DRAFT ENGINEERING EVALUATION

Facility ID No. 203774
Anthro Energy - Alameda
2095 North Loop Road, Alameda, CA 94502
Application No. 719035

Background

Anthro Energy – Alameda (Anthro Energy) is applying for an Authority to Construct/Permit to Operate for the following equipment:

S-1 Emergency Standby Diesel Engine
Make: Caterpillar, Model: C9, Model Year: 2022
480 bhp, 3.18 MMBtu/hr
Permit Condition Nos. 100072 and 100073

The criteria pollutants are nitrogen oxides (NO_x), carbon monoxide (CO), precursor organic compounds (POC) from unburned diesel fuel, sulfur dioxide (SO_2) and particulate matter (PM_{10}). All of these pollutants are briefly discussed on the District's web site at www.baaqmd.gov.

S-1 meets the Environmental Protection Agency and California Air Resources Board (EPA/CARB) Tier 3 Off-road standard. The engine will burn commercially available California low sulfur diesel fuel. The sulfur content of the diesel fuel will not exceed 0.0015% by weight.

This evaluation report will discuss compliance of the proposed project with all applicable rules and regulations.

Emissions

Table 1. Annual and Daily Emissions from EPA/CARB Certified Data from S-1

Pollutant	Emission Factor (g/bhp-hr)	Max Daily Emissions (lb/day)	Annual Emissions (lb/year)	Annual Emissions (tons/year)
NO_x	2.55	64.8	135	0.067
POC	0.20	5.1	11	0.005
CO	2.46	62.5	130	0.065
$PM_{10}/PM_{2.5}$[1]	0.11	2.8	6	0.003
SO_2	N/A[2]	0.1	0	0.000

Basis:

- Annual emissions: Reliability-related activity 50 hours for S-1
- Max daily emissions: 24-hour operation
- Emission factors from EPA Engine Family NCPXL08.8NZS for S-1
- [1] $PM_{2.5}$ are conservatively assumed to be equal to total PM emissions.
- [2] SO_2 emission factor is from AP-42 Table 3.4-1, SO_2 (15 ppm) = 0.00809*0.0015 lb SO_2/bhp-hr

Plant Cumulative Increase

Table 2 summarizes the cumulative increase in criteria pollutant emissions that will result from this application.

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

Pollutant	Existing Emissions Post 4/5/91 (tons/year)	Application Emissions (tons/year)	Cumulative Emissions (tons/year)
NO_x	0.000	0.067	0.067
POC	0.000	0.005	0.005
CO	0.000	0.065	0.065
PM_{10}	0.000	0.003	0.003
$PM_{2.5}$	0.000	0.003	0.003
SO_2	0.000	0.000	0.000

Health Risk Assessment (HRA)

The diesel particulate emissions from the project are 5.92 lb/year. All PM_{10} emissions are considered diesel particulate emissions. The PM_{10} emissions from this application are summarized in Table 1. There were no other related projects permitted in the last five years. Since the diesel particulate emissions from the project are greater than the toxic trigger level of 0.26 lb/year, an HRA is required. This application does not qualify for the HRA streamlining.

The project is in compliance with project risk requirements as recommended, limiting reliability-related activity hours by permit condition. See HRA report.

HRA Results

This analysis estimates the incremental health risk resulting from toxic air contaminant (TAC) emissions from non-emergency operation of a standby generator diesel engine at this facility. Results from this HRA indicate that the maximum project cancer risk is estimated at 1.9 in a million, and the maximum project chronic hazard index is estimated at 0.00075. See HRA Report for more details.

Table 3. HRA Results

Maximally Exposed Receptor	Maximum Cancer Risk (chance in a million)	Maximum Chronic Hazard Index
Resident	1.9	0.000
Off-site worker	0.97	0.00075
Student (Coastline Christian School)	0.22	0.00012

DRAFT

TBACT

In accordance with the District's Regulation 2-5-301, this source requires TBACT because the estimated source cancer risk is greater than 1.0 in a million. BACT and TBACT determinations for compression ignition engines with a rated capacity between 50-1000 bhp are described in BAAQMD BACT/TBACT Workbook for IC Engines – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump, Document #96.1.3, Revision 8. dated 12/22/2020 (see Attachment 1). The proposed engine complies with TBACT by having a certified PM emission rate that is less than or equal to 0.15 g/bhp-hour. The certified PM emission rate is 0.11 g/bhp-hour.

Project Risk Limits

Since the proposed engine, operating at 50 hours/year for reliability related testing, has an estimated project cancer risk that does not exceed 10 in a million, and the chronic hazard index does not exceed 1.0, this project complies with the District's Regulation 2-5-302 project risk requirements. No additional operating hour restrictions were necessary for this project.

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, NO_x, CO, SO_2, or PM_{10}.

As shown in Table 1, emissions of NOx and CO exceed 10 pounds per day and thus trigger BACT requirements.

Per Section 2-2-202, BACT is defined as an emission limitation, control device, or control technique applied at a source that is the most stringent of:

- the most effective device or technique successfully utilized,
- the most stringent emission limitation achieved by an emission control device or technique for the type of equipment comprising such a source,
- the most effective emission control limitation for the type of equipment comprising such a source that is contained in an approved implementation plan of any state, or
- the most effective control device or technique or most stringent emission limitation that is technologically feasible, taking into consideration cost-effectiveness, any ancillary health and environmental impacts, and energy requirements.

These requirements are generally categorized as either technologically feasible and cost-effective (termed "BACT 1") or achieved-in-practice (termed "BACT 2").

BACT 2 is either equal to or less stringent than BACT 1. Because achieved-in-practice is required regardless of cost and BACT 1 is more stringent than BACT 2, an evaluation for what has been achieved-in-practice is first conducted.

DRAFT

Achieved-in-Practice.
Achieved-in-practice BACT is presented in the current BAAQMD BACT/TBACT Workbook for IC Engine – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump 50 BHP and < 1000 BHP Output, Document #96.1.3, Revision 8, dated 12/22/2020.

For NO_x and CO, achieved-in-practice BACT has been determined to be meeting the CARB Air Toxics Control Measure (ATCM) standard for the respective pollutant at the applicable horsepower rating.

Technologically Feasible and Cost-Effective.
The following control technologies and mitigation measures have been found technically feasible for abating NO_x emissions from internal combustion engines[1]:

- Engine ignition timing retard (achievable NOx reduction 20 to 30 percent), and
- Selective catalytic reduction (achievable NOx reduction of 90 percent)

Techniques for mitigating CO emissions include:

- Catalytic oxidation, and
- Good combustion practices (e.g., preventative maintenance, change oil and filter every 500 hours of operation, inspect all hoses and belts every 500 hours of operation, minimize idling time).

Although Regulation 2-2 does not include a definition for cost-effectiveness, Section 2-2-414 requires the Air District to publish and periodically update a BACT Workbook and that BACT will be determined using the workbook as a guidance document.

Section 1 of the BACT Workbook includes a maximum cost guideline for NO_x emissions of $17,500 per ton of emissions reduced. The BACT Workbook does not have a maximum cost effectiveness value for CO. However, the South Coast Air Quality Management District lists a maximum cost-effectiveness value of $832 for CO. Using these maximum cost effectiveness values and assuming that 90 percent of the emissions in Table 1 could be abated, maximum annualized costs could not exceed $1,063 for NO_x controls and $49 for CO controls to be deemed cost-effective.

All NO_x and CO controls for S-1 are expected to exceed both maximum annualized costs. Therefore, requiring more stringent controls than meeting achieved-in-practice requirements is deemed not cost-effective.

Consequently, S-1 is required to comply with the current achieved-in-practice standards:

S-1	**Pollutant**	**Emission Factor**	**BACT(2) Standard**
	NO_x*	2.55 g/bhp-hr	2.85 g/bhp-hr
	CO	2.46 g/bhp-hr	2.60 g/bhp-hr

[1] United States Environmental Protection Agency. Control Techniques Guidelines for Alternative Control Techniques Document – NOx Emissions from Stationary Reciprocating Internal Combustion Engines. EPA-453/R-93-032. July 1993. Updated September 2000.

DRAFT

Basis: The standard is expressed as 3.0 g/bhp of non-methane hydrocarbons + NO_x. NO_x is estimated to be 95% of the combined standard (3.0*0.95 = 2.85 g/bhp-hr).

Offsets

Offset must be provided for any new or modified source at a facility that will have the potential to emit more than 10 tons per year of NO_x or POC, as specified in Regulation 2-2-302; 100 tons per year or more of $PM_{2.5}$, PM_{10} or sulfur dioxide, as specified in Regulation 2-2- 303.

Table 4. Potential to Emit for FID 203774

Pollutant	Existing Annual Emissions (TPY)	Application Annual Emissions* (TPY)	Facility Annual Emissions* (TPY)	Offset Requirement (TPY)	Offset Required
NO_x	0.000	0.202	0.202	>10	N
POC	0.000	0.016	0.016	>10	N
CO	0.000	0.195	0.195	-	N
PM_{10}	0.000	0.009	0.009	≥100	N
$PM_{2.5}$	0.000	0.009	0.009	≥100	N
SO_2	0.000	0.000	0.000	≥100	N

**Annual emissions: Reliability-related activity of 50 hours and emergency operation of 100 hours for S-1.*

Since the facility's potential to emit is below the offsets trigger levels specified in Regulation 2-2, offsets are not required.

Statement of Compliance

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

Airborne Toxic Control Measure for Stationary Compression Ignition Engines
ATCM, 5/19/2011, Section 93115, Title 17, CA Code of Regulations

District Rules
Regulation 6-1-303 (*Ringelmann No. 2 Limitation*)
Regulation 6-1-305 *(Visible Particles)*
Regulation 6-1-310 *(Total Suspended Particulate (TSP) Concentration Limits)*

Sections 6-1-310.1 and 6-1-310.2 limit TSP emissions to 0.15 grains/dscf of exhaust gas volume or less depending on the exhaust gas rate (see Table 6-1-310.2 for the corresponding TSP concentration limit). The certified particulate emission rate from S-1 is 0.08 grams per bhp-hour, which results in an outlet grain loading of 0.01 grains/dscf. Since the emission rate is less than the limit in Section 6-1-310, compliance with this section is expected.

Table 5. Section 6-1-310 Emissions Calculations

Engine Maximum Exhaust Flow Rate	2,461	acfm=	825	dscf/min=	49,514	dscf/hr
Engine Maximum Exhaust Temperature	923	F				
Water (H2O) Content (%)	12.50%					
PM10 abatement for Engine	0%					
Engine PM10 emissions	0.12	lb/hr=	470	kg/yr=	829	gr/hr
Are Engine PM10 Emissions > 1000 kg/yr?	NO					
Applicable Regulation 6-1-310 section?	6-1-310.1					
TSP Concentration for Engine	0.017	gr/dscf				
Corresponding Regulation 6-1 TSP Limit	0.15	gr/dscf				
PM10 emissions < Corresponding Reg 6-1 TSP Limit?	**YES**					

* dscfm = acfm x (460 R + 70 F)/(460 R + Engine Maximum Exhaust Temperature in F) x (1- water (H2O Content))

Regulation 9-1-301 (*Limitations on Ground Level Concentrations of SO_2*)
Regulation 9-8 (*NOx and CO from Stationary Internal Combustion Engines*)
Section 9-8-110.5 – Limited exemption for emergency standby engines
Section 9-8-330 – Hours of operation for emergency

California Environmental Quality Act (CEQA)
This permit application is categorically exempt from the California Environmental Quality Act (CEQA). CEQA Guidelines, Section 15301, exempts projects that involve negligible or no expansion of use. The emergency standby engine will not expand the facility's normal operation and will result in no increase or only a negligible increase in use of the facility. Further, based on the review of the permit application materials, including Appendix H, environmental information form, the project will not have any significant environmental impacts, and cumulative impacts from successive projects of the same type in the same place will not result in significant environmental impacts.

New Source Performance Standards (NSPS)
40 CFR 60, Subpart IIII (*Stationary Compression Ignition Internal Combustion Engines*)

National Emissions Standards for Hazardous Air Pollutants (NESHAP)
40 CFR 63, Subpart ZZZZ (*Stationary Reciprocating Internal Combustion Engines (RICE)*)

Prevention of Significant Deterioration (PSD)
This application is not part of a PSD project as defined in Regulation 2-2.

Public Notice (Regulation 2-1-412)
This project is not located within Overburdened Community, as defined in Regulation 2-1-243. However, the project is located within 1000 feet of a K-12 school which has more than 12 students enrolled, and results in the increase of diesel particulate emissions, which is a toxic air contaminant (TAC). Therefore, this project is subject to the public notification requirements of Regulation 2-1-412 due to the increase in emissions from the project.

DRAFT

Table 6. Schools Subject to Public Noticing for Application No. 719035

School Name	Street Address
Coastline Christian School	1801 North Loop Road Alameda, CA 94502

A public notice will be sent to all parents or guardians of students enrolled at the schools listed above within ¼ mile of the source and all businesses and residents within 1000' of the proposed source. All comments received shall be summarized in the final evaluation report.

Permit Conditions

Permit Condition #100072 for S-1

1. The owner or 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]

2. 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]

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 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. Fuel usage for each engine(s).

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

DRAFT

4. At School and Near-School Operation: If the emergency standby engine is located on school grounds or within 1000 feet of any school grounds, the following requirements shall apply: The owner or 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, playground, 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]

Permit Condition #100073 for S-1

The owner/operator shall not exceed the following limits per year per engine for reliability-related activities:

- 50 Hours of Diesel fuel (Diesel fuel)

[Basis: Cumulative Increase; Regulation 2-5; Title 17, California Code of Regulations, Section 93115, ATCM for Stationary CI Engines]

End of Conditions

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 an Authority to Construct for the equipment listed below. However, the proposed source will be located within 1,000 feet of a K-12 school and results in an increase in TAC emissions, which triggers the public notification requirements of Regulation 2-1-412. After the comments are received from the public 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 and/or a Permit to Operate for the following equipment:

S-1 Emergency Standby Diesel Engine
Make: Caterpillar, Model: C9, Model Year: 2022
480 bhp, 3.18 MMBtu/hr
Permit Condition Nos. 100072 and 100073

Prepared By: Zachary Kowalewski, Air Quality Engineer I

DRAFT

Attachment 1

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Best Available Control Technology (BACT) Guideline

Source Category

Source:	**IC Engine-Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump**	**Revision:**	**8**
		Document #:	**96.1.3**
Class:	➢ **50 BHP and < 1000 BHP Output**	**Date:**	**12/22/2020***

Determination

Pollutant	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
POC (NMHC)	1. n/s[c] 2. CARB ATCM standard[a] for POC at applicable horsepower rating (see attached Table 1).	1. n/s[c] 2. Any engine certified or verified to achieve the applicable standard. [a]
NOx	1. n/s[c] 2. CARB ATCM standard[a] for NOx at applicable horsepower rating (see attached Table 1).	1. n/s[c] 2. Any engine certified or verified to achieve the applicable standard. [a]
SO_2	1. n/s[c] 2. Fuel sulfur content not to exceed 0.0015% (wt) or 15 ppm (wt).	1. n/s[c] 2. CARB Diesel Fuel (Ultra Low Sulfur Diesel)
CO	1. n/s[c] 2. CARB ATCM standard[a] for CO at the applicable horsepower rating (see attached Table 1).	1. n/s[c] 2. Any engine certified or verified to achieve the applicable standard. [a]
PM_{10}	1. n/s[c] 2. 0.15 g/bhp-hr 3. 0.15 g/bhp-hr	1. n/s[c] 2. Any engine or technology demonstrated, certified or verified to achieve the applicable standard. 3. Any engine or technology demonstrated, certified or verified to achieve the applicable standard.
NPOC	1. n/s 2. n/s	1. n/s 2. n/s

* Applies to open permit applications with a complete date on or after 1/1/2020.

References

a.	ATCM standard (listed below): Where NMHC + NOx is listed (with no individual standards for NOx or NMHC) as the standard, the portions may be considered 95% NOx and 5% NMHC. For the purposes of determining BACT NMHC = POC. Any engine which has been certified or demonstrated to meet the current year tier standard may be considered compliant with the certified emission standard for that pollutant.
b.	Deleted (no longer applies).
c.	Cost- effectiveness analysis must be based on lesser of 50 hr/yr or non-emergency operation as limited by District health risk screen analysis.

Table 1: BACT 2 Emission Limits based on CARB ATCM

Emissions Standards for Stationary Emergency Standby Diesel-Fueled CI Engines ≥50 BHP g/Kw-hr (g/bhp-hr)			
Maximum Engine Power	**PM**	**NMHC+NOx**	**CO**
37 ≤ KW < 56 (50 ≤ HP < 75)	0.20 (0.15)	4.7 (3.5)	5.0 (3.7)
56 ≤ KW < 75 (75 ≤ HP < 100)	0.20 (0.15)	4.7 (3.5)	5.0 (3.7)
75 ≤ KW < 130 (100 ≤ HP < 175)	0.20 (0.15)	4.0 (3.0)	5.0 (3.7)
130 ≤ KW < 225 (175 ≤ HP < 300)	0.20 (0.15)	4.0 (3.0)	3.5 (2.6)
225 ≤ KW < 450 (300 ≤ HP < 600)	0.20 (0.15)	4.0 (3.0)	3.5 (2.6)
450 ≤ KW ≤ 560 (600 ≤ HP ≤ 750)	0.20 (0.15)	4.0 (3.0)	3.5 (2.6)
560 < KW < 750 (750 < HP < 1000)	0.20 (0.15)	6.4 (4.8)	3.5 (2.6)

DRAFT