

**Draft Engineering Evaluation
TLC Child and Family Services
Application No. 30655 / Plant No. 24753
1800 N Gravenstein Hwy
Sebastopol, CA 95472**

BACKGROUND

TLC Child and Family Services has applied for an Authority to Construct (AC) for the following equipment:

**S-1 Emergency Standby NG Engine
PSI, Model: GM 5.7 Model Year: 2020
105 BHP, 0.81 MMBtu/hr,**

EMISSIONS CALCULATIONS

The emission factors used to estimate criteria pollutant emissions from the natural gas engine generator set described above are based on generic engine manufacturer abated emissions data. Total Hydrocarbon emission rates were assumed to be equal to Precursor Organic Compound (POC) emission rates.

The Abated Efficiency, PM₁₀ and SO₂ emission factors are based on AP 42, Fifth Edition, Volume I, Chapter 3: Stationary Internal Combustion Sources; Section 2.4.1 Control Techniques for 4-Cycle Rich-burn Engines.¹ The engine will operate during emergency use and for a maximum of 50 hours per year for maintenance and testing. Manufacturer emission factors (tested with equipped TWC) will be used for NO_x, POC, and CO emissions.

Table 1-Estimated Abated Emissions From S-1

Pollutant	Emission Factor (g/BHP-hr)	Emission (lb/hr)	Emission (lb/yr)	Emission (TPY)	Maximum Daily Emissions (lb/day)
NO _x	0.001	0.000	0.01	0.000	0.01
POC	0.054	0.012	0.62	0.000	0.30
CO	0.334	0.077	3.86	0.002	1.9
PM ₁₀	0.033	0.008	0.39	0.000	0.19
SO ₂	0.0021	0.000	0.02	0.000	0.012

Basis:

105 bhp Max Rated Output

799 cf/hr Max fuel use Rate = 0.81 MMBTU/hr

NO_x, HC and CO emission factors are from the engine manufacturer.

The PM and SO₂ emission factors are from EPA AP-42, Table 3.2-3 for 4 stroke Rich-burn Engines

Annual Emissions are based on the Annual Limit (50 hr/yr) of operation for testing and maintenance

Max daily emissions are based on 24 hr/day since no daily limits are imposed on emergency operations

TOXIC RISK SCREENING ANALYSIS

¹ SO₂ Emission Factor = 5.88 E-04 Lb./MMBtu; calculations assume 100% of fuel sulfur conversion with the content in natural gas = 2000 gr/10⁶scf. PM₁₀ Fuel input Emission Factor = 9.50E-03 Lb./MMBtu; aerodynamic particle diameter <= 1 μm, for the purposes of filterable emissions PM₁₀= PM_{2.5}. These emissions are expected to be negligible, but included for completeness.

The emission factors used to estimate Hazardous Air Pollutants (HAPs) emissions from the engine described above are from: AP-42 for natural gas fired 4-cycle rich burn engine Table 3.2-3, or the California Air Toxics Emission Factor Database (maintained by the California Air Resources Board) for natural gas fired 4-cycle rich burn engines with less than 650 hp.

The CATEF Emission Factors maintained by the ARB were used to estimate emissions for all compounds that have AP-42 emission factors and CATEF emission factors.

The HAP emission estimates are based on uncontrolled emission factors for natural gas engines and an assumed abatement efficiency of 0% for a conservative estimate. The abatement efficiency is based on the fact that there is no proposed catalyst for the exhaust

As shown in Table 2 and Table 3 below, no toxic air contaminants exceed the District Risk Screening Triggers and a Risk Screening Analysis is not required.

Table 2
HAP EMISSIONS ESTIMATES BASED ON AP-42 TABLE 3.2-3 (FOR COMPOUNDS WITH NO CATEF E.F.)

Compound	E.F.	Unit	Assumed Abatement Efficiency %	Abated Emissions (lb/hr)	Acute Trigger Level (lb/hr)	HRSA Triggered? (Y/N)	Abated Emissions (lb/yr)	Chronic Trigger Level (lb/yr)	HRSA Triggered? (Y/N)	
1,1,2,2-Tetrachloroethane	2.53E-05	lb/MMBtu	0	2.06E-05	None	NO	1.03E-03	1.40E+00	NO	
1,1,2-Trichloroethane	<	1.53E-05	lb/MMBtu	0	1.25E-05	None	NO	6.23E-04	5.00E+00	NO
1,1-Dichloroethane	<	1.13E-05	lb/MMBtu	0	9.21E-06	None	NO	4.60E-04	5.00E+01	NO
1,2-Dichloroethane	<	1.13E-05	lb/MMBtu	0	9.21E-06	None	NO	4.60E-04	None	NO
1,2-Dichloropropane	<	1.30E-05	lb/MMBtu	0	1.06E-05	None	NO	5.30E-04	None	NO
1,3-Butadiene		6.63E-04	lb/MMBtu	0	CATEF	None	NO	CATEF	4.80E-01	NO
1,3-Dichloropropene	<	1.27E-05	lb/MMBtu	0	1.04E-05	None	NO	5.18E-04	None	NO
Acetaldehyde		2.79E-03	lb/MMBtu	0	CATEF	1.00E+00	NO	CATEF	2.90E+01	NO
Acrolein		2.63E-03	lb/MMBtu	0	CATEF	5.50E-03	NO	CATEF	1.40E+01	NO
Benzene		1.58E-03	lb/MMBtu	0	CATEF	6.00E-02	NO	CATEF	2.90E+00	NO
Butyr/isobutyraldehyde		4.86E-05	lb/MMBtu	0	3.96E-05	None	NO	1.98E-03	None	NO
Carbon Tetrachloride	<	1.77E-05	lb/MMBtu	0	1.44E-05	4.20E+00	NO	7.21E-04	1.90E+00	NO
Chlorobenzene	<	1.29E-05	lb/MMBtu	0	1.05E-05	None	NO	5.26E-04	3.90E+04	NO
Chloroform	<	1.37E-05	lb/MMBtu	0	1.12E-05	3.30E-01	NO	5.58E-04	1.50E+01	NO
Ethylbenzene	<	2.48E-05	lb/MMBtu	0	CATEF	None	NO	CATEF	3.30E+01	NO
Ethylene Dibromide	<	2.13E-05	lb/MMBtu	0	1.74E-05	None	NO	8.68E-04	1.10E+00	NO
Formaldehyde		2.05E-02	lb/MMBtu	0	CATEF	1.20E-01	NO	CATEF	1.40E+01	NO
Methanol		3.06E-03	lb/MMBtu	0	2.49E-03	6.20E+01	NO	1.25E-01	1.50E+05	NO
Methylene Chloride		4.12E-05	lb/MMBtu	0	3.36E-05	3.10E+01	NO	1.68E-03	8.20E+01	NO
Naphthalene	<	9.71E-05	lb/MMBtu	0	CATEF	None	NO	CATEF	2.40E+00	NO
PAH		1.41E-04	lb/MMBtu	0	CATEF	None	NO	CATEF	None	NO
Styrene	<	1.19E-05	lb/MMBtu	0	9.70E-06	4.60E+01	NO	4.85E-04	3.50E+04	NO
Toluene		5.58E-04	lb/MMBtu	0	4.55E-04	8.20E+01	NO	2.27E-02	1.20E+04	NO
Vinyl Chloride	<	7.18E-06	lb/MMBtu	0	5.85E-06	4.00E+02	NO	2.93E-04	1.10E+00	NO
Xylene		1.95E-04	lb/MMBtu	0	1.59E-04	4.90E+01	NO	7.95E-03	2.70E+04	NO

**Table 3
HAP EMISSION ESTIMATES BASED ON CATEF EMISSION FACTORS**

SUBSTANCE	E.F. MEAN	UNIT	Assumed Abatement Efficiency %*	Abated Emissions (lb/hr)	Acute Trigger Level (lb/hr)	HRSA Triggered? (Y/N)	Abated Emissions (lb/yr)	Chronic Trigger Level (lb/yr)	HRSA Triggered? (Y/N)
1,3-Butadiene	1.04E-01	lbs/MMcf	0%	8.31E-05	1.50E+00	NO	4.15E-03	4.80E-01	NO
Acenaphthene	1.94E-03	lbs/MMcf	0%	1.55E-06	None	NO	7.75E-05	None	NO
Acenaphthylene	1.45E-02	lbs/MMcf	0%	1.16E-05	None	NO	5.79E-04	None	NO
Acetaldehyde	8.83E-01	lbs/MMcf	0%	7.06E-04	1.00E+00	NO	3.53E-02	2.90E+01	NO
Acrolein	5.47E-01	lbs/MMcf	0%	4.37E-04	5.50E-03	NO	2.19E-02	1.40E+01	NO
Anthracene	1.84E-03	lbs/MMcf	0%	1.47E-06	None	NO	7.35E-05	None	NO
Benzene	7.39E-02	lbs/MMcf	0%	5.90E-05	6.00E-02	NO	2.95E-03	2.90E+00	NO
Benzo(a)anthracene	3.39E-04	lbs/MMcf	0%	2.71E-07	None	NO	1.35E-05	None	NO
Benzo(a)pyrene	1.15E-04	lbs/MMcf	0%	9.19E-08	None	NO	4.59E-06	None	NO
Benzo(b)fluoranthene	2.37E-04	lbs/MMcf	0%	1.89E-07	None	NO	9.47E-06	None	NO
Benzo(g,h,i)perylene	1.95E-04	lbs/MMcf	0%	1.56E-07	None	NO	7.79E-06	None	NO
Benzo(k)fluoranthene	1.03E-04	lbs/MMcf	0%	8.23E-08	None	NO	4.11E-06	None	NO
Chrysene	3.10E-04	lbs/MMcf	0%	2.48E-07	None	NO	1.24E-05	None	NO
Dibenz(a,h)anthracene	1.25E-05	lbs/MMcf	0%	9.99E-09	None	NO	4.99E-07	None	NO
Ethylbenzene	1.16E-02	lbs/MMcf	0%	9.27E-06	None	NO	4.63E-04	4.30E+01	NO
Fluoranthene	9.95E-04	lbs/MMcf	0%	7.95E-07	None	NO	3.98E-05	None	NO
Fluorene	6.91E-03	lbs/MMcf	0%	5.52E-06	None	NO	2.76E-04	None	NO
Formaldehyde	4.99E-02	lbs/MMcf	0%	3.99E-05	2.10E-01	NO	1.99E-03	1.80E+01	NO
Indeno(1,2,3-cd)pyrene	1.69E-04	lbs/MMcf	0%	1.35E-07	None	NO	6.75E-06	None	NO
Naphthalene	7.65E-02	lbs/MMcf	0%	6.11E-05	None	NO	3.06E-03	2.40E+00	NO
Phenanthrene	7.07E-03	lbs/MMcf	0%	5.65E-06	None	NO	2.82E-04	None	NO
Propylene	1.60E+01	lbs/MMcf	0%	1.28E-02	None	NO	6.39E-01	1.20E+05	NO
Pyrene	1.79E-03	lbs/MMcf	0%	1.43E-06	None	NO	7.15E-05	None	NO
Toluene	1.07E+00	lbs/MMcf	0%	8.55E-04	8.20E+01	NO	4.27E-02	1.20E+04	NO
Xylene (m,p)	4.41E-01	lbs/MMcf	0%	3.52E-04	4.90E+01	NO	1.76E-02	2.70E+04	NO
Xylene (o)	2.17E-01	lbs/MMcf	0%	1.73E-04	4.90E+01	NO	8.67E-03	2.70E+04	NO
Xylene (Total)	6.02E-02	lbs/MMcf	0%	4.81E-05	4.90E+01	NO	2.40E-03	2.70E+04	NO
PAH Equivalents as Benzo(a)pyrene	2.66E-06	lbs/MMcf	0%	2.13E-09	5.00E+01	NO	1.06E-07	3.30E-03	NO

PLANT CUMULATIVE EMISSIONS

Table 4 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-1.

Table 4

Plant Cumulative Increase: (tons/year)			
Pollutant	Existing	New	Total
NOx	0.000	0.000	0.000
POC	0.000	0.000	0.000
CO	0.000	0.002	0.002
PM10	0.000	0.000	0.000
SO2	0.000	0.000	0.000

BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

In accordance with Regulation 2-2-301, BACT is triggered for any new or modified source with the potential to emit 10 pounds or more per highest day of POC, NPOC, NOx, CO, SO₂ or PM₁₀.

Based on the emission calculations above, BACT is not triggered for any pollutant since the maximum daily emission of each pollutant does not exceed 10 lb/day.

OFFSETS

Per Regulation 2-2-302, offsets must be provided for any new or modified source at a facility that emits more than 10 tons/yr of POC or NOx. Based on the emission calculations above, offsets are not required for this application.

New Source Performance Standards (NSPS)

The New Source Performance Standard (NSPS) in 40 CFR 60, Subpart JJJJ does apply because the engine is to be installed after January 1, 2011. The engine will comply with the following limits in Table 1 for emergency spark-ignited engines greater than 25 hp and under 130 hp:

Pollutant	S-1 Emission Factor	NSPS Standard
NOx + HC	0.055 g/bhp-hr	10 g/bhp-hr
CO	0.334 g/bhp-hr	387 g/bhp-hr

As the information above shows, S-1 is in compliance with these NSPS emission requirements.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

This engine will be classified as a HAP area source therefore will be subject to the Reciprocating Internal Combustion Engine (RICE) NESHAP (40 CFR Part 63, Subpart ZZZZ) because it is a new source and installed after 2007. A new RICE at an area source that is subject to Part 60 Subpart JJJJ NSPS requirements has no further requirements under Subpart ZZZZ pursuant to 40 CFR Part 63.6590(c). Therefore, S-1 complies with NESHAP by meeting the requirements under 40CFR60 (NSPS).

STATEMENT OF COMPLIANCE

The owner/operator of S-1 shall comply with Regulation 6, Rule 1 (*Particulate Matter and Visible Emissions Standards*) and Regulation 9-1-301 (*Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations*). From Regulation 9-1-301, the ground level concentrations of SO₂ will not exceed 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours.

S-1 is an emergency standby generator; from Regulation 9, Rule 8 (*NO_x and CO from Stationary Internal Combustion Engines*), Section 110.5 (*Emergency Standby Engines*), S-1 is exempt from the requirements of Regulations 9-8-301 (*Emission Limits on Fossil Derived Fuel Gas*), 9-8-302 (*Emission Limits on Waste Derived Fuel Gas*), 9-8-303 (*Emissions Limits – Delayed Compliance, Existing Spark-Ignited Engines, 51 to 250 bhp or Model Year 1996 or Later*), 9-8-304 (*Emission Limits – Compression-Ignited Engines*), 9-8-305 (*Emission Limits – Delayed Compliance, Existing Compression-Ignited Engines, Model Year 1996 or Later*), 9-8-501 (*Initial Demonstration of Compliance*) and 9-8-503 (*Quarterly Demonstration of Compliance*).

Allowable operating hours and the corresponding record keeping in Regulations 9-8-330 (*Emergency Standby Engines, Hours of Operation*) and 9-8-530 (*Emergency Standby Engines, Monitoring and Recordkeeping*) will be included in the Permit Conditions below.

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)

The proposed equipment is located within 1000 feet of Journey Academy. Therefore, the facility is subject to requirements of Regulation 2-1-412. A public notice is required.

PERMIT CONDITIONS

Permit Condition # 23112

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 Recordkeeping 9-8-530)
3. 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 facilities 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 (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 for engine.
(Basis: Emergency Standby Engines, Monitoring and Recordkeeping 9-8-530)

