

DRAFT
Engineering Evaluation
The Nueva High School
131 East 28th Avenue, San Mateo, CA 94403
Plant No. 22495; Application No. 26361

BACKGROUND

The Nueva High School has applied for an Authority to Construct and/or Permit to Operate the following equipment:

S-1 Emergency Standby Natural Gas Generator Set with Integral Catalyst
Caterpillar, Model: G35LG2, Model Year 2014
EPA Family Name: EGNXB05.42L1
54 BHP, 0.696MMBtu/hr

The above equipment will be located at 131 East 28th Avenue, San Mateo, CA 94403.

The natural gas powered emergency unit (S-1) will provide emergency standby power in the event of a disruption to power service. S-1 is equipped with an air/fuel ratio controller and an exhaust catalyst which are both an integral and permanent part of the source. During an emergency, the generator will operate 24 hours a day until regular electric supply is restored. The engine will operate for a maximum of 50 hours per year for maintenance and testing, as limited by Regulation 9-8-330.3.

The engine is subject to attached condition no. 23107.

EMISSION CALCULATIONS

The emissions factors used to estimate criteria pollutant emissions from S-1 are based on engine manufacturer emissions data. Total Hydrocarbon emission rates were assumed to be equal to Precursor Organic Compound (POC) emission rates.

Basis:

- 54 hp output rating
- 50 hr/yr operation for testing and maintenance
- 682 Scf/hr max fuel use rate
- 1020BTU/ft³ natural gas heat content

Annual Emissions:

Annual emissions are calculated based on the number of hours per year of operation for testing and maintenance. See Table 1.

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. See Table 1.

Table 1. Annual and Daily Criteria Pollutants from S-1

Pollutant	Emission Factor [g/BHP-hr]	Emission [lb/day]	Emission [lb/yr]	Emission [TPY]
NOx	0.22	0.6	1.3	0.001
POC	0.38	1.1	2.3	0.001
CO	0.64	1.8	3.8	0.002

PLANT CUMULATIVE INCREASE

S-1 located at “131 East 28th Avenue, San Mateo, CA 94403” is a new facility. Therefore, there are no existing emissions at the plant. Table 4 summarizes the cumulative increase in criteria pollutant emissions that will result from the operation of S-1.

Table 4. Cumulative increases post 4/5/1991 in criteria pollutant emissions from operation of S-1

Pollutant	Existing [TPY]	New [TPY]	Total [TPY]
NOx	0.000	0.001	0.001
POC	0.000	0.001	0.001
CO	0.000	0.002	0.002

TOXIC RISK SCREENING ANALYSIS

To estimate Hazardous Air Pollutants (HAPs) or Toxic Air Contaminants (TACs) emissions from S-1, the higher emission factors of those from EPA AP-42 Table 3.2-2 for natural gas fired 4-stroke lean burn engines and CARB California Air Toxics Emission Factors (CATEFs) for natural gas fired 4-stroke lean burn engines with less than 650 hp are used. The engine being permitted has a maximum firing rate of 0.696 MMBtu/hr and a maximum rating of 54 hp.

The HAP emission estimates are based on uncontrolled emission factors for natural gas engines and assume a conservative abatement efficiency of 50% removal of organic HAP compounds. The abatement efficiency assumption is based on the fact that the engine is being permitted with an exhaust catalyst and an air/fuel ratio controller.

As shown in Tables 2 and 3 below, no TACs exceed the District’s Risk Screening trigger levels. Therefore, a Health Risk Screening Analysis (HRSA) is not required.

Table 2. HAP Emissions Estimates Based on AP-42 Table 3.2-2

Compound		E.F.	E.F. Unit	Assumed Abatement Efficiency [%]	Abated Emissions [lb/hr] ¹	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	<	4.00E-05	lb/MMBtu	50	1.39E-05	None	NO	6.96E-04	1.9E+00	NO
1,1,2-Trichloroethane	<	3.18E-05	lb/MMBtu	50	1.11E-05	None	NO	5.53E-04	6.6E+00	NO
1,1-Dichloroethane	<	2.36E-05	lb/MMBtu	50	8.21E-06	None	NO	4.10E-04	6.6E+01	NO
1,2,3-Trimethylbenzene		2.30E-05	lb/MMBtu	50	8.00E-06	None	NO	4.00E-04	None	NO
1,2,4-Trimethylbenzene		1.43E-05	lb/MMBtu	50	4.97E-06	None	NO	2.49E-04	None	NO
1,2-Dichloroethane	<	2.36E-05	lb/MMBtu	50	8.21E-06	None	NO	4.10E-04	5.3E+00	NO
1,2-Dichloropropane	<	2.69E-05	lb/MMBtu	50	9.36E-06	None	NO	4.68E-04	None	NO
1,3,5-Trimethylbenzene		3.38E-05	lb/MMBtu	50	1.18E-05	None	NO	5.88E-04	None	NO
1,3-Butadiene		2.67E-04	lb/MMBtu	50	9.29E-05	None	NO	4.64E-03	6.3E-01	NO
1,3-Dichloropropene	<	2.64E-05	lb/MMBtu	50	9.18E-06	None	NO	4.59E-04	None	NO
2-Methylnaphthalene		3.32E-05	lb/MMBtu	50	1.15E-05	None	NO	5.77E-04	None	NO
2,2,4-Trimethylpentane		2.50E-04	lb/MMBtu	50	8.70E-05	None	NO	4.35E-03	None	NO
Acenaphthene		1.25E-06	lb/MMBtu	50	CATEF		NO	CATEF		NO
Acenaphthylene		5.53E-06	lb/MMBtu	50	CATEF		NO	CATEF		NO
Acetaldehyde		8.36E-03	lb/MMBtu	50	CATEF		NO	CATEF		NO
Acrolein		5.14E-03	lb/MMBtu	50	CATEF		NO	CATEF		NO
Benzene		4.40E-04	lb/MMBtu	50	CATEF		NO	CATEF		NO
Benzo(b)fluoranthene		1.66E-07	lb/MMBtu	50	CATEF		NO	CATEF		NO
Benzo(e)pyrene		4.15E-07	lb/MMBtu	50	1.44E-07	None	NO	7.22E-06	None	NO
Benzo(g,h,i)perylene		4.14E-07	lb/MMBtu	50	CATEF		NO	CATEF		NO
Biphenyl		2.12E-04	lb/MMBtu	50	7.37E-05	None	NO	3.69E-03	None	NO
Butane		5.41E-04	lb/MMBtu	50	1.88E-04	None	NO	9.41E-03	None	NO
Butyr/Isobutyraldehyde		1.01E-04	lb/MMBtu	50	3.51E-05	None	NO	1.76E-03	None	NO
Carbon Tetrachloride	<	3.67E-05	lb/MMBtu	50	1.28E-05	4.2E+00	NO	6.38E-04	2.5E+00	NO
Chlorobenzene	<	3.04E-05	lb/MMBtu	50	1.06E-05	None	NO	5.29E-04	3.9E+04	NO
Chloroethane		1.87E-06	lb/MMBtu	50	6.50E-07	None	NO	3.25E-05	1.2E+06	NO
Chloroform	<	2.85E-05	lb/MMBtu	50	9.91E-06	3.3E-01	NO	4.96E-04	2.0E+01	NO
Chrysene		6.93E-07	lb/MMBtu	50	CATEF		NO	CATEF		NO
Cyclopentane		2.27E-04	lb/MMBtu	50	7.90E-05	None	NO	3.95E-03	None	NO
Ethane		1.05E-01	lb/MMBtu	50	3.65E-02	None	NO	1.83E+00	None	NO
Ethyl Benzene		3.97E-05	lb/MMBtu	50	1.38E-05	None	NO	6.90E-04	4.3E+01	NO
Ethylene Dibromide	<	4.43E-05	lb/MMBtu	50	1.54E-05	None	NO	7.70E-04	1.5E+00	NO
Fluoranthene		1.11E-06	lb/MMBtu	50	CATEF		NO	CATEF		NO
Fluorene		5.67E-06	lb/MMBtu	50	CATEF		NO	CATEF		NO
Formaldehyde		5.28E-02	lb/MMBtu	50	CATEF		NO	CATEF		NO
Methanol		2.50E-03	lb/MMBtu	50	8.70E-04	6.2E+01	NO	4.35E-02	1.5E+05	NO
Methylcyclohexane		1.23E-03	lb/MMBtu	50	4.28E-04	None	NO	2.14E-02	None	NO
Methylene Chloride		2.00E-05	lb/MMBtu	50	6.96E-06	3.1E+01	NO	3.48E-04	1.1E+02	NO
n-Hexane		1.11E-03	lb/MMBtu	50	3.86E-04	None	NO	1.93E-02	2.7E+05	NO
n-Nonane		1.10E-04	lb/MMBtu	50	3.83E-05	None	NO	1.91E-03	None	NO
n-Octane		3.51E-04	lb/MMBtu	50	1.22E-04	None	NO	6.10E-03	None	NO
n-Pentane		2.60E-03	lb/MMBtu	50	9.04E-04	None	NO	4.52E-02	None	NO
Naphthalene		7.44E-05	lb/MMBtu	50	CATEF		NO	CATEF		NO
PAH		2.69E-05	lb/MMBtu	50	CATEF		NO	CATEF		NO
Phenanthrene		1.04E-05	lb/MMBtu	50	CATEF		NO	CATEF		NO
Phenol		2.40E-05	lb/MMBtu	50	8.35E-06	1.3E+01	NO	4.17E-04	7.7E+03	NO
Propane		4.19E-02	lb/MMBtu	50	1.46E-02	None	NO	7.29E-01	None	NO
Pyrene		1.36E-06	lb/MMBtu	50	CATEF		NO	CATEF		NO
Styrene	<	2.36E-05	lb/MMBtu	50	8.21E-06	4.6E+01	NO	4.10E-04	3.5E+04	NO
Tetrachloroethane		2.48E-06	lb/MMBtu	50	8.63E-07	None	NO	4.31E-05	1.9E+00	NO
Toluene		4.08E-04	lb/MMBtu	50	CATEF		NO	CATEF		NO
Vinyl Chloride		1.49E-05	lb/MMBtu	50	5.18E-06	4.0E+02	NO	2.59E-04	1.4E+00	NO
Xylene		1.84E-04	lb/MMBtu	50	6.40E-05	4.9E+01	NO	3.20E-03	2.7E+04	NO

¹ CATEFs are used when AP-42 EFs are less conservative (lower) than CATEFs.

Note: Natural Gas Engine Equipped with Catalytic Converter with vendor guarantee of 90% reduction in Organics Emissions.

As a conservative estimate for organic air toxic compounds it assumed that the Catalytic Converter will have a 50% reduction in Air Toxic Organic Emissions.

Table 3. HAP Emissions from S-1, Based on CATEFs

Substance	E.F. Mean	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)	PAH PEF	PAH Equivalents
Acenaphthene	7.17E-04	lb/MMcf	50	2.44E-07	None	NO	1.22E-05	None	NO		
Acenaphthylene	7.59E-03	lb/MMcf	50	2.59E-06	None	NO	1.29E-04	None	NO		
Acetaldehyde	3.99E+00	lb/MMcf	50	1.36E-03	1.0E+00	NO	6.80E-02	3.8E+01	NO		
Acrolein	1.63E+00	lb/MMcf	50	5.56E-04	5.5E-03	NO	2.78E-02	1.4E+01	NO		
Anthracene	2.56E-04	lb/MMcf	50	8.73E-08	None	NO	4.36E-06	None	NO		
Benzene	1.21E+00	lb/MMcf	50	4.13E-04	2.9E+00	NO	2.06E-02	3.8E+00	NO		
Benzo(a)anthracene	7.78E-05	lb/MMcf	50	2.65E-08	None	NO	1.33E-06	None	NO		
Benzo(a)pyrene	3.55E-05	lb/MMcf	50	1.21E-08	None	NO	6.05E-07	None	NO	1.0	6.05E-07
Benzo(b)fluoranthene	3.27E-04	lb/MMcf	50	1.12E-07	None	NO	5.58E-06	None	NO	0.1	5.58E-07
Benzo(g,h,i)perylene	1.03E-04	lb/MMcf	50	3.51E-08	None	NO	1.76E-06	None	NO		
Benzo(k)fluoranthene	5.30E-04	lb/MMcf	50	1.81E-07	None	NO	9.04E-06	None	NO	0.1	9.04E-07
Chrysene	9.64E-05	lb/MMcf	50	3.29E-08	None	NO	1.64E-06	None	NO	0.01	1.64E-08
Dbenz(a,h)anthracene	1.09E-05	lb/MMcf	50	3.72E-09	None	NO	1.86E-07	None	NO	1.05	1.95E-07
Fluoranthene	2.50E-04	lb/MMcf	50	8.53E-08	None	NO	4.26E-06	None	NO		
Fluorene	4.60E-04	lb/MMcf	50	1.57E-07	None	NO	7.84E-06	None	NO		
Formaldehyde	2.87E+01	lb/MMcf	50	9.79E-03	1.2E-01	NO	4.89E-01	1.8E+01	NO		
Indeno(1,2,3-cd)pyrene	1.20E-04	lb/MMcf	50	4.09E-08	None	NO	2.05E-06	None	NO	0.1	2.05E-07
Naphthalene	1.22E-01	lb/MMcf	50	4.16E-05	None	NO	2.08E-03	3.2E+00	NO		
Phenanthrene	8.93E-04	lb/MMcf	50	3.05E-07	None	NO	1.52E-05	None	NO		
Propylene	1.87E+01	lb/MMcf	50	6.38E-03	None	NO	3.19E-01	1.2E+05	NO		
Pyrene	1.23E-04	lb/MMcf	50	4.19E-08	None	NO	2.10E-06	None	NO		
Toluene	4.12E-01	lb/MMcf	50	1.40E-04	8.2E+01	NO	7.02E-03	1.2E+04	NO		
Xylene (m,p)	8.63E-02	lb/MMcf	50	2.94E-05	4.9E+01	NO	1.47E-03	2.7E+04	NO		
Xylene (o)	4.94E-02	lb/MMcf	50	1.68E-05	4.9E+01	NO	8.42E-04	2.7E+04	NO		
PAH Equivalents as Benzo(a)pyrene								6.9E-03	NO		2.48E-06

BEST AVAILABLE CONTROL TECHNOLOGY (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_x, CO, SO₂ or PM₁₀.

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

OFFSETS

Offsets must be provided for any new or modified source at a facility that emits more than 10 tons/year of POC or NO_x per Regulation 2, Rule 2, Section 302. Based on the project emissions in Table 2, offsets are not required for this application.

New Source Performance Standards (NSPS)

S-1 is subject to 40 CFR 60, Subpart JJJJ, Standards of Performance for Stationary Spark Ignition (SI) Internal Combustion Engines (ICEs), Section 60.4230(a)(4)(iv) because the engine is an emergency engine which was manufactured after January 1, 2009 and has a maximum power greater than 25 hp.

Determining Emissions Standards

Section 60.4233(d) states owners and operators of stationary SI ICEs with a maximum engine power greater than 25 hp and less than 100 hp (except gasoline and rich burn engines that use LPG) must comply with emission standards in Table 1 to this subpart for their emergency stationary SI ICE.

From Table 1 for emergency engines between 25 hp and 130 hp, the emission standards are:

- NO_x: 10 g/hp-hr
- CO: 387 g/hp-hr
- VOC: N/A

S-1 complies with the above emission standards.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

S-1 is subject to 40 CFR 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (RICE). Per 40 CFR 63.6590(c)(1), a new or reconstructed stationary RICE located at an area source must meet the requirements of 40 CFR 60, Subpart JJJJ for spark ignition engines. As stated above in the NSPS section, S-1 meets the emissions requirements of 40 CFR 60, Subpart JJJJ.

STATEMENT OF COMPLIANCE

The owner/operator of S-1 shall comply with Regulation 6-1 (*Particulate Matter – General Requirements*) and Regulation 9-1-301 (*Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations*). Pursuant to Regulation 9-1-301, the ground level concentrations of SO₂ shall 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. Per Regulation 9-8 (*NOx 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 – Spark-Ignited Engines Powered by Fossil Derived Fuels*), 9-8-302 (*Emission Limits – Spark-Ignited Engines Powered by Waste Derived Fuels*), 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 (50 hours/yr) and the corresponding recordkeeping requirements in Regulations 9-8-330.3 (*Emergency Standby Engines, Hours of Operation*) and 530 (*Emergency Standby and Low Usage Engines, Monitoring and Recordkeeping*) will be included in the permit conditions below.

This application 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 emission factors and therefore is not discretionary as defined by CEQA. (Permit Handbook Chapter 2.3.2)

Because this equipment will be located within 1,000 feet of Nueva High School, the project is subject to the public notification requirements of Regulation 2-1-412 due to the increase in emissions from the project. A public notice will be sent to all parents of students of the above mentioned school and all residents within 1,000 feet of the facility. There will be a 30-day public comment period.

PSD does not apply.

PERMIT CONDITIONS

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/Silencer Unit (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 for engine.

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

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 and Authority to Construct for the equipment listed below. However, the proposed source will be located within 1,000 feet of at least one school, which triggers the public notification requirements of 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 Natural Gas Generator Set with Integral Catalyst
Caterpillar, Model: G35LG2, Model Year 2014
EPA Family Name: EGNXB05.42L1
54 BHP, 0.696MMBtu/hr**

Prepared by: _____

Flora Chan
Air Quality Engineer

Date: _____