

ENGINEERING EVALUATION

Plant No. 6061
Maxar Space LLC
3875 Fabian Way, Palo Alto, CA 94303
Application No. 32052

BACKGROUND

Maxar Space LLC has applied for an Authority to Construct/Permit to Operate for the following equipment:

S-5301 Emergency Backup Diesel Generator
Engine Make: Caterpillar, Model: C9, Family PCPXL08.8NZS
Model Year: 2023, 398 BHP, 2.69 MMBtu/hour

S-5302 Emergency Backup Diesel Generator
Engine Make: Caterpillar, Model: C9, Family PCPXL08.8NZS
Model Year: 2023, 398 BHP, 2.69 MMBtu/hour

S-5301 and S-5302 are both Tier 3 engines with no abatement; however, both engines meet BACT(2) requirements. The engines will burn commercially available California low sulfur diesel fuel. The sulfur content of the diesel fuel will not exceed 0.0015% by weight.

S-5301 and S-5302 will emit the following pollutants:
Oxides of nitrogen (NO_x), Precursor organic compounds (POC), Carbon monoxide (CO), Particulate matter with aerodynamic diameter smaller than or equal to a nominal 10 microns (PM₁₀), Particulate matter with aerodynamic diameter smaller than or equal to a nominal 2.5 microns (PM_{2.5}), and Sulfur dioxide (SO₂).

EMISSIONS

Table 1. Annual and Daily Emissions from each engine (S-5301 or S-5302)

Pollutant	Emission Factor ⁽¹⁾	Max Daily Emissions	Annual Emissions	Annual Emissions
	(g/bhp-hour)	(pounds/day)	(pounds/year)	(tons/year)
NO _x	2.621	55.149	114.89	0.057
POC	0.138	2.903	6.05	0.003
CO	2.461	51.775	107.87	0.054
PM ₁₀	0.112	2.353	4.90	0.002
PM _{2.5}	N/A ⁽²⁾	2.235	4.90	0.002
SO ₂	N/A ⁽³⁾	0.10	0.21	0.000

Basis:

- Annual emissions: Reliability-related activity set at 50 hours for S-5301 and S-5302
- Maximum daily emissions: 24-hour operation
- ¹Emission factors calculated as the average of all EPA certified data tests for engine family PCPXL08.8NZS
- ²PM_{2.5} = PM₁₀
- ³SO₂ emission factor calculated based on the following:

- Complete conversion of sulfur in fuel to SO₂ and a maximum sulfur content of 15 ppm.
- Density of Ultra Low Sulfur Diesel Fuel = 7.31 lb/gal
- Fuel Consumption Rate = 19.4 gal/hr
- MW(SO₂)=64.066 g/mole, MW(S)=32.065 g/mol
- $$E_{SO_2} = \left(\frac{15 \text{ lb S}}{10E+06 \text{ lb fuel}} \right) \left(7.31 \frac{\text{lb fuel}}{\text{gal fuel}} \right) \left(19.4 \frac{\text{gal fuel}}{\text{hr}} \right) \left(\frac{64.066 \text{ g/mol}}{32.065 \text{ g/mol}} \right) \left(50 \frac{\text{hr}}{\text{yr}} \right)$$

$$E_{SO_2} = 0.10 \text{ lb/day} = 0.21 \text{ lb/yr} = 0.000 \text{ ton/yr}$$

CUMULATIVE INCREASE

Table 2 summarizes the cumulative increase in criteria pollutant emissions that will result from this application assuming S-5301 and S-5302 will each operate for 50 hours/year for reliability related testing.

Table 2. Cumulative Emissions Increase, Post 4/5/91

Pollutant	Existing Emissions Post 4/5/91 (tons/year)	S-5301 and S-5302 Emissions (tons/year)	Cumulative Emissions (tons/year)
NOx	0.433	0.115	0.548
POC	10.631	0.006	10.637
CO	0.053	0.108	0.161
PM ₁₀	0.009	0.005	0.014
PM _{2.5}	0	0.005	0.005
SO ₂	0	0.000	0.000

HEALTH RISK ASSESSMENT (HRA)

Table 3 summarizes the calculated emissions and the acute and chronic trigger levels for the Regulation 2-5 toxic air contaminants emitted by S-5301 and S-5302, assuming it will operate for 50 hours/year for reliability related testing.

Table 3. Hourly and Annual Project TAC Emissions

Pollutant	Hourly	Annual	Acute Trigger (lbs/hr)	Chronic Trigger (lbs/yr)	Exceeds Acute Trigger?	Exceeds Chronic Trigger?
	lbs/hr	lbs/year				
Diesel PM (diesel exhaust particulate matter)	N/A	9.81	N/A	0.26	N/A	YES

The diesel exhaust particulate matter emissions from S-5301 and S-5302, estimated at 9.81 pounds/year assuming the engine operates for 50 hours/year, is greater than the Regulation 2, Rule 5 chronic toxic trigger level of 0.26 pounds/year.

As determined using the District's HRSA Streamlining Policy Checklist for Stationary Emergency Standby and Fire Pump Diesel Engines, this application does not qualify for the District's May 6, 2015 HRSA Streamlining Policy for Stationary Diesel-Fired IC Engines Used for Backup Power or Fire Pumps. Therefore, a refined Health Risk Assessment (HRA) is required for this application.

Results from the HRA indicate that the project cancer risk is **3.1 in a million**, and the project chronic hazard index (HI) is **0.00084**. In accordance with District Regulation 2-5-301, each of the proposed new sources requires TBACT because the estimated source risk for each exceeds a cancer risk of 1.0 in a million and/or a chronic HI of 0.20. Since the estimated project cancer risk does not exceed 10.0 in a million and hazard indices do not exceed 1.0, this project complies with the District's Regulation 2-5-302 project risk requirements, for projects not located within an Overburdened Community as defined in Regulation 2-1-243. These engines are located approximately 286 feet from the grounds of the Kehillah Jewish High School (3900 Fabian Way, Palo Alto, CA 94303). Since the engines are located within 500 feet of school grounds, non-emergency operation is prohibited between 7:30 am and 3:30 pm on days when school is in session (ATCM Section 93115, Title 17 CCR). Therefore, the health risk to students while at school is considered to be negligible.

It can be seen from Table 1 that the Diesel Exhaust Particulate Matter (DEPM) emission rate for S-5301 and S-5302 is 0.11 g/bhp-hour/engine. The engines meet TBACT because the above DEPM rate is below the TBACT of 0.15 g/bhp-hour in BACT/TBACT Document # 96.1.3 dated December 22, 2020.

BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

Per Regulation 2-2-301, an Authority to Construct and/or Permit to Operate for a new source shall require BACT to control emissions of a District BACT pollutant as defined in Regulation 2-2-210 if the source will have the potential to emit (PTE) that pollutant in an amount of 10.0 or more pounds on any day, as defined in Regulation 2-2-301.1.

Per Table 1, S-5301 and S-5302's PTE for NOx and CO exceeds 10.0 or more pounds on any day and triggers BACT.

BACT for S-5301 and S-5302 is presented in the current BAAQMD BACT/TBACT Workbook for IC Engine – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump, for engines greater than or equal to 50 bhp and less than 1,000 bhp: Document #96.1.3, Revision 8, dated 12/22/2020. For NOx and CO, BACT(2) is 2.85 g/bhp-hour, and 2.6 g/bhp-hour. The more restrictive BACT(1) standards are not applicable to S-5301 and S-5302 because they will be limited to operate as an emergency standby engine.

S-5301 and S-5302 satisfy the current BACT(2) standards for NOx and CO as shown in Table 4.

Table 4. BACT check

Pollutant	Emission Factor	BACT(2) Standard
NOx	2.621 g/bhp-hour	2.85 g/bhp-hour
CO	2.461 g/bhp-hour	2.6 g/bhp-hour

OFFSETS

In accordance with the District's Policy for Calculating Potential to Emit (PTE) of Emergency Generators, the Potential to Emit for S-5301 and S-5302 was estimated assuming 150 hours of operation/year as shown in Table 5.

Table 5. Offsets

Pollutant	Pre-Application Cumulative Increase (tons/year)	S-5301 and S-5302 PTE (tons/year)	Facility PTE (tons/year)	Offset Triggers	Offsets Required (Yes/No)
NOx	0.433	0.345	0.778	>10	No
POC	10.631	0.018	10.649	>10	Yes
CO	0.053	0.324	0.377	N/A	N/A
PM ₁₀	0.009	0.015	0.024	>100	No
PM _{2.5}	0.000	0.015	0.015	>100	No
SO ₂	0.000	0.001	0.001	>100	No

It can be seen from Table 5 that the facility’s PTE after S-5301 and S-5302 are permitted is above the Regulation 2-2 offset trigger level for POC. For the purposes of calculating the PTE, current sources at Plant # 6061 and its support facilities (Plant # 23812, #13188, and #20151) were collectively considered to have a combined PTE of 10.62 TPY. Since Maxar has stated that they do not own any ERCs and their combined PTE is < 35 TPY, the cumulative increase of 0.006 TPY from S-5301 and S-5302 as shown in Table 2 will be offset from the Air District’s Small Facility Banking Account.

STATEMENT OF COMPLIANCE

The owner/operator is expected to comply with all applicable requirements. Key requirements are listed below:

Regulation 6-1 (Particulate Matter – General Requirements)

S-5301 and S-5302 are subject to Regulation 6, Rule 1. Opacity and visible emissions from S-5301 and S-5302 are limited by Regulation 6-1-303.2 (engine used solely as a standby source of motive power) to an opacity of No. 2 on the Ringelmann chart.

Regulation 6-1-305 prohibits emission of particles from any operation in sufficient number to cause annoyance to any other person where the particles are large enough to be visible as individual particles at the emission point, or of such size and nature as to be visible individually as incandescent particles. S-5301 and S-5302 are not expected to produce visible emissions or fallout in violation of this regulation and will be assumed to be in compliance with Regulation 6-1-305.

S-5301 and S-5302’s compliance with Regulation 6, Rule 1 will be confirmed by the District’s Compliance & Enforcement staff during their routine inspections.

Regulation 9-1-301 (Limitations on Ground Level Concentrations)

S-5301 and S-5302 are subject to and are expected to comply with the applicable SO₂ limitations in Regulation 9, Rule 1 (“Inorganic Gaseous Pollutants – Sulfur Dioxide”). Because SO₂ emissions from S-5301 and S-5302 are negligible, it is unlikely the APCO will require Maxar Space LLC to conduct ground level monitoring.

Regulation 9-8 (Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines)

S-5301 and S-5302 will be operated as emergency standby engines and are therefore not subject to the emission rate limits in Regulation 9, Rule 8 ("Inorganic Gaseous Pollutants – NO_x and CO from Stationary Internal Combustion Engines"). S-5301 and S-5302 are exempt from the requirements of Sections 9-8-301 through 305, 501, and 503 per Reg. 9-8-110.5 (Emergency Standby Engines). S-5301 and S-5302 are subject to and are expected to comply with 9-8-330.3 (Emergency Standby Engines, Hours of Operation) since non-emergency hours of operation will be limited in the permit conditions to 50 hours per year per engine. S-5301 and S-5302 are also subject to and are expected to comply with monitoring and record keeping requirements of Regulations 9-8-502.1 and 9-8-530, which are incorporated into the proposed permit conditions.

Airborne Toxic Control Measure (ATCM) for Emergency Standby Diesel-Fueled CI Engines (>50 bhp)

The Air District is charged with enforcing the requirements of California’s Air Toxic Control Measure for Stationary Compression Ignition Engines in Title 17, California Code of Regulations, Sections 93115 *et seq.* (ATCM)

Subsection 93115.6(a)(3)(A)(1)(a) requires S-5301 and S-5302 to meet the emissions standards specified in Table 6 below. (These emissions standards expressed as g/bhp-hour are essentially the same as EPA’s Tier 3 standards, which are expressed as g/kW-hour.¹) The generators will have emission rates that comply with these requirements as shown in Table 6.

Table 6. Engine Emission Rates vs. ATCM Emission Standards (g/bhp-hour)

Pollutant	Emissions Rate S-5301 and S-5302	ATCM Emission Standards
PM	0.112	0.15
NMHC + NO _x (NMHC: Non-methane hydrocarbon)	2.759	3.0
CO	2.461	2.6

Subsection 93115.6(a)(3)(A)(1)(b) requires that the generator be certified to meet EPA’s Tier 2 emission standards as required under the NSPS discussed below. The generators meet the requirements of EPA Tier 3 standards.

Subsection 93115.6(a)(3)(A)(1)(c) limits the non-emergency operation of the engine to 50 hours/year for maintenance and testing. Permit Condition 22850 will limit non-emergency operation of S-5301 and S-5302 to 50 hours/year/engine and hence will comply with this subsection.

¹ The conversion factor for converting engine output in horsepower to kilowatts is 1.341 hp/kw. Applying this conversion factor to the ATCM standards shows that they are essentially identical to EPA’s Tier 2 standards.

California Environmental Quality Act (CEQA)

This project is ministerial under the District Regulation 2-1-311 (Permit Handbook Chapter 2.3.1) and therefore is not subject to CEQA review per CCR § 15369.

New Source Performance Standards (NSPS)

40 CFR 60, Subpart IIII (NSPS IIII), Standards of Performance for Stationary Compression Ignition Internal Combustion Engines applies to non-fire pump engines such as S-5301 and S-5302 that were manufactured after April 1, 2006. Per §60.4205(b), S-5301 and S-5302 are subject to the Tier 2 emissions standards in 40 CFR 1039, Appendix I for all pollutants.

Applicable emission standards found in Appendix I of 40 CFR 1039 that apply to S-5301 and S-5302 are:

NMHC + NO_x = 4.0 gram/kW-hour (2.98 gram/bhp-hour);

CO = 3.5 gram/kW-hour (2.61 gram/bhp-hour); and

PM = 0.20 gram/kW-hour (0.15 gram/bhp-hour).

Emission rates for the above pollutants summarized in Tables 1 and 6 in this evaluation shows that S-5301 and S-5302 comply with the emission standards in NSPS IIII.

40 CFR 89.113 (a) sets forth the following smoke emission standards for non-road CI engines:

- 20% during the acceleration mode;
- 15% during the lugging mode; and
- 50% during the peaks in either the acceleration or lugging modes.

The opacity standards in 40 CFR 89.113 it appears, apply to mobile (and not stationary) non-road CI engines. Therefore, S-5301 and S-5302 are not subject to the above standards. Instead, S-5301 and S-5302 are subject to the opacity standards in Regulation 6, Rule 1, which was discussed above.

Per §60.4207(b), S-5301 and S-5302 are subject to the following diesel fuel requirements in 40 CFR 80.510(c):

- Sulfur content ≤ 15 ppm
- Minimum Cetane index = 40 or maximum aromatic content of 35% by volume

Diesel fuel sold in California meets the above standards. Therefore, S-5301 and S-5302 comply with the diesel fuel requirements in NSPS IIII.

National Emissions Standards for Hazardous Air Pollutants (NESHAP)

S-5301 and S-5302 are subject to 40 CFR 63, Subpart ZZZZ (MACT ZZZZ), National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines because the engine will be constructed (~installed) on/after June 12, 2006. Per §63.6590(c)(1), "new" sources such as S-5301 and S-5302 are required to meet the requirements in MACT ZZZZ by meeting the requirements in NSPS IIII. As previously discussed, S-5301 and S-5302 comply with NSPS IIII and therefore, will comply with MACT ZZZZ as well.

Prevention of Significant Deterioration (PSD)

PSD does not apply to this application.

School Notification (*Regulation 2-1-412*)

S-5301 and S-5302 are located approximately 286 feet from the grounds of the Kehillah Jewish High School (3900 Fabian Way, Palo Alto, CA 94303). Therefore, S-5301 and S-5302 are subject to the public notification requirements of Regulation 2-1-412.

Overburdened Communities Notification (*Regulation 2-1-412*)

S-5301 and S-5302 are not located within an Overburdened Community as defined in Regulation 2-1-243.

PERMIT CONDITIONS

Permit Condition #22850 for S-5301 and S-5302

1. The owner/operator shall not exceed 50 hours per year per engine for reliability-related testing.

[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

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: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

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: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

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: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

- 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, athletic field, or other areas of school property but does not include unimproved school property.

[Basis: Title 17, California Code of Regulations, section 93115, ATCM for Stationary CI Engines]

End of Conditions

RECOMMENDATION

The Air District has evaluated the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable District, state, and federal air quality-related regulations, including the health risks resulting from toxic air contaminant emissions. The preliminary recommendation is to issue a permit for this project. After considering all comments received, the Air District will make a final determination.

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

S-5301 Emergency Backup Diesel Generator
Engine Make: Caterpillar, Model: C9, Family PCPXL08.8NZS
Model Year: 2023, 398 BHP, 2.69 MMBtu/hour

S-5302 Emergency Backup Diesel Generator
Engine Make: Caterpillar, Model: C9, Family PCPXL08.8NZS
Model Year: 2023, 398 BHP, 2.69 MMBtu/hour

Chris Thompson
AQ Engineer I

Date: _____