

## DRAFT ENGINEERING EVALUATION

Facility ID No. 25074  
Emergency Operation Center  
780 W Olive Avenue, Sunnyvale, CA 94086  
Application No. 31456

### Background

Emergency Operation Center is applying for an Authority to Construct/Permit to Operate for the following equipment:

**S-3 Emergency Standby Diesel Generator Set**  
**Make: Cummins, Model: QST30-G5 NR2, Model Year: 2021**  
**1490 bhp, 9.89 MMBtu/hr**  
**Permit Condition Nos. 22850 and 27416**

*Abated by*

**A-3 Selective Catalytic Reduction**  
**Cummins CA451-T4i After Treatment**

The criteria pollutants are nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), precursor organic compounds (POC) from unburned diesel fuel, sulfur dioxide (SO<sub>2</sub>) and particulate matter (PM<sub>10</sub>). All of these pollutants are briefly discussed on the District's web site at [www.baaqmd.gov](http://www.baaqmd.gov).

S-3 meets the Environmental Protection Agency and California Air Resources Board (EPA/CARB) Tier 2 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-3**

Pollutant	Unabated Emission Factor (g/bhp-hr)	Abated Emission Factor (g/bhp-hr)	Max Daily Emissions (lb/day)	Annual Emissions (lb/yr)	Annual Emissions (tons/yr)
NO <sub>x</sub>	4.23	0.50	39.38	82.12	0.041
POC	0.18	0.14	11.03	22.99	0.011
CO	0.52	0.97	76.40	159.32	0.080
PM <sub>10</sub> /PM <sub>2.5</sub> <sup>1</sup>	0.10	0.08	6.30	13.14	0.007
SO <sub>2</sub>	N/A <sup>2</sup>	N/A <sup>2</sup>	0.43	0.90	0.000

Basis:

- Annual emissions: Reliability-related activity 50 hours for S-3
- Max daily emissions: 24-hour operation

- NO<sub>x</sub> and POC emissions from manufacturer emissions document
- Emissions from PA Engine Family MCEXL030.AAD for S-3
- <sup>1</sup> Conservative Assumption: All PM emissions are PM<sub>2.5</sub>
- <sup>2</sup> SO<sub>2</sub> emission factor from AP-42 Table 3.4-1, SO<sub>2</sub> (15 ppm) = 0.00809\*0.0015 lb SO<sub>2</sub>/bhp-hr

**Ammonia Slip**

The proposed engine will have an SCR installed (A-3), which will control emissions with ammonia via catalytic reactions. However, there will be a small amount of ammonia that will not react and will slip through the SCR. Below are estimated Ammonia emissions for this project.

**Table 2. Emissions from Ammonia Slip**

Source#	Ammonia Slip ppm @ 15% O <sub>2</sub>	Ammonia Slip ppm @ 0% O <sub>2</sub>	Actual Temp. (°F)	Actual Exhaust Flowrate (acfm)	Dry Standard Exhaust Flowrate (dscfm)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (lb/year)
S-3	10	35.42	890	7540	1350.32	1.3E-01	6.3E+00

Basis:

- Annual emissions: Reliability-related activity 50 hours.
- It is assumed that the exhaust water content is 12.5% by weight.
- It is assumed that the exhaust is at standard pressure.
- Volumetric concentrations were corrected to 0% O<sub>2</sub> from 15% O<sub>2</sub>.
- The exhaust flowrates were corrected to 0% O<sub>2</sub> from 10% O<sub>2</sub>.

**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/yr)	Application 31404 Emissions (tons/yr)	Application 31456 Emissions (tons/yr)	Cumulative Emissions (tons/yr)
NO <sub>x</sub>	0.000	0.103	0.041	0.144
POC	0.000	0.002	0.011	0.013
CO	0.000	0.005	0.080	0.085
PM <sub>10</sub> /PM <sub>2.5</sub>	0.000	0.003	0.007	0.010
SO <sub>2</sub>	0.000	0.000	0.000	0.001

**Health Risk Assessment (HRA)**

HRA was required. The diesel particulate emissions from the project are greater than the toxic trigger level of 0.26 lb/year. All PM<sub>10</sub> emissions are considered diesel particulate emissions. The PM<sub>10</sub> emissions from this application are summarized in Table 1. There is

a related application in the project, AN 31404. 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 did not qualify for HRA streamlining because the application had multiple toxic air contaminants (TAC), both ammonia and PM emissions.

Ammonia emissions are not expected to exceed Regulation 2-5 acute and chronic toxic trigger level of 7.1 lb/hr and 7,700 lb/year. However, Ammonia emissions were included in the HRA.

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 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 4.2 in a million, and the maximum project chronic hazard index is estimated at 0.0032. The maximum acute hazard index is 0.0024. See HRA Report for more details.

**Table 3. Risk Screening Results: Project**

<b>Maximally Exposed Receptor</b>	<b>Maximum Cancer Risk</b>	<b>Maximum Chronic Hazard Index</b>
Resident	3.0 chances in a million	0.00082
Worker	4.2 chances in a million	0.0032
School	0.30 chances in a million	0.0011

**Table 4. Cancer Risk by Source**

<b>Source</b>	<b>Resident</b>	<b>Worker</b>
S-1	1.6	1.4
S-2	1.4	2.8
S-3	0.053	0.018

**TBACT**

In accordance with the District’s Regulation 2-5-301, this source does not require TBACT because the estimated source cancer risk is less 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).

**Project Risk Limits**

Since the proposed engine, operating at 50 hours/year for reliability related testing, complies with TBACT, and the estimated project cancer risk 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, NOx, CO, SO<sub>2</sub>, or PM<sub>10</sub>.

BACT for this source is presented in the current BAAQMD BACT/TBACT Workbook for IC Engine – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump, Document #96.1.5, Revision 0. dated 12/22/2020. For NOx, CO, POC and PM<sub>10</sub>, BACT(2) is the CARB ATCM standard for the respective pollutant at the applicable horsepower rating. For SO<sub>2</sub>, BACT(2) is using fuel with sulfur content not to exceed 0.0015%, or 15 ppm. The more restrictive BACT(1) standards are not applicable to this engine because it will be limited to operation as an emergency standby engine.

The CO emission factor is an EPA certified value for the engine family. The POC and NOx emission factor is an uncertified value after installation of the SCR. Therefore, S-3 will need to verify compliance with the POC and NOx BACT (2) standard through the performance of a source test. S-3 satisfies the current BACT(2) standards for the following pollutants which exceed 10 lb/day in Table 1:

<b>Pollutant</b>	<b>Emission Factor</b>	<b>BACT(2) Standard</b>
NOx	0.50 g/bhp-hr	0.50 g/bhp-hr
CO	0.97 g/bhp-hr	2.60 g/bhp-hr
POC	0.14 g/bhp-hr	0.14 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 NOx or POC, as specified in Regulation 2-2-302; 100 tons per year or more of PM<sub>2.5</sub>, PM<sub>10</sub> or sulfur dioxide, as specified in Regulation 2-2- 303.

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 9-1-301 (*Limitations on Ground Level Concentrations of SO<sub>2</sub>*)

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 standby engines  
Section 9-8-502 – Recordkeeping

**California Environmental Quality Act (CEQA)**

This project is ministerial under the District Regulation 2-1-311 (Permit Handbook Chapter 2.3) and is therefore not subject to CEQA review.

**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.

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

Because this equipment will be located within 1,000 feet of Little Tree Montessori International 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(s) and all residents within 1,000 feet of the facility. There will be a 30-day public comment period.

**Permit Conditions**

**Permit Condition 22850 for S-3**

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, 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 27416 for S-3**

1. The owner/operator shall not operate unless nitrogen oxide (NO<sub>x</sub>) emissions from the emergency diesel engine are abated by a Selective Catalytic Converter at all

times.

[Basis: BACT]

2. The owner/operator shall not exceed the following emission limitations:
  - a. NO<sub>x</sub>: 0.5 gram/horsepower hour  
[Basis: BACT]
3. Within 60 days from startup, and within a frequency of no less than once every three (3) years after each subsequent source test thereafter, the owner/operator shall conduct District approved source tests to determine compliance with the limit in Part 2 of this condition. The owner/operator shall submit the source test results to the District's Source Test Section no later than 60 days after the source test.  
[Basis: Regulation 2-1-403]
4. The owner/operator shall comply with all applicable testing requirements as specified in Volume IV of the District's Manual of Procedures. The owner/operator shall notify the District's Source Test Section, in writing, of the source test protocols and projected test dates at least 7 days prior to testing.  
[Basis: Regulation 2-1-403]
1. The owner/operator shall maintain the following records 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 District staff upon request.
  - a. Source Test Notification
  - b. Source Test Report  
[Basis: Regulation 2-1-403]

*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/Permit to Operate 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 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/Permit to Operate for the following source:

**S-3 Emergency Standby Diesel Generator Set**  
**Make: Cummins, Model: QST30-G5 NR2, Model Year: 2021**  
**1490 bhp, 9.89 MMBtu/hr**  
**Permit Condition Nos. 22850 and 27416**

*Abated by*

**A-3 Selective Catalytic Reduction**  
**Cummins CA451-T4i After Treatment**

Prepared By: Liana Solis, Air Quality Technician I

DRAFT



## Attachment 1

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

**Source Category**

<b>Source:</b>	IC Engine-Compression Ignition: Stationary Emergency, non- Agricultural, non-direct drive fire pump	<b>Revision:</b>	0
		<b>Document #:</b>	96.1.5
<b>Class:</b>	≥ 1000 BHP Output	<b>Date:</b>	12/22/2020*

**Determination**

Pollutant	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
<b>POC (NMHC)</b>	1. n/s <sup>a</sup> 2. 0.14 g/bhp-hr <sup>b</sup>	1. n/s <sup>a</sup> 2. Any engine certified or verified to achieve the applicable standard
<b>NO<sub>x</sub></b>	1. n/s <sup>a</sup> 2. 0.5 g/bhp-hr <sup>b</sup>	1. n/s <sup>a</sup> 2. Any engine certified or verified to achieve the applicable standard
<b>SO<sub>2</sub></b>	1. n/s <sup>a</sup> 2. Fuel sulfur content not to exceed 0.0015% (wt) or 15 ppm (wt)	1. n/s <sup>a</sup> 2. CARB Diesel Fuel (Ultra Low Sulfur Diesel)
<b>CO</b>	1. n/s <sup>a</sup> 2. 2.6 g/bhp-hr <sup>b</sup>	1. n/s <sup>a</sup> 2. Any engine certified or verified to achieve the applicable standard
<b>PM<sub>10</sub></b>	1. n/s <sup>a</sup> 2. 0.02 g/bhp-hr <sup>b</sup>  3. 0.02 g/bhp-hr	1. n/s <sup>a</sup> 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
<b>NPOC</b>	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**

- |                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a.</p> <p>b.</p> <p>c.</p> | <p>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.</p> <p>Deleted (no longer applies).</p> <p>Cost- effectiveness analysis must be based on lesser of 50 hr/yr or non-emergency operation as limited by District health risk screen analysis.</p> |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Table 1: BACT 2 Emission Limits based on CARB ATCM

<b>Emissions Standards for Stationary Emergency Standby Diesel-Fueled CI Engines <math>\geq 50</math> BHP g/Kw-hr (g/bhp-hr)</b>			
<b>Maximum Engine Power</b>	<b>PM</b>	<b>NMHC+NOx</b>	<b>CO</b>
37 $\leq$ KW < 56 (50 < HP < 75)	0.20 (0.15)	4.7 (3.5)	5.0 (3.7)
56 $\leq$ KW < 75 (75 < HP < 100)	0.20 (0.15)	4.7 (3.5)	5.0 (3.7)
75 $\leq$ KW < 130 (100 < HP < 175)	0.20 (0.15)	4.0 (3.0)	5.0 (3.7)
130 $\leq$ KW < 225 (175 $\leq$ HP < 300)	0.20 (0.15)	4.0 (3.0)	3.5 (2.6)
225 $\leq$ KW < 450 (300 < HP < 600)	0.20 (0.15)	4.0 (3.0)	3.5 (2.6)
450 $\leq$ KW $\leq$ 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)

