

**Engineering Evaluation Report
SBC/Pacific Bell, Plant #13556
Emergency Standby Generator Diesel Engine, Application #6737
February 3, 2003**

I. **Background:** SBC/Pacific Bell has applied for an Authority to Construct/Permit to Operate an emergency standby generator diesel engine:

D S-2 Emergency Standby Generator/Diesel Engine: Caterpillar 1250 kW Generator; Model 3512B DITASC, 1807.3 bhp, 3158 cubic inch displacement diesel engine

II. **Emission Calculations:**

Basis: Fuel usage: 0.0892 thousand gallons/hour
 Fuel density: 7.1 pounds/gallon
 Fuel sulfur content: 0.05 wt%
 Engine size: 1910 bhp
 Hours of operation: 1 hour/month & 1 5-hr test per year
 50 hours per year condition limit

Pollutant	Emission rate, g/bhp-hr	Emission Factor, lbs/thou gal
PM ₁₀	0.14	6.4
POC	0.28	13.0
NO _x	6.26	295.7
CO	0.84	39.8
SO _x		7.1

$$\text{SO}_2 \text{ Emissions} = (\text{Fuel Usage}) * (\text{Fuel density}) * (\text{Hours of operation}) * (\text{Sulfur Content}) * (\text{mol. wt. SO}_2 / \text{mol. wt. S})$$

$$\text{Other Emissions} = (\text{Engine size}) * (\text{Emission rate}) * (\text{Hours of operation})$$

Emission Estimates				
Pollutant	lbs/hour	lbs/day (24hrs)	lbs/yr (50hrs)	tons/yr (50hrs)
PM ₁₀	0.57	13.7	28.6	0.014
POC	1.16	27.9	58.1	0.029
NO _x	26.38	633.0	1318.8	0.659
CO	3.55	85.2	177.4	0.089
SO ₂	0.63	15.2	31.7	0.016

III. **Plant Cumulative Increase (as of April 5, 1991):**

Pollutant	Current, tpy	Proposed, tpy	New Total, tpy
PM ₁₀	0.0	0.014	0.014
POC	0.0	0.029	0.029
NO _x	0.0	0.659	0.659
CO	0.0	0.089	0.089
SO ₂	0.0	0.016	0.016

IV. Toxic Screening Analysis: For 50 hours of operation per year for reliability-related activities, the maximum cancer risk is less than ten in a million. This level of risk is acceptable, under District's Risk Management Policy (March 2, 2001).

D A. EMISSIONS: Diesel particulate emission estimates are based on 0.14 g/hp-hr for the 1910 hp engine operating 50 hours per year. The annualized diesel particulate emission rate for each engine is 4.24 E-4 g/s.

B. MODELING: The ISCST3 model was run with SCREEN3 meteorological data to determine the maximum one-hour average ground-level concentration for a unit emission rate, X/Q. The annual average concentration is estimated by applying a persistence factor of 0.1.

C. CANCER RISK: Estimates of residential risk are based on continuous 70-year exposure to annual average pollutant concentrations. For students, the risk is based on higher breathing rates for children (581 L/kg versus 286 L/kg) and an exposure for 36 weeks per year for 9 years out of a 70-year lifetime.

$$\text{Cancer risk} = (\text{annual average emission rate, g/s}) * (\text{one-hr average conc. X/Q, } (\mu\text{g/m}^3) / (\text{g/s})) * (\text{persistence factor}) * (\text{exposure adjustment factor}) * (\text{unit risk, } (\mu\text{g/m}^3)^{-1})$$

Receptor	Annual avg. emission rate (g/s)	X/Q, ($\mu\text{g/m}^3$) / (g/s)	persistence factor	exposure adjustment factor	unit risk ($\mu\text{g/m}^3$) ⁻¹	Cancer risk in-a-million
Residential	4.24 E-4	260	0.1	1	3.0 E-04	3
Lincoln Elementary School	4.24 E-4	181	0.1	0.18	3.0 E-04	0.4

D. HAZARD INDEX: The hazard index is based on exposures to annual average concentrations. Estimates of residential hazard index are based on continuous exposure to annual average pollutant concentrations. For students, the hazard index is based on an exposure for 36 weeks per year.

$$\text{Hazard index} = (\text{annual average emission rate, g/s}) * (\text{one-hr average conc. X/Q, } (\mu\text{g/m}^3) / (\text{g/s})) * (\text{persistence factor}) / (\text{reference exposure level, } (\mu\text{g/m}^3))$$

Receptor	annual avg. emission rate (g/s)	One-hr avg. X/Q, ($\mu\text{g/m}^3$) / (g/s)	persistence factor	exposure adjustment factor	reference exposure level ($\mu\text{g/m}^3$)	Hazard Index
Residential	4.24 E-4	260	0.1	1.0	5.0	0.002
Lincoln Elementary School	4.24 E-4	181	0.1	0.69	5.0	0.001

V. Best Available Control Technology: BACT is triggered for PM₁₀, POC, NO_x, CO and SO₂ emissions, each of which may exceed 10 lb/highest day under emergency operating conditions. The engine satisfies the BACT 2 standard of 1.5 g/bhp-hr for POC, 6.9 g/bhp-hr for NO_x, 2.75 g/bhp-hr for CO. Use of California Diesel Fuel, < 0.05 wt% sulfur and < 20 vol% aromatic hydrocarbons, will satisfy the BACT 2 requirements for PM₁₀ and SO₂ emissions. BACT 1 is not applicable to engines that operate exclusively as standby generators.

TBACT is triggered for diesel exhaust particulate emissions, which result in a maximum cancer risk of more than one, but less than ten in a million. The operation of the engine with a 0.14 g/hp-hr PM₁₀ emission rate meets the TBACT requirement.

VI. Statement of Compliance:

Regulations: The engine is subject to and expected to be in compliance with the requirements of District Regulations:

Regulation	Description
6	Particulate Matter and Visible Emissions
9-1-301	Sulfur Dioxide: Limitations on Ground Level Concentrations
9-1-304	Sulfur Dioxide: Fuel Burning (Liquid and Solid Fuels)
9-8-530	NO _x and CO from Stationary IC Engines, Emergency Standby Engines, Monitoring and Recordkeeping

Offsets, PSD, NSPS, and NESHAPS are not triggered.

CEQA: This project is considered to be ministerial under Regulation 2-1-311 and therefore is not subject to CEQA review.

Public Notice, Schools: This project is within 1,000 ft of Lincoln Elementary School, which has students in grades Kindergarten through 12th grade and has more than 12 students. The public notification requirements of Regulation 2-1-412 are triggered for this application. A public notice, dated ??? ??, 2003, was sent out to the parents of the students and to the residences within 1000 feet of the source.

[*Public notice comments and responses*] .

VII. Conditions:

- D
1. Emergency Standby Generator Diesel Engine, S2, shall be fired exclusively on diesel fuel having a sulfur content no greater than 0.05% by weight. The sulfur content of the fuel oil shall be certified by the fuel oil vendor. [Basis: TBACT, Cumulative Increase]
 2. Hours of Operation: Emergency Standby Generator Diesel Engine, S2, shall only be operated to mitigate emergency conditions or for reliability-related activities.
 - A. Operation for reliability-related activities shall not exceed 50 hours in any calendar year. Reliability-related activities are defined as any of the following:
 - i. operation to test the engine's ability to perform for an emergency use, or
 - ii. operation during maintenance of a primary motor.
 - B. The engine may be operated for an unlimited amount of time for the purpose of mitigating emergency conditions. Emergency conditions are defined as any of the following:
 - i. loss of regular natural gas supply;
 - ii. failure of regular electric power supply;
 - iii. flood mitigation;
 - iv. sewage overflow mitigation;
 - v. fire;
 - vi. failure of a primary motor, but only for such time as needed to repair or replace the primary motor.[Regulation 9, Rule 8]
 3. Emergency Standby Generator Diesel Engine, S1, shall be equipped with either:
 - A. a non-resettable totalizing meter that records hours of operation, or
 - B. a non-resettable fuel usage meter (4460 gallons of fuel are equivalent to 50 hours of operation). [Regulation 9, Rule 8]
- T

VI. Conditions (continued):

4. Records: The following monthly records shall be maintained in a District-approved log for at least 2 years and shall be made available for District inspection upon request:
- A. total hours of operation of the engine
 - B. hours of operation under emergency conditions and a description of the nature of each emergency condition
 - C. amount of fuel used.
- [Regulation 9, Rule 8; Regulation 1-441]

VIII. Recommendation: Issue an Authority to Construct to the SBC/Pacific Bell, Plant #13556, for the following equipment:

- S2 Emergency Standby Generator/Diesel Engine: Caterpillar 1250 kW Generator; Model 3512B DITASC, 1807.3 bhp, 3158 cubic inch displacement diesel engine

Jane H. Lundquist
Air Quality Engineer II
Permit Services Division

