Draft Engineering Evaluation Report
Application # 29018
PG&E, Plant #24016
Plant address: 731 Schwerin Street, Daly City, CA 94014

BACKGROUND

PG&E is applying for an Authority to Construct and/or Permit to Operate for the following equipment:

S-1 Emergency Standby Generator: Natural Gas Engine. Model: Ford GGHG, MY 2018; 131.6 BHP; Abated by a 3-way Catalyst.

It will be located at 731 Schwerin Street, Daly City, CA 94014.

EMISSIONS SUMMARY

The proposed emergency standby, natural gas-fired IC engine (S-1) is an EPA-certified 2018 engine (EPA Certificate HCEXB06.8GDB-015). The criteria pollutant emissions from the engine are calculated based on manufactured provided emission factors (EFs) for CO, HC, NOx. Emission factor for SO_2 is from Chapter-3, Table 3.2-2 of the EPA Document AP-42, Emission Factors for 4-Stroke Rich-Burn Engines.

Basis: S-1

- 131.6 hp output rating
- Maximum Operation hours: 24 hours/day, 50 hours/year
- Fuel consumption = 945 ft^3/hr natural gas
- Heat capacity = 1,020 MMBtu/10^6 ft^3 natural gas
- Engine heat input = 945 ft^3/hr x (1020 MMBtu/10^6 ft^3) =0.96 MMBtu/hr

Table 1. Criteria pollutant emission factors for S-1

POC[a]	0.14	g/hp-hr
NOx[a]	0.02	g/hp-hr
CO[a]	0.01	g/hp-hr
SO_2	0.000588	lb/MMBtu
PM	0.01941	lb/MMBtu

[a] Emission Factor from the Manufacturer.

Emissions from S-1 are determined by the following calculations:

$$NOx\ \left(\frac{lb}{hr}\right) = 0.02\left(\frac{g}{hp-hr}\right)(131.6\ bhp)\left(\frac{1lb}{453.6\ g}\right) = 0.0058\left(\frac{lb}{hr}\right)$$

$$CO\ \left(\frac{lb}{hr}\right) = 0.01\left(\frac{g}{hp-hr}\right)(131.6bhp)\left(\frac{1lb}{453.6\ g}\right) = 0.0029\left(\frac{lb}{hr}\right)$$

$$POC\ \left(\frac{lb}{hr}\right) = 0.14\left(\frac{g}{hp-hr}\right)(131.6\ bhp)\left(\frac{1lb}{453.6\ g}\right) = 0.0406\left(\frac{lb}{hr}\right)$$

$$SO_2 = \left(0.000588\frac{lb}{MMBtu}\right)\left(\frac{0.96\ MMBtu}{hr}\right)\left(\frac{50\ hr}{yr}\right) = 0.028\left(\frac{lb}{yr}\right) = 0.000014\left(\frac{ton}{yr}\right)$$

The emission rates above are multiplied by the maximum allowable discretionary usage of 50 hours per year, as allowed under District Regulation 9, Rule 8, to calculate annual emissions. Worst case daily emissions have been based on continuous operation 24 hours per day. Maximum daily emission and Maximum Annual Emission are determined by the following calculations except for SO_2:

$$Emission\ (\frac{lb}{day}) = EF(\frac{g}{bhp-hr})(131.6\ bhp)(\frac{24\ hr}{day})(\frac{1lb}{453.6\ g})$$

$$Emission\ (\frac{Ton}{year}) = EF(\frac{g}{bhp-hr})(131.6\ bhp)(\frac{50\ hr}{year})(\frac{1lb}{453.6\ g})(\frac{1\ Ton}{2000\ lb})$$

Emission rates for this engine (while burning natural gas) and equivalent outlet emission concentrations for S-1 are presented in Table 2. Maximum daily and maximum annual emissions from S-1 are presented in Table 3.

Table 2. Criteria Pollutant Emission Rates from S-1 (while burning natural gas)

	g/bhp-hr	g/hr	lbs/hr	ppmv @ 15% O_2	grains/dscf @ 0% O_2
POC	0.14	18.42	0.0406	11.9	
NOx	0.02	2.63	0.0058	1.6	
CO	0.01	1.32	0.0029	1.3	
PM10	0.064	8.49	0.0187		0.0156
SO_2			0.0006	0.1	

Table 3. Maximum Daily and Maximum Annual Emissions from S-1

	lbs/hr	hours/day	Emissions pounds/day	hours/year	Emissions pounds/year	Emissions tons/year
POC	0.0406	24	0.97	50	2.03	0.0010
NOx	0.0058	24	0.14	50	0.29	0.0001
CO	0.0029	24	0.07	50	0.15	0.0001
SO2	0.0006	24	0.01	50	0.03	0.0000
PM10	0.0187	24	0.45	50	0.94	0.0005

Toxic Emissions from Natural Gas Combustion:

The emission factors used to estimate TAC emissions from the engine described above are from: California Air Toxics Emission Factor Database (maintained by the California Air Resources Board) for natural gas fired 4-stroke rich burn engines with less than 650 hp or AP-42 for natural gas fired 4-stroke rich burn engine Table 3.2-3. The engine being permitted has a maximum firing rate of 0.96 MMBtu/hr

Table 4. TAC Emissions Estimates

Toxic Air Contaminant	PEF	Unabated Emission factor (lb/MMBTU)	Oxidation Catalyst Control Efficiency	Abated Emission factor (lb/MMBTU)	Hourly Emissions (lb/hr)	Acute Trigger Level (lb/hr)	Over Acute Trigger (Yes/No)	Annual Emissions (lb/year)	Chronic Trigger (lb/year)	Over Chronic Trigger (Yes/No)
1,1,2,2-Tetrachloroethane*		2.53E-05	50%	1.3E-05	1.2E-06	-		6.1E-05	1.4E+00	No
1,1,2-Trichloroethane*		1.53E-05	50%	7.7E-06	7.4E-07			3.7E-05	5.0E+00	No
1,1-Dichloroethane*		1.13E-05	50%	5.7E-06	5.4E-07	-		2.7E-05	5.0E+01	No
1,3-Butadiene		1.02E-04	50%	5.1E-05	4.9E-06	-		2.5E-04	6.3E-01	No
Acetaldehyde		8.66E-04	50%	4.3E-04	4.2E-05	1.00E+00	No	2.1E-03	2.9E+01	No
Acrolein		5.36E-04	50%	2.7E-04	2.6E-05	5.50E-03	No	1.3E-03	1.4E+01	No
Benzene		1.87E-03	50%	9.4E-04	9.0E-05	6.00E-02	No	4.5E-03	2.9E+00	No
Carbon Tetrachloride*		1.77E-05	50%	8.9E-06	8.5E-07	4.20E+00	No	4.3E-05	1.9E+00	No
Chlorobenzene*		1.29E-05	50%	6.5E-06	6.2E-07	-		3.1E-05	3.9E+04	No
Chloroform*		1.37E-05	50%	6.9E-06	6.6E-07	3.30E-01	No	3.3E-05	1.5E+01	No
Ethylbenzene		1.14E-05	50%	5.7E-06	5.5E-07	-		2.7E-05	3.3E+01	No
Ethylene Dibromide*		2.13E-05	50%	1.1E-05	1.0E-06	-		5.1E-05	1.1E+00	No
Formaldehyde		2.30E-03	50%	1.2E-03	1.1E-04	1.20E-01	No	5.5E-03	1.4E+01	No
Methanol*		3.06E-03	50%	1.5E-03	1.5E-04	6.20E+01	No	7.4E-03	1.5E+05	No
Methylene Chloride*		4.12E-05	50%	2.1E-05	2.0E-06	3.10E+01	No	9.9E-05	8.2E+01	No
Naphthalene		7.50E-05	50%	3.8E-05	3.6E-06	-		1.8E-04	2.4E+00	No
PAH or derivative										
Benzo(a)anthracene	0.1	2.87863E-07								
Benzo(a)pyrene	1	1.12488E-07								
Benzo(b)fluoranthene	0.1	2.33E-07								
Benzo(k)fluoranthene	0.1	1.00845E-07								
Chrysene	0.01	3.04405E-07								
Dibenz(a,h)anthracene	1.05	1.22549E-08								
Indeno(1,2,3-cd)pyrene	0.1	1.6585E-07								
PAH or derivative TOTAL		2.07E-07	50%	1.0E-07	1.0E-08	-		5.0E-07	3.3E-03	No
Propylene		1.57E-02	50%	7.9E-03	7.6E-04	-		3.8E-02	1.2E+05	No
Styrene*		1.19E-05	50%	6.0E-06	5.7E-07	4.60E+01	No	2.9E-05	3.5E+04	No
Toluene		1.05E-03	50%	5.3E-04	5.1E-05	8.20E+01	No	2.5E-03	1.2E+04	No
Vinyl Chloride*		7.18E-06	50%	3.6E-06	3.5E-07	4.00E+02	No	1.7E-05	1.1E+00	No
Xylene		5.90E-05	50%	3.0E-05	2.8E-06	4.90E+01	No	1.4E-04	2.7E+04	No

* AP-42 Factors when CATEF was not available
For CATEF, mean unabated emission factors with 50% control efficiency were used.

and a maximum rating of 131.6 hp. In accordance with the District's Permit Handbook Chapter 2.3.2 for Stationary Natural Gas Engines, the CATEF Emission Factors maintained by the ARB were used to estimate emissions for all compounds that have both AP-42 emission factors and CATEF emission factors. The heat content of natural gas was assumed to be 1020 Btu/scf. The 3-way catalyst abates organics by over 90%, however, to be very conservative for TAC emissions, a 50% reduction was used in the calculation. Even with this conservative calculation, no TAC would be emitted in levels in excess of the trigger levels in Regulation 2, Rule 5, Table 1.

Cumulative Emission Increase

Table 5 summarizes the cumulative increase in criteria pollutant emissions that will result from this project.

Table 5. Cumulative Emission Increase

Pollutant	Existing (ton/yr)	New (ton/yr)	New Total
POC	0	0.001	0.001
NOx	0	0.000	0.000
CO	0	0.000	0.000
PM	0	0.000	0.000
SO_2	0	0.000	0.000

COMPLIANCE DETERMINATION

Regulation 1: General Provisions and Definitions

The facility is subject to Regulation 1, Section 301, which prohibits discharge of air contaminants resulting in public nuisance. The facility is expected to comply with this requirement.

Regulation 2, Rule 1: Permits – General Requirements

California Environmental Quality Act (CEQA): District Regulation 2, Rule 1, Section 310 specifies that all proposed new and modified sources subject to District permit requirements must be reviewed in accordance with CEQA requirements, except for ministerial projects or projects exempt from CEQA under Section 2-1-312. The engineering review for this project requires only the application of standard permit conditions and standard emission factors in accordance with Permit Handbook Chapter 2.3.2, Combustion Equipment – Internal Combustion Engines, Stationary Natural Gas Engines. Therefore, this application is considered to be ministerial and is exempt from CEQA review.

Public Notification: The public notification requirements of Regulation 2-1-412 apply to applications which result in any increase in toxic air contaminant or hazardous air contaminant emissions at facilities within 1,000 feet of the boundary of a K-12 school. The applicant has reported that there are one K-12 school within a 1000 feet radius of this facility. Based on the District's database, the Bayshore Elementary School is 0.07 miles (370 feet) from the facility. Therefore, the public notice requirements in Regulation 2-1-412 will apply.

Regulation 2, Rule 2: Permits – New Source Review

Best Available Control Technology (BACT): Regulation 2, Rule 2, Section 301 states that BACT requirements are triggered if maximum potential emissions from a new or modified source will be 10 pounds/day or more of NOX, CO, POC, NPOC, PM10, or SO2. As shown in Table 3, the emissions will not exceed 10 pounds/day for any pollutant. Therefore, BACT is not required.

Emission Offsets: Under Section 2-2-302, POC and NOx emission offsets are required for new or modified sources at a facility which emits or will be permitted to emit 10 tons per year or more on a pollutant specific basis. Since the facility does not have the potential to emit more than 10 tons per year of NOx or POC emissions, the facility is not subject to NO_x or POC offsets.

Since the facility will not have the potential to emit more than 100 tons per year of any criteria pollutant, the facility is not a "Major Facility" as defined in Regulation 2-1-203, and is not subject to PM_{10} or SO_2 offsets under Regulation 2-2-303.

PSD BACT Review

Since the facility will not have the potential to emit more than 100 tons per year of any criteria pollutant, the facility is not a "Major Facility" as defined in Regulation 2-1-203, and is not subject to PSD permitting requirements under Regulation 2-2-304.

Regulation 2, Rule 5: Permits – New Source Review of Toxic Air Contaminants

Health Risk Assessment: The District's regulation concerning toxic air contaminant emissions is codified in Regulation 2, Rule 5, New Source Review of Toxic Air Contaminants (TAC). The TAC emissions from new and modified sources are subject to risk assessment review, if the emissions of any individual TAC exceed either the acute or chronic emission thresholds defined in Table 2-5-1.

As shown in Table 4, the proposed emissions from the operation of S-1 do not exceed any chronic or acute trigger levels. No health risk assessment is required for this application.

Regulation 6, Rule 1: Particulate Matter – General Requirements

Like all combustion sources, this natural gas-fired IC engine is subject to Regulation 6, Rule 1. Since the engine displacement is less than 1500 cubic inches, Section 6-1-303 applies instead of 6-1-301. Section 6-1-303 limits visible emissions to not exceed Ringelmann 2.0 for periods aggregating more than 3 minutes in any hour or equivalent opacity. Section 6-1-305 prohibits public nuisance caused by fallout of visible particulate emissions. Properly operating natural gas-fired IC engines are not expected to produce visible emissions or fallout in violation of these sections.

Section 6-1-310 limits particulate emissions to 0.15 grains/dscf of exhaust gas volume. The particulate emission rate from this IC engine is 0.01941 lbs/MMBtu, which result in an outlet grain loading of 0.0156 grains per dscf at 0% O_2. This emission rate is less than the limit in Section 6-1-310, so compliance with this section is ensured.

Regulation 8, Rule 1: Organic Compounds – General Provisions

All internal combustion engines are exempt from Regulation 8 per Section 8-1-110.2, therefore none of the rules in Regulation 8 apply to this engine.

Regulation 9, Rule 1: Inorganic Gaseous Pollutants – Sulfur Dioxide
The burner is subject to and will comply with Regulation 9, Rule 1, "Inorganic Gaseous Pollutants, Sulfur Dioxide," by restricting fuel use to natural gas only. Based on the following calculation, combustion of natural gas is expected to produce a SO_2 concentration of less than 2 ppmv, thereby meeting the requirement of a maximum outlet concentration of 300 ppmv of SO_2 prescribed in Regulation 9, Rule 1-302.

SO_2 ppmv = (0.000588 lb/MMBtu)* (385.5 ft^3 SO_2/lb mol SO_2)/(1 ft^3 SO_2/10^6 $sdft^3$ flue)/[(20.9)/(20.9-15)]/(64.0588 lb SO_2/lb mol SO_2)/(8710 $sdft^3$ flue/MMBtu) = 0.11 ppmv at 15% O_2

Regulation 9, Rule 8: Inorganic Gaseous Pollutants – Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines
Regulation 9, Rule 8 applies to stationary internal combustion engines with a rated output greater than 50 bhp. S-1 has a rated capacity of 131.6 bhp and is subject to this rule. However, Section 9-8-110.5 exempts emergency standby engines from Section 301 through 305, 501, and 503 of this rule. Since S-1 will be used as an emergency standby engine, the limitation to 50 hours of reliability-related operation in any calendar year will apply, as specified by Section 9-8-330. Operation during emergencies is not limited.

In addition, the monitoring and recordkeeping requirements in Section 9-8-530 apply and will be included in the permit conditions for this source.

Federal Requirements
New Source Performance Standards (NSPS): S-1 is subject to 40 CFR Part 60 Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines per §60.4230(a)(4)(iv) since it commenced construction after June 12, 2006, and was manufactured on or after January 1, 2009, and is an emergency engine with a maximum engine power greater than 25 HP. Per §60.4233(e), the owner/operators must meet the emission standards in Table 1 to Subpart JJJJ of Part 60, which are: NO_x 2.0 g/bhp-hr, VOC 1.0 g/bhp-hr and CO 4.0 g/bhp-hr. The engine family for S-1 has been certified to comply with these emission standards under EPA Family Name HCEXB06.8GDB.

Per §60.4245(a), the owner/operator must keep records of all notifications submitted, maintenance conducted, and documentation from the manufacturer that the engine is certified to meet the emission standards.

National Emission Standards for Hazardous Air Pollutants (NESHAPs): S-1 is subject 40 CFR Part 63 Subpart ZZZZ National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. Per §63.6590(c)(1), this engine complies with this subpart because it is located at an area source and meets the requirement of 40 CFR Part 60 Subpart JJJJ.

Permit Conditions
Condition #23107 setting out the operating and recordkeeping requirements for operations at source S-1 shall be made a part of the source's Authority to Construct/Permit to Operate.

RECOMMENDATION

The preliminary recommendation is to issue an Authority to Construct for the following equipment subject to Condition # 23107. 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. 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 equipment:

S-1 Emergency Standby Generator: Natural Gas Engine. Model: Ford GGHG, MY 2018; 131.6 BHP; Abated by a 3-way Catalyst.

_____ _____

Davis Zhu Date
Air Quality Engineer

COND# 23107 ----------

1. The owner or operator shall operate the stationary emergency standby engine only to mitigate emergency conditions or for reliability-related activities (maintenance and testing). Operating while mitigating emergency conditions and while emission testing to show compliance with this part is unlimited. Operating for reliability-related activities are limited to 50 hours per year.(Basis: Emergency Standby Engines, Hours of Operation Regulation 9-8-330)

2. The Owner/Operator shall equip the emergency standby engine(s) with: a non-resettable totalizing meter that measures hours of operation or fuel usage. (Basis: Emergency Standby Engines, Monitoring and Record keeping 9-8-530)

3. The Owner/Operator shall not operate unless the natural gas fired engine is abated with a Catalytic Converter. (Basis: Cumulative Increase)

4. Records: The Owner/Operator shall maintain the following monthly records in a District-approved log for at least 24 months from the date of entry. 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 (maintenance and testing).
b. Hours of operation for emission testing.
c. Hours of operation (emergency).
d. For each emergency, the nature of the emergency condition.
e. Fuel usage or operating hours for engine.

(Basis: Emergency Standby Engines, Monitoring and Recordkeeping 9-8-530)