

# ENGINEERING EVALUATION

Sebastopol Fire Department

Plant: 21456

Application: 24675

## BACKGROUND

The **Sebastopol Fire Department**. has applied to obtain an Authority to Construct (AC) and/or a Permit to Operate (PO) for the following equipment:

**S-1            Emergency Standby Diesel Caterpillar Generator Set Model D125-6, 2012 Certified  
2012 Caterpillar Engine Model C6.6, 2011, Perkins Engine Model 1106D-E66TA, 217 BHP, 1.49  
MMBTU/hr**

to be installed at 7425 Bodega Ave. Sebastopol, California 95472.

## EMISSIONS

The engine manufacturer certifies that hourly emissions of CO, NO<sub>x</sub>, HC and PM are all below EPA and CARB Tier 3 standards. Except for SO<sub>2</sub>, emission factors for these engines are from the Manufacturer's Performance Data sheet. SO<sub>2</sub> emissions were calculated based on the maximum allowable sulfur content (0.0015 wt% S) of diesel fuel with assumption that all of the sulfur present will be converted to SO<sub>2</sub> during the combustion process. The POC emission factor is assumed to be 5% of the manufacturer's NO<sub>x</sub> and POC (NMHC+NO<sub>x</sub>) factor based on District Policy.

### Basis:

217 hp output rating

50 hr/yr operation for testing and maintenance

10.7 gallons/hr max fuel use rate

NMHC + NO<sub>x</sub>, CO and PM<sub>10</sub> emission factors from the Manufacturer's Performance Data sheet

POC is assumed to be 5% of NMHC + NO<sub>x</sub>

NO<sub>x</sub> is assumed to be 95% of NMHC + NO<sub>x</sub>

SO<sub>2</sub> emissions are quantified based on the full conversion of 0.0015 wt% (~ 15 ppm) sulfur in the ULS diesel fuel.

The SO<sub>2</sub> emission factor was derived from EPA AP-42, Table 3.4-1.

### **Annual Emissions:**

Annual emissions are calculated based on the number of hours per year of operation for testing and maintenance.

### **Daily Emissions:**

Daily emissions are calculated to establish whether a source triggers the requirement for BACT (10 lb/highest day total source emissions for any class of pollutants). 24-hr/day of operation will be assumed since no daily limits are imposed on intermittent and unexpected operations.

Table 1

Pollutant	Emission Factor (g/hp-hr)	Annual Emissions (lb/yr)	Annual Emissions (TPY)	Max. Daily (lb/day)
NMHC+NO <sub>x</sub>	2.68			
NO <sub>x</sub>	2.55	60.8	0.0304	29.2
POC	0.134	3.20	0.00160	1.54
CO	1.34	32.0	0.0160	15.4
PM <sub>10</sub>	0.112	2.68	0.00134	1.28
SO <sub>2</sub>	0.0055	0.131	0.000657	0.63

**PLANT CUMULATIVE INCREASE**

Table 2 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-1.

Table 2

Pollutant	Current Emissions (since April 5, 1991) (TPY)	Increase with this application (TPY)	Cumulative Increase (Current + Increase) (TPY)
NOx	0.0	0.0304	0.0304
POC	0.0	0.00160	0.00160
CO	0.0	0.0160	0.0160
PM10	0.0	0.00134	0.00134
SO2	0.0	0.000657	0.000657

**TOXIC RISK SCREENING ANALYSIS**

This application required a Toxics Risk Screen because the diesel particulate emissions are greater than the toxic trigger level.

<b><u>Toxic Pollutant Emitted</u></b>	<b><u>Emission Rate (lb/yr)</u></b>	<b><u>Risk Screening Trigger (lb/yr)</u></b>
PM10 (Diesel Particulate)	2.7	0.34

S-1 meets Best Available Control Technology for toxics (TBACT) since the diesel particulate emissions are less than 0.15 g/bhp-hr. For an engine that meets the TBACT requirement, it must also pass the toxic risk screening level of less than ten in a million. Estimates of residential risk assume exposure to annual average toxic air contaminant concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Risk estimates for offsite workers assume exposure occurs 8 hours per day, 245 days per year, for 40 years. Risk estimates for students assume a higher breathing rate, and exposure is assumed to occur 10 hours per day, 36 weeks per year, for 9 years.

Based on 50 hours per year of operation, the emergency generator passed the Health Risk Screening Analysis (HRSA) completed on October 25, 2012 by the District's Toxic Evaluation Section. The source poses no significant toxic risk, since the increased cancer risk to the maximally exposed receptor (resident) is 8.1 in a million with a hazard index of 0.0029. The increased cancer risk to workers is 3.4 in a million with a hazard index of 0.0024. For the students who attend Parkside Elementary School, the increased maximum cancer risk is negligible since the facility is not allowed to operate the diesel engine for non-emergency use, including testing and maintenance between 7:30 am and 3:30 pm on days when the school is in session. Thus, in accordance with Regulation 2, Rule 5, the screen passes, since the engine meets the TBACT requirement of 0.15 g/bhp-hr limitation for particulate emission.

**STATEMENT OF COMPLIANCE**

The owner/operator of S-6 shall comply with Reg. 6, Rule 1 Particulate Matter – General Requirements and Reg. 9-1-301 (Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations). Since this engine meets TBACT for PM10 (<0.15 g/hp-hr), it is expected to comply with Reg. 6, Rule 1 Particulate Matter - General Requirements. Ultra-low sulfur diesel (15 PPM sulfur) will be used to meet the sulfur limitation of 0.5wt% in Reg. 9-1-304 as well as to minimize PM10 emissions. Because S-6 is an emergency standby generator, Reg. 9-8-110 (Inorganic Gaseous Pollutants: Nitrogen Oxides from Stationary Internal Combustion Engines) exempts the requirements for emission limits of Sections 9-8-301, 302, and 502. Allowable operating hours and the corresponding record keeping in Reg. 9-8-330 and 530 will be included in the Permit Conditions below.

**PUBLIC NOTICE AND COMMENT**

This facility is within 1000 feet from the nearest school and therefore is subject to the public notification requirements of Regulation 2-1-412. A public notice will be prepared and sent to all addresses within 1000 feet of the diesel generator set and parents and guardians of students of the following school(s):

Parkside Elementary School  
7450 Bodega Ave. Sebastopol, California 95472

A final determination on the application will be made following receipt and review of comments.

**BACT**

In accordance with Regulation 2, Rule 2, Section 301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, NO<sub>x</sub>, CO, SO<sub>2</sub> or PM<sub>10</sub>.

BACT is triggered for NO<sub>x</sub> and CO since the maximum daily emissions of these pollutants exceeds 10 lb/day.

The Emergency Diesel Engine Generator Set (S-1) is equipped with the best available control technology (BACT) for minimizing the release of air borne criteria pollutants and harmful air toxins due to fuel combustion. The criteria pollutants are nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), precursor organic compounds (POC) from unburned diesel fuel, sulfur dioxide (SO<sub>2</sub>) and particulate matter (PM<sub>10</sub>). POC from a combustion source is denoted as non-methane hydrocarbons (NMHC). All of these pollutants are briefly discussed on the District's web site at [www.baaqmd.gov](http://www.baaqmd.gov).

BACT for this source is presented in the current BAAQMD BACT/TBACT Workbook for IC Engine – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump, Document # 96.1.3, Revision 6 dated 12/22/2010. For NO<sub>x</sub> and CO, BACT 2 is the current off-road tier standard for the horsepower. BACT 1 levels do not apply for 'engines used exclusively for emergency use during involuntary loss of power' as per Reference b, Document 96.1.2 of the BAAQMD BACT Guidelines for IC Engines. Hence, the owner/operator has to meet BACT 2 limits.

S-1 meets the current tier (Tier 3) emissions standards for NO<sub>x</sub> and CO, so S-1 meets the current BACT 2 requirements.

**OFFSETS**

Offsets must be provided for any new or modified source at a facility that emits more than 10 tons/yr of POC or NO<sub>x</sub>. Based on the emission calculations above, offsets are not required for this application.

**NSPS**

The engine is subject to 40 CFR 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines because it was manufactured after April 1, 2006, as required by Section 60.4200(a)(2)(i).

The engine has a total displacement of 6.6 liters and has 6 cylinders, so each cylinder has a volume of less than 10 liters. The engine is a 2012 model year engine and is not a fire pump. Section 60.4205(b) requires these engines to comply with the emission standards in Section 60.4202, which refers to 40CFR89.112 and 40CFR89.113 for all pollutants. For engines greater than 175 hp and less than 300 hp, these standards are:

NMHC+NO<sub>x</sub>: 3.0g/hp-hr

CO: 2.6 g/hp-hr

PM: 0.15g/hp-hr

20% opacity during acceleration mode

15% opacity during lugging mode

50% opacity during peaks in acceleration or lugging mode

According to the Manufacturer's performance data, the engine will comply with the standards.

Sections 60.4206 and 60.4211(a) require that the owner/operator operate and maintain the engine according to the manufacturer's written instructions or procedures developed by the owner or operator that are approved by the engine manufacturer, over the entire life of the engine. The owner/operator is expected to comply with this requirement.

Section 60.4207(a) requires that by October 1, 2007, the owner/operator must use fuel that complies with 40 CFR 80.510(a). This means that the fuel must have a sulfur content of 500 parts per million (ppm) maximum, a cetane index of 40 or a maximum aromatic content of 35 volume percent. The owner/operator is expected to comply with this requirement because CARB diesel is required to be used in California.

Section 60.4207(b) requires that by October 1, 2010, the owner/operator must use fuel that complies with 40 CFR 80.510(b). This means that the fuel must have a sulfur content of 15 parts per million (ppm) maximum, and the same cetane index or aromatic content as above. The owner/operator is expected to comply with this requirement because CARB diesel is required to be used in California.

Section 60.4209(a) requires a non-resettable hour meter. This requirement is already in the standard permit conditions.

The engine will comply with the requirements of Section 60.4211(c) because it has been certified in accordance with 40 CFR Part 89.

The engine will comply with the requirement in Section 60.4211(e) to run for less than 100 hours per year for maintenance checks and readiness testing, and the prohibition of running for any reason other than emergency operation, maintenance, and testing because they are limited by permit condition to 50 hours per year for reliability testing and otherwise may only operate for emergencies.

The owner/operator is not required to perform tests in accordance with Section 60.4212 or 60.4213.

Section 60.4214 states that owner/operators do not have to submit an initial notification to EPA for emergency engines.

Because the engine does not have a diesel particulate filter, the owner/operator is not subject to Section 60.4214(c).

The owner/operator is required to comply with certain sections of 40 CFR 60, Subpart A, General Provisions. The owner/operator is expected to comply with this requirement.

#### **ATCM**

This diesel engine is subject to the Stationary Diesel Airborne Toxics Control Measure (ATCM) and is considered a new stationary emergency standby diesel engine since it will be installed after January 1, 2005 and is larger than 50 HP. The requirements of the ATCM will be included in the permit conditions.

#### **CEQA**

The project is considered to be ministerial under the District's CEQA regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emissions factors and therefore is not discretionary as defined by CEQA. (Permit Handbook Chapter 2.3)

#### **NESHAP**

This engine is not subject to 40 CFR 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, because it is not located at a major facility for hazardous air pollutants.

**PSD does not apply.**

**PERMIT CONDITIONS**

COND# 22850 -----

1. The owner/operator shall not exceed 50 hours per year per engine for reliability-related testing.  
[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]
2. The owner/operator shall operate each emergency standby engine only for the following purposes: to mitigate emergency conditions, for emission testing to demonstrate compliance with a District, State or Federal emission limit, or for reliability-related activities (maintenance and other testing, but excluding emission testing). Operating while mitigating emergency conditions or while emission testing to show compliance with District, State or Federal emission limits is not limited.  
[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]
3. The owner/operator shall operate each emergency standby engine only when a non-resettable totalizing meter (with a minimum display capability of 9,999 hours) that measures the hours of operation for the engine is installed, operated and properly maintained.  
[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection(e)(4)(G)(1)]
4. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 36 months from the date of entry (60 months if the facility has been issued a Title V Major Facility Review Permit or a Synthetic Minor Operating Permit). Log entries shall be retained on-site, either at a central location or at the engine's location, and made immediately available to the District staff upon request.
  - a. Hours of operation for reliability-related activities (maintenance and testing).
  - b. Hours of operation for emission testing to show compliance with emission limits.
  - c. Hours of operation (emergency).
  - d. For each emergency, the nature of the emergency condition.
  - e. Fuel usage for each engine(s).  
[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(I), (or, Regulation 2-6-501)]
5. At School and Near-School Operation: If the emergency standby engine is located on school grounds or within 500 feet of any school grounds, the following requirements shall apply: The owner/operator shall not operate each stationary emergency standby diesel-fueled engine for non-emergency use, including maintenance and testing, during the following periods:
  - a. Whenever there is a school sponsored activity (if the engine is located on school grounds)
  - b. Between 7:30 a.m. and 3:30 p.m. on days when school is in session. "School" or "School Grounds" means any public or private school used for the purposes of the education of more than 12 children in kindergarten or any of grades 1 to 12, inclusive, but does not include any private school in which education is primarily conducted in a private home(s). "School" or "School Grounds" includes any building or structure, playground, athletic field, or other areas of school property but does not include unimproved school property.  
[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(1)] or (e)(2)(B)(2)]

**RECOMMENDATION**

The District has reviewed the material contained in the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable requirements of District, state, and federal air quality-related regulations. The preliminary recommendation is to issue an Authority to Construct for the equipment listed below. However, the proposed source will be located within 1000 feet of a school, which triggers the public notification requirements of District Regulation 2-1-412.6. After the comments are received and reviewed, the District will make a final determination on the permit.

I recommend that the District initiate a public notice and consider any comments received prior to taking any final action on issuance of an Authority to Construct for the following source:

- S-1            Emergency Standby Diesel Caterpillar Generator Set Model D125-6, 2012 Certified  
                 2012 Caterpillar Engine Model C6.6, 2011, Perkins Engine Model 1106D-E66TA, 217 BHP, 1.49  
                 MMBTU/hr**

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