emissions are based on the methodology found in 40 CFR Part 98, Subpart C, §98.33(a)(1), and factors found in Table C-1 and Table C-2 of that subpart. According to 40 CFR, §98.30, GHG emissions from emergency generators are not included in the mandatory

greenhouse gas reporting rule, so estimated emissions are included here for informational purposes only.

Total rated heat input capacity of the generator = 6.562 MMBtu/hr × 500 hr/yr = 3,281 MMBtu/yr

CO_2: 3,281 MMBtu/yr × 73.96 kg/MMBtu ÷ 1,000 kg/metric ton = 242.66 metric tons/year
NO_2: 3,281 MMBtu/yr × 6×10^{-4} kg/MMBtu ÷ 1,000 kg/metric ton = 0.002 metric tons/year
CH_4: 3,281 MMBtu/yr × 3×10^{-3} kg/MMBtu ÷ 1,000 kg/metric ton = 0.010 metric tons/year

CO_2e = (242.66 × 1) + (0.002 × 310) + (0.010 × 21) = **243.48 metric tons/year of CO_2e**
= 268.32 tpy of CO_2e

B002 – Emergency Generator #2

Heating Rate:	750 kW
Fuel rate:	51.7 gal/hr
Fuel density:	7.50 lb/gal
Sulfur content:	0.05%
Operation:	500 hrs/year

Emissions of all pollutants except SO_X are based on the manufacturer's "Not to Exceed" data. Emissions of SO_X (as SO_2) are based on the following equation which assumes all sulfur in the fuel is converted to SO_2:

$$SO_2 \text{ (lb/hr)} = 0.01998 \times \text{Fuel Rate (lb/hr)} \times \%_wS$$
$$SO_2 = 0.01998 \times 51.7 \text{ gal/hr} \times 7.50 \text{ lb/gal} \times 0.05 = 0.39 \text{ lb/hr } SO_2$$

Where $0.01998 = MW_{SO2} \div (MW_S \times 100) = 64.065 \div (32.066 \times 100)$.

Emergency Generator B002 Emissions

Pollutant	Emissions Factor		Short-Term Emissions (lb/hr)	Long-Term Emissions (tpy)
PM	53.9 g/hr	Manufacturer Guarantee	0.12	0.03
PM_{10}	53.9 g/hr	Manufacturer Guarantee	0.12	0.03
$PM_{2.5}$	53.9 g/hr	Manufacturer Guarantee	0.12	0.03
NO_X	6420 g/hr	Manufacturer Guarantee	14.15	3.54
CO	1430 g/hr	Manufacturer Guarantee	3.15	0.79
SO_X		See equation above	0.39	0.10
VOC	197 g/hr	Manufacturer Guarantee	0.43	0.11

GHG Mass and CO_2e Emissions:
GHG emissions from emergency generators are not included in the mandatory greenhouse gas reporting rule, so estimated emissions are included here for informational purposes only.

Total rated heat input capacity of the generator = 7.083 MMBtu/hr × 500 hr/yr = 3,541 MMBtu/yr

CO_2: 3,541 MMBtu/yr × 73.96 kg/MMBtu ÷ 1,000 kg/metric ton = 261.89 metric tons/year
NO_2: 3,541 MMBtu/yr × 6×10^{-4} kg/MMBtu ÷ 1,000 kg/metric ton = 0.002 metric tons/year
CH_4: 3,541 MMBtu/yr × 3×10^{-3} kg/MMBtu ÷ 1,000 kg/metric ton = 0.011metric tons/year

$CO_2e = (261.89 \times 1) + (0.002 \times 310) + (0.011 \times 21)$ = **262.77 metric tons/year of CO_2e**
= **289.58 tpy of CO_2e**

B003 – Emergency Generator #3

Heating Rate:	60 kW
Fuel rate:	4.9 gal/hr
Fuel density:	7.50 lb/gal
Sulfur content:	0.05%
Operation:	500 hrs/year

Emissions of all pollutants except SO_X are based on the manufacturer's "Not to Exceed" data. Emissions of SO_X (as SO_2) are based on the following equation which assumes all sulfur in the fuel is converted to SO_2:

$$SO_2 \text{ (lb/hr)} = 0.01998 \times \text{Fuel Rate (lb/hr)} \times \%_wS$$
$$SO_2 = 0.01998 \times 4.9 \text{ gal/hr} \times 7.50 \text{ lb/gal} \times 0.05 = 0.04 \text{ lb/hr } SO_2$$

Where $0.01998 = MW_{SO2} \div (MW_S \times 100) = 64.065 \div (32.066 \times 100)$.

Emergency Generator B003 Emissions

Pollutant	Emissions Factor		Short-Term Emissions (lb/hr)	Long-Term Emissions (tpy)
PM	0.2 g/kW-hr	Manufacturer Guarantee	0.03	0.01
PM_{10}	0.2 g/ kW-hr	Manufacturer Guarantee	0.03	0.01
$PM_{2.5}$	0.2 g/ kW-hr	Manufacturer Guarantee	0.03	0.01
NO_X	8 g/ kW-hr	Manufacturer Guarantee	1.31	0.33
CO	0.7 g/ kW-hr	Manufacturer Guarantee	0.11	0.03
SO_X		See equation above	0.04	0.01
VOC	0.4 g/ kW-hr	Manufacturer Guarantee	0.07	0.02

GHG Mass and CO_2e Emissions:
GHG emissions from emergency generators are not included in the mandatory greenhouse gas reporting rule, so estimated emissions are included here for informational purposes only.

Total rated heat input capacity of the generator = 0.671 MMBtu/hr × 500 hr/yr = 336 MMBtu/yr

CO_2: 336 MMBtu/yr × 73.96 kg/MMBtu ÷ 1,000 kg/metric ton = 24.85 metric tons/year
NO_2: 336 MMBtu/yr × 6×10^{-4} kg/MMBtu ÷ 1,000 kg/metric ton = 0.0002 metric tons/year
CH_4: 336 MMBtu/yr × 3×10^{-3} kg/MMBtu ÷ 1,000 kg/metric ton = 0.001metric tons/year

$CO_2e = (24.85 \times 1) + (0.0002 \times 310) + (0.001 \times 21)$ = **24.93 metric tons/year of CO_2e**
= **27.48 tpy of CO_2e**

B004 – Emergency Generator #4

Heating Rate:	750 kW
Fuel rate:	57.8 gal/hr
Fuel density:	7.50 lb/gal

Sulfur content: 0.0015%
Operation: 500 hrs/year

Emissions of all pollutants except SO_X are based on the manufacturer's "Not to Exceed" data. Emissions of SO_X (as SO_2) are based on the following equation which assumes all sulfur in the fuel is converted to SO_2:

$$SO_2 \text{ (lb/hr)} = 0.01998 \times \text{Fuel Rate (lb/hr)} \times \%_wS$$
$$SO_2 = 0.01998 \times 57.8 \text{ gal/hr} \times 7.50 \text{ lb/gal} \times 0.0015 = 0.013 \text{ lb/hr } SO_2$$

Where $0.01998 = MW_{SO2} \div (MW_S \times 100) = 64.065 \div (32.066 \times 100)$.

Emergency Generator B004 Emissions

Pollutant	Emissions Factor		Short-Term Emissions (lb/hr)	Long-Term Emissions (tpy)
PM	0.166 g/kW-hr	Manufacturer Guarantee	0.08	0.02
PM_{10}	0.166 g/ kW-hr	Manufacturer Guarantee	0.08	0.02
$PM_{2.5}$	0.166 g/ kW-hr	Manufacturer Guarantee	0.08	0.02
NO_X	6.233 g/ kW-hr	Manufacturer Guarantee	12.23	3.06
CO	0.59 g/ kW-hr	Manufacturer Guarantee	1.16	0.29
SO_X		See equation above	0.013	0.003
VOC	1.29 g/ kW-hr	Manufacturer Guarantee	0.25	0.06

GHG Mass and CO_2e Emissions:
GHG emissions from emergency generators are not included in the mandatory greenhouse gas reporting rule, so estimated emissions are included here for informational purposes only.

Total rated heat input capacity of the generator = 7.919 MMBtu/hr × 500 hr/yr = 3,960 MMBtu/yr

CO_2: 3,960 MMBtu/yr × 73.96 kg/MMBtu ÷ 1,000 kg/metric ton = 292.88 metric tons/year
NO_2: 3,960 MMBtu/yr × 6×10^{-4} kg/MMBtu ÷ 1,000 kg/metric ton = 0.002 metric tons/year
CH_4: 3,960 MMBtu/yr × 3×10^{-3} kg/MMBtu ÷ 1,000 kg/metric ton = 0.012 metric tons/year

$CO_2e = (292.88 \times 1) + (0.002 \times 310) + (0.012 \times 21)$ = **293.87 metric tons/year of CO_2e**
= **323.93 tpy of CO_2e**

REGULATORY APPLICABILITY:

1. **Article XXI Requirements for Issuance:**
   See Permit Application No. 0867-I001, Section 5. The requirements of Article XXI, Parts B and C for the issuance of minor modification installation permits have been met for this facility. Article XXI, Part D, Part E & Part H will have the necessary sections addressed individually.

   §2103.12.a.2.B (Standards for Issuance): Existing sources, where no limits have been established under Article XXI, are subject to Reasonably Available Control Technology (RACT) requirements. In this case, RACT will be consistent with the BACT determination performed at the time of IP 0867-I001 issuance.

   a. The Department has determined that RACT/BACT shall be:

a. The use of ultra low sulfur fuel oil with 15 ppm sulfur content for generator B004.

2. **Testing Requirements:**
No testing is required for this installation at this time. However, the Department reserves the right to require testing in the future to assure compliance with the terms and conditions of Operating Permit No. 0867.

3. **New Source Performance Standards (NSPS):**
Generator B004 is subject to 40 CFR Part 60, Subpart IIII – *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*. This includes, but is not limited to the following sections:
   - **40 CFR §60.4207(b)** – minimum fuel requirements for sulfur content and cetane index (as given in §80.510(b)).
   - **40 CFR §60.4211(a)** – minimum emissions standards (as given in §89.112).
   - **40 CFR §60.4211(c)** – engine certification.
   - **40 CFR §60.4211(e)** – operation limits for non-emergencies.
   - **40 CFR §60.4214(b)** – use of a non-resettable hour meter.

   Generators B001, B002, and B003 are not subject to 40 CFR Part 60, Subpart IIII. The generators commenced construction before July 11, 2005, before the applicability date of the NSPS and were manufactured prior to April 1, 2006.

4. **NESHAP and MACT Standards:**
Generator B004 is subject to 40 CFR Part 63, Subpart ZZZZ – *National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*. However, per §63.6595(c), the generator meets the requirements of this subpart by meeting the requirements of 60 CFR Part 60, Subpart IIII, and no further requirements of Part 63, Subpart ZZZZ apply.

5. **Risk Management Plan; CAA Section 112(r):**
The facility is not required to have a risk management plan at this time because none of the regulated chemicals exceed the thresholds in the regulation.

6. **Greenhouse Gases (40 CFR Part 98):**.
The facility is a minor source of greenhouse gas emissions based on estimated potential emissions of 910 tpy of CO_2e, which is less than the major source threshold of 100,000 tpy of CO_2e. There are presently no Title V applicable requirements for greenhouse gases. Should the facility exceed 25,000 metric tons of CO_2e in any 12-month period, the facility would be required to submit reports in accordance with 40 CFR Part 98.

7. **Emissions Inventory:**
This facility is not required to provide annual Emission Inventory reports per §2108.01.e of Article XXI because this facility does not have the potential to emit a total of:
   a) Ten (10) or more tons of any hazardous air pollutant;
   b) Twenty-five (25) or more tons of all hazardous air pollutant; or
   c) Twenty-five (25) or more tons of any other pollutant regulated under Article XXI.

EMISSIONS SUMMARY:

Verizon Bridgeville Emission Limitations

POLLUTANT	Yearly Emissions (tons/year)*
Particulate Matter	**0.52**
Particulate Matter <10µm (PM_{10})	**0.52**
Particulate Matter <2.5µm ($PM_{2.5}$)	**0.52**
Nitrogen Oxides (NO_X)	**11.82**
Sulfur Oxides (SO_X)	**0.20**
Carbon Monoxide (CO)	**2.89**
Volatile Organic Compounds (VOCs)	**0.28**
Greenhouse Gases (CO_2e)	**910**

* A year is defined as any consecutive 12-month period

RECOMMENDATION:

All applicable Federal, State, and County regulations have been addressed in the permit application. The facility is not subject to the restrictions of §2102.04.k of Article XXI because there have been no Notices of Violation issued for this or any other Verizon Company facility in Allegheny County during the last 18 months. The Operating Permit for Verizon Bridgeville should be approved with the emission limitations, terms and conditions in Operating Permit No. 0867.