

DRAFT ENGINEERING EVALUATION

Facility ID No. 14036
Silicon Valley Clean Water, Redwood City Pump Station
1581 Maple Street, Redwood City, CA 94063
Application No. 681163

Background

Silicon Valley Clean Water, Redwood City Pump Station is applying for an Authority to Construct/Permit to Operate for the following equipment:

S-2 Emergency Standby Diesel Generator Set
Make: Mitsubishi, Model: S16R-Y2PTAW2-1, Model Year: 2022
2933 bhp, 19.47 MMBtu/hr
Permit Condition Nos. 100072, 100073, 27785

Abated by

A-1 Selective Catalytic Reduction
Make: Johnson Matthey, Model: SCRT

A-2 Diesel Particulate Filter
Make: Johnson Matthey, Model: SCRT

The criteria pollutants are nitrogen oxides (NO_x), carbon monoxide (CO), precursor organic compounds (POC) from unburned diesel fuel, sulfur dioxide (SO₂) and particulate matter (PM₁₀). All of these pollutants are briefly discussed on the District's web site at www.baaqmd.gov.

S-2 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-2

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 _x	4.034	0.500	77.26	161.10	0.081
POC	0.380	0.140	21.63	45.11	0.023
CO	0.447	0.448	69.16	144.22	0.072
PM ₁₀ /PM _{2.5} ¹	0.127	0.038	5.88	12.26	0.006
SO ₂	N/A ²	N/A ²	0.85	1.77	0.001

Basis:

- Annual emissions: Reliability-related activity 50 hours for S-2
- Max daily emissions: 24-hour operation
- Emissions from EPA Engine Family NMVXL65.4BBA for S-2
- ¹ Conservative Assumption: All PM emissions are PM2.5
- ² SO₂ emission factor from AP-42 Table 3.4-1, SO₂ (15 ppm) = 0.00809*0.0015 lb SO₂/bhp-hr

Ammonia Slip

The proposed engine will have an SCR installed (A-1), 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% O2	Ammonia Slip ppm @ 0% O2	Actual Temp. (°F)	Actual Exhaust Flowrate (acfm)	Dry Standard Exhaust Flowrate (dscfm)	Hourly Emission Rate (lb/hr)	Annual Emission Rate (lb/year)
S-2	10	35.42	979	17302	2906.89	2.7E-01	1.4E+01

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% O₂ from 15% O₂.
- The exhaust flowrates were corrected to 0% O₂ from 10% O₂.

Plant Cumulative Increase

Table 3 summarizes the cumulative increase in criteria pollutant emissions that will result from this application.

Table 3. Plant Cumulative Emissions Increase, Post 4/5/91

Pollutant	Existing Emissions Post 4/5/91 (tons/yr)	Application Emissions (tons/yr)	Cumulative Emissions (tons/yr)
NO _x	0.000	0.081	0.081
POC	0.000	0.023	0.023
CO	0.000	0.072	0.072
PM ₁₀ /PM _{2.5}	0.000	0.006	0.006
SO ₂	0.000	0.001	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 PM10 emissions are considered diesel particulate emissions. The PM10 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 did not qualify for HRA streamlining because the project emissions are greater than the streamlining thresholds.

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 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 0.098 in a million, and the maximum project chronic hazard index is estimated at 0.000077. The maximum acute hazard index is 0.0022. See HRA Report for more details.

Table 4. Risk screening results

Maximally Exposed Receptor	Maximum Cancer Risk	Maximum Chronic Hazard Index
Resident	0.047 chances in a million	0.000013
Worker	0.098 chances in a million	0.000077

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 ≥ 1000 bhp are described in BAAQMD BACT/TBACT Workbook for IC Engines – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump, Document #96.1.5, Revision 0. dated 12/22/2020 (see Attachment 1). The PM emission rate is not certified for this engine after installation of the DPF. S-2 will need to verify compliance with the TBACT standards through the performance of a source test.

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 6.0 in a million, and project hazard indices do not exceed 1.0, this project complies with the District’s Regulation 2-5-302 project risk requirements for permit applications deemed

complete after to July 1, 2022, and for projects located within an Overburdened Community, as defined in Regulation 2-1-243.

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.

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 #96.1.3, Revision 8. dated 12/22/2020. For NOx, CO, POC and PM₁₀, BACT(2) is the CARB ATCM standard for the respective pollutant at the applicable horsepower rating. For SO₂, 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 NOx, POC, PM₁₀, and CO emission factors are uncertified after installation of the SCR. Therefore, S-2 will need to verify compliance with the BACT (2) standards through the performance of a source test. S-2 satisfies the current BACT(2) standards for the following pollutants which exceed 10 lb/day in Table 1:

Pollutant	Emission Factor	BACT(2) Standard
NOx	0.50 g/bhp-hr	0.50 g/bhp-hr
CO	0.45 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_{2.5}, PM₁₀ or sulfur dioxide, as specified in Regulation 2-2- 303.

Table 5. Potential to Emit for FID 14036

Pollutant	Existing Annual Emissions* (TPY)	Application Annual Emissions* (TPY)	Facility Annual Emissions (TPY) *	Offset Requirement (TPY)	Offset Required
NOx	0.853	0.242	1.095	>10	N
POC	0.025	0.068	0.093	>10	N
CO	0.196	0.216	0.412	-	N
PM ₁₀ /PM _{2.5} ¹	0.025	0.018	0.043	≥100	N
SO ₂	0.014	0.003	0.017	≥100	N

*Annual emissions:

Reliability-related activity of 20 hours and emergency operation of 100 hours for S-1.

Reliability-related activity of 50 hours and emergency operation of 100 hours for S-2.

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 SO₂*)

Regulation 9-8 (*NO_x 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)

Silicon Valley Clean Water served as the Lead Agency under the California Environmental Quality Act (CEQA) and prepared an Environmental Impact Report in August 2017. The State Clearing House Number is 2016022055.

The main goal of the project is to provide improvements and upgrades to portions of the conveyance system and wastewater treatment plant as part of the Treatment Reliability Improvements Project. The project will include adding a chemical odor scrubber, exhaust fans, electric equipment and standby power generator to the Redwood City Pump Station.

The Lead Agency has determined that air quality impacts will be less than significant with mitigation. In addition, the project is not expected to exceed the District's Air Quality CEQA Thresholds of Significance. Furthermore, the individual component, S-2, will be statutorily exempt under CEQA Guidelines Section 15269(c) because S-2 will be used for the purpose of mitigating emergencies.

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 Notification (Regulation 2-1-412)

Because this equipment will be located within Overburdened Community, as defined in Regulation 2-1-243, and requires an HRA, 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 businesses and residents within 1,000 feet of the facility. There will be a 30-day public comment period.

Permit Conditions

Permit Condition #100072 for S-2

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. I 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]
4. 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 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-2

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]

Permit Condition # 27783 for S-2

1. The owner/operator shall ensure the engine is abated at all times of operation by an approved Selective Catalytic Reduction (SCR) System and Diesel Particulate Filter (DPF) equipped with a backpressure monitor or other approved Diesel Exhaust Particulate Matter Abatement System. The engine, SCR System, and DPF with backpressure monitor or other approved system shall be installed, maintained, and operated in accordance with the manufacturer specifications and/or best modern practices.

[Basis: Cumulative Increase, Title 17 CCR Section 93115.6(a)(3), 40 CFR 1039.101, BACT, TBACT]

2. The owner/operator shall take all corrective actions recommended by the manufacturer in response to backpressure monitor notifications.
[Basis: Cumulative Increase, Title 17 CCR Section 93115.6(a)(3), 40 CFR 1039.101, BACT, TBACT]

3. The owner/operator shall ensure urea injection commences as soon as the SCR catalyst bed reaches minimum operating temperature as specified by the manufacturer.

[Basis: Cumulative Increase, Title 17 CCR Section 93115.6(a)(3), 40 CFR

1039.101, BACT, TBACT]

4. The owner/operator shall ensure engine emissions do not exceed an ammonia (NH₃) slip of 10 ppmv, dry @ 15% O₂ from the SCR system. If deemed necessary to demonstrate compliance with Regulation 2, Rule 5, the Air District may require a source test to determine compliance with this emission limit.
[Basis: Regulation 2, Rule 5]
5. The owner/operator shall ensure engine emissions do not exceed the following limits:
NO_x: 0.50 g/bhp-hour
POC: 0.14 g/bhp-hour
CO: 2.60 g/bhp-hour
[Basis: BACT and Cumulative Increase]
6. To demonstrate compliance with Part 5, the owner/operator shall conduct an initial Air District-approved source test within 60 days of startup and once every three years thereafter at the normal or expected load during emergency operation using Air District approved source test methods. The owner/operator shall document urea usage (gallons per minute) and average kW during all tests, preferable as digital records. The owner/operator shall submit the source test results to the Air District's Source Test Section no later than 60 days after source test completion.
[Basis: BACT and Cumulative Increase]
7. The owner/operator shall comply with all applicable testing, sampling port location and safe access requirements as specified in Volume IV of the Air District's Manual of Procedures. The owner/operator shall notify the Air District's Source Test Section, in writing, of the source test protocols, sampling port locations, layout, access and projected test dates at least 30 days prior to testing. The following test methods shall be used for each pollutant:
NO_x EPA Method 7E or Air District- approved equivalent
POC EPA Method 25A and EPA Method 18 or Air District- approved equivalent
CO EPA Method 10 or Air District- approved equivalent.
[Basis: Regulation 2-1-403]
8. To determine compliance with the above conditions, the owner/operator shall maintain the following records in a Air District- approved log and shall make these records available to Air District staff upon request. All records shall be retained 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 Synthetic Minor Operating Permit). These recordkeeping requirements shall not replace the recordkeeping requirements contained in any applicable Air District or state regulations.
 - a. Source Test Notifications
 - b. All source test reports

- c. Engine serial number and source number for each source test
 - d. Engine load percentage
 - e. Engine, SCR, and DPF maintenance records
 - f. SCR system owner's manual or manufacturer's specifications
 - g. DPF owner's manual or manufacturer's specifications
 - h. All backpressure and corrective actions
 - i. SCR urea injection rate (gpm)
- [Basis: BACT, Cumulative Increase, Recordkeeping]

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 an Overburdened Community, as defined in Regulation 2-1-243, 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-2 Emergency Standby Diesel Generator Set
Make: Mitsubishi, Model: S16R-Y2PTAW2-1, Model Year: 2022
2933 bhp, 19.47 MMBtu/hr
Permit Condition Nos. 100072, 100073, and 27785

Abated by

A-1 Selective Catalytic Reduction
Make: Johnson Matthey, Model: SCRT

A-2 Diesel Particulate Filter
Make: Johnson Matthey, Model: SCRT

Prepared By: Liana Solis, Air Quality Technician II

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:	0
		Document #:	96.1.5
Class:	≥ 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 ^a 2. 0.14 g/bhp-hr ^b	1. n/s ^a 2. Any engine certified or verified to achieve the applicable standard
NO_x	1. n/s ^a 2. 0.5 g/bhp-hr ^b	1. n/s ^a 2. Any engine certified or verified to achieve the applicable standard
SO₂	1. n/s ^a 2. Fuel sulfur content not to exceed 0.0015% (wt) or 15 ppm (wt)	1. n/s ^a 2. CARB Diesel Fuel (Ultra Low Sulfur Diesel)
CO	1. n/s ^a 2. 2.6 g/bhp-hr ^b	1. n/s ^a 2. Any engine certified or verified to achieve the applicable standard
PM₁₀	1. n/s ^a 2. 0.02 g/bhp-hr ^b 3. 0.02 g/bhp-hr	1. n/s ^a 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

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|-------------------------------|---|
| <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> |
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Table 1: BACT 2 Emission Limits based on CARB ATCM

Emissions Standards for Stationary Emergency Standby Diesel-Fueled CI Engines \geq50 BHP g/Kw-hr (g/bhp-hr)			
Maximum Engine Power	PM	NMHC+NOx	CO
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 \leq 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)