ENGINEERING EVALUATION
Mare Island Dry Dock, LLC
Plant 22155 | Application No. 727025
1180 Nimitz Avenue, Vallejo, CA 94592

BACKGROUND

Mare Island Dry Dock, LLC (MIDD) has applied for an Authority to Construct (AC)/Permit to Operate (PO) for the following equipment:

S-2 Portable Prime Direct-Drive Diesel Fire Pump Generator Set
Firewater Pump Make/Model: Multiquip DCA70SSJU4F
Tier 4 diesel engine with integrated diesel oxidation catalyst (DOC) and selective catalytic reduction (SCR)
Diesel Engine Make: John Deere, Model: 4045HFC04, EPA Family Name: MJDXL04.5315
Model Year: 2021, 140 BHP, 1.07 MMBtu/hour
CARB Executive Order U-R-004-0605 dated November 25th, 2020
Location: Southeast portion of dock

S-3 Portable Prime Direct-Drive Diesel Fire Pump Generator Set
Firewater Pump Make/Model: Multiquip DCA70SSJU4F
Tier 4 diesel engine with integrated diesel oxidation catalyst (DOC) and selective catalytic reduction (SCR)
Diesel Engine Make: John Deere, Model: 4045HFC04, EPA Family Name: MJDXL04.5315
Model Year: 2021, 140 BHP, 1.07 MMBtu/hour
CARB Executive Order U-R-004-0605 dated November 25th, 2020
Location: Northeast portion of dock

MIDD provides service and repair for government and commercially owned maritime vessels. The proposed S-2 and S-3 portable prime direct-drive diesel fire pump engines will operate only when the onboard fire suppression system in the maritime vessels serviced/repaired at MIDD is temporarily disabled for maintenance. Both portable diesel engines provide standby fire protection when required. MIDD has requested an annual limit of 365 hours of usage for each engine.

Portable engines are non-road engines as defined by 40 CFR 10393.801 and 1068.30. Section 209(e)(1) of the Federal Clean Air Act does not allow states "or political subdivisions" to impose emission control on non-road engines. The exception is standards and other requirements imposed by the State of California necessary to achieve attainment of air pollution standards. The regulatory analysis for this application will take this into account.

S-2 and S-3 each meet the United States Environmental Protection Agency (USEPA) Tier 4 Off-road standard. The engines will exclusively burn commercially available California ultra-low sulfur diesel. The sulfur content of the diesel fuel will not exceed 0.0015% by weight.

EMISSION CALCULATIONS

Emissions for Oxides of Nitrogen (NOx), Precursor Organic Compounds (POCs), carbon monoxide (CO), particulate matter with an aerodynamic diameter of 10 microns (PM10), particulate matter with an aerodynamic diameter of 2.5 microns (PM2.5), and oxides of Sulfur (SO2) are calculated in Table 1 below. Each engine is rated 140 bhp with a 1.07 MMBtu/hr firing rate. Certified emission factors summarized in Table 1 were taken from CARB Executive Order U-R-004-0605 dated November 25th, 2020, for Tier 4 Final Model Year 2021 John Deere engine family MJDXL04.5315.

Table 1. Emissions Summary for S-2 and S-3

Pollutant	Emission Factor (g/bhp-hr)	Combined Maximum Daily Emissions[1] (lb/day)	Combined Annual Emissions[2] (lb/yr)	Annual Emissions (tpy)
NOx	2.46E-01	3.65E+00	55.45	0.028
CO	7.46E-02	1.10E+00	16.80	0.008
POC	1.49E-02	2.21E-01	3.36	0.002
PM_{10}	1.49E-02	2.21E-01	3.36	0.002
$PM_{2.5}$	1.49E-02	2.21E-01	3.36	0.002
SO_2	0.001515	2.24E-02	0.34	0.000

[1] Maximum daily emissions are based on 24-hour operation for each engine (S-2 and S-3)

$$2.46E-01\frac{\cancel{g}_{NOx}}{\cancel{bhp-hr}} * 140\,\cancel{bhp} * \frac{24\,\cancel{hr}}{day} * \frac{1\,lb}{453.6\,\cancel{g}} = 1.82\,lb\,NOx/day$$

[2] Annual emissions are based on 365 hours of operation for each engine (S-2 and S-3)

$$2.46E-01\frac{\cancel{g}_{NOx}}{\cancel{bhp-hr}} * 140\,\cancel{bhp} * \frac{365\,\cancel{hr}}{year} * \frac{1\,lb}{453.6\,\cancel{g}} = 27.72\,lb\,NOx/year$$

[3] SO_2 emissions are based upon the following:

- Maximum sulfur content = 15 ppm
- Density of Ultra Low Sulfur Diesel Fuel = 7.31 lb/gal
- Fuel usage rate of 7.8 gal/hour
- Molecular weight (MW) of SO2 = 64.066 g/mol, MW of Sulfur (S) = 32.065 g/mol

The following provides the calculations for the daily and annual emission rates of SO_2 for each engine (S-2 and S-3).

$$\left(\frac{15\,lb\,S}{1.0E+06\,lb\,fuel}\right) * \left(\frac{7.31\,lb\,fuel}{gal\,fuel}\right) * \left(\frac{7.8\,gal\,fuel}{hr}\right) * \left(\frac{64.066\ \ g/mol}{32.065\ \ g/mol}\right) * \left(\frac{365\,hr}{yr}\right)$$

$$= 0.041\,\frac{lbs\,SO_2}{day} = 0.62\,\frac{lbs\,SO_2}{year} = 0.00031\,tpy$$

Ammonia Slip

S-2 and S-3 will each be abated by an integral diesel oxidation catalyst and a selective catalytic reduction (SCR) system. Ammonia slip emissions refer to the small amount of ammonia that will not react in reducing NOx and slip past the SCR catalyst. Since the device is integral and not add-on, we will assume an ammonia emission limit of 10 ppmv at 15% oxygen and 12.5% water content. The estimated emissions from ammonia slip from each engine (S-2 and S-3) are summarized in Table 2 below.

445 acfm, 752° F, 15% oxygen, and 12.5% water content
(445 acfm) * ((460° F + 70° F) / (460° F + 752° F)) = 195 scfm
195 scfm * (1 – 0.125) = 171 dscfm

Ammonia slip: 10 ppmv * (20.9% / (20.9% - 15%)) = 35.42 ppmv

Ammonia mass emissions
(35.42 ppmv * 171 dscfm * 60 min/hr * 17 lb-mol/mol) / (1,000,000 x 386.9 scf/lb-mol)
= 1.6E-02 lbs/hr

Table 2. Ammonia Slip Emissions Summary for each engine (S-2 and S-3)

Source #	Ammonia Slip ppm @ 15% O_2	Actual Temp (°F)	Actual Exhaust Flowrate (acfm)	Standard Exhaust Flowrate (scfm)	Dry Standard Exhaust Flowrate (dscfm)	Hourly Emission Rate (lb/hour)	Annual Emission Rate (lb/year)
2	35.4	752	445	195	171	1.6E-02	5.8
3	35.4	752	445	195	171	1.6E-02	5.8

Cumulative Increase
Table 3 summarizes the cumulative increase in criteria pollutant emissions that will result from this application assuming S-2 and S-3 will each operate for 365 hours/year as prime engines.

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

Pollutant	Post-4/5/91 Emissions (tpy)	Application 727025 S-2 Emissions (tpy)	Application 727025 S-3 Emissions (tpy)	Cumulative Increase (tpy)
NO_x	0.000	0.014	0.014	0.028
CO	0.000	0.004	0.004	0.008
POC	17.740	0.001	0.001	17.742
PM_{10}	0.810	0.001	0.001	0.812
$PM_{2.5}$	0.000	0.001	0.001	0.002
SO_2	0.000	0.000	0.000	0.000

Toxics
Table 4 below summarizes the toxic air contaminant (TAC) emissions that will result from this application. Diesel engines are a source of diesel exhaust particulate matter (DEPM), which is a TAC. Since S-2 and S-3 are each equipped with an integral ammonia slip catalyst, emissions of ammonia – a TAC was also considered along with DEPM when evaluating TACs in the HRA. While ammonia emissions from this project are below the TAC trigger levels as specified in Air District Regulation 2, Rule 5 Table 2-5-1, DEPM emissions exceed the chronic TAC threshold and, therefore, a refined health risk assessment (HRA) is required for this project.

Table 4. Application 727025 Project Emissions (S-2 and S-3)

Pollutant	Emission Rate	TAC Trigger
PM_{10} (Diesel Particulate Matter)	3.36 lb/yr	0.26 lb/yr
Ammonia	3.2E-02 lb/hr	1.4E+00 lb/hr
	11.7 lb/yr	7,700.0 lb/yr

Health Risk Assessment (HRA)
The combined diesel exhaust particulate matter emissions from S-2 and S-3, estimated at 3.36 pounds/year assuming each engine operates for 365 hours/year, is greater than the Regulation 2, Rule 5 chronic toxic trigger level of 0.26 pounds/year. Therefore, an HRA is required.

This application does not qualify for HRA streamlining using the Air District's 2024 HRA Streamlining spreadsheet for diesel-fired IC engines because the project exceeds the emissions threshold for vicinity to a nearby business while located in an overburdened community. The HRA will be conducted in conformance with the Air District's risk assessment guidelines, and those guidelines provide for a streamlined approach for determining that the project complies with Air District Regulation 2-5 risk limits for certain types of backup diesel generators.

Regulation 2-5-216 requires the project include those new or modified sources of TACs at a facility that have been permitted within the five-year period immediately preceding the date a complete application is received, and any project at that facility where an Authority to Construct has been issued and has not expired, unless the applicant demonstrates to the satisfaction of the APCO that construction or modification of the sources included in the current application was neither (1) a reasonable foreseeable consequence of the previous project, nor (2) a critical element or integral part of the previous project. This application is not related to any other applications issued in the past 5 years to be considered part of a project.

Offsets
The potential to emit (PTE) for all sources operating at the facility is shown in Table 5.

Table 5. PTE from all active sources at the facility

Pollutant	Pre-Application PTE (tpy)	S-2 Engine (tpy)	S-3 Engine (tpy)	Total PTE (tpy)
NO_x	0.000	0.014	0.014	0.028
POC	22.510	0.001	0.001	22.512
CO	0.000	0.004	0.004	0.008
PM_{10}	0.810	0.001	0.001	0.812
$PM_{2.5}$	0.000	0.001	0.001	0.002
SO_2	0.000	0.000	0.000	0.000

Because there is currently no entity controlling, controlled by, or under common control with MIDD that owns or controls offsets, and since the post-application POC TPY is less than 35 TPY, 0.002 TPY of POC will be offset by the Air District Small Facility Bank at a 1:1 ratio per Air District Regulation 2-2-302.1.

<u>STATEMENT OF COMPLIANCE</u>
The owner/operator is expected to comply with all applicable requirements listed below:

<u>Air District Rules</u>

Regulation 1
S-2 and S-3 are subject to and expected to be in compliance with the requirements of Regulation 1-301 (Public Nuisance).

Regulation 2, Rule 1

2-1-301 – Authority to Construct
According to Regulation 2-1-301, prior to the installation of the equipment, an ATC must be obtained. The facility has submitted an application and is expected to be in compliance with Regulation 2-1.

2-1-310 – Applicability of 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 portable prime engines 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.

2-1-412 – Public Notice, Schools, & Overburdened Communities
Pursuant to California Health & Safety Code §42301.6(a) and BAAQMD Regulation 2-1-412, prior to approving an application for a permit to construct or modification of a source, which is located within 1,000 feet from the outer boundary of a school site, the Air District shall prepare a public notice as detailed in §42301.6. In addition, if the facility is located in an overburdened community (OBC) and triggers an HRA, a public notice needs to be filed. The facility has been certified by the applicant and verified by the Air District staff to be located greater than 1,000 feet from the nearest school. However, the facility is located within an OBC and requires an HRA. Therefore, a public notice pursuant to Regulation 2-1-412 is required for this application.

Regulation 2, Rule 2

2-2-301 – Best Available Control Technology (BACT)
S-2 and S-3 are portable engines. Therefore, emissions from these sources are not subject to BACT standards per Section 209(e) of the Federal Clean Air Act and Appendix A to Subpart A of 40 CFR Part 1074. In addition and per Table 1, the potential to emit Air District BACT pollutants from S-2 and S-3 are each below 10.0 pounds per pollutant on any day. Therefore, BACT even if required, would not be triggered for S-2 and S-3.

2-2-302 – Offset Requirements, Precursor Organic Compounds and Oxides of Nitrogen
Offsets are required for new and modified sources when the potential to emit NOx or POC at a facility exceeds 10 tons per year per pollutant. As seen in Table 5 above, the facility's PTE exceeds 10 tons per year for POC. Since MIDD (or any entity controlled by, or under common control with MIDD) does not own or controls offsets, the cumulative increase of 0.002 tpy of POCs from this application (#727025) will be offset from the Air District's Small Facility Banking Account at a 1:1 ratio per Air District Regulation 2-2-302.1.

2-2-304, 305, and 306 – Prevention of Significant Deterioration (PSD) BACT and Impact Analysis Requirements
Sections 304, 305, and 306 outline BACT and Impact Analysis requirements for PSD projects. Section 2-2-224 defines a PSD Project as one that meets all of the following criteria:

i. The sources are located at a Major PSD facility;
ii. The project results in a significant emissions increase per Section 2-2-227.1;
iii. The project results in a significant net emissions increase per Section 2-2-227.1.

The total emissions increase from S-2 and S-3 summarized in Table 1 are below the significant emission rate thresholds for each pollutant in Section 2-2-227.2; therefore, PSD does not apply.

Regulation 2, Rule 5 – New Source Review of TACs
A refined HRA is required for any new or modified source(s) of TAC emissions that equals and/or exceeds the acute and/or chronic TAC thresholds in Table 2-5-1 of Air District Regulation 2-5. Per Table 1 and because the combined DEPM emissions from S-2 and S-3 of 3.36 pounds per year exceed the DEPM chronic trigger level of 0.26 pounds per year, a refined HRA is required.

The refined HRA results for S-2 and S-3 estimated the project cancer risk at 0.29 in a million, the project chronic hazard index (HI) at 0.00023, and the project acute HI at 0.00037. In accordance with the Air District's Regulation 2-5-301, the HRA concluded none of the proposed new sources requires TBACT because each of the estimated source risk does not exceed a cancer risk of 1.0 in a million, and/or chronic hazard index of 0.20. Since the estimated project cancer risk does not exceed 6.0 in a million and hazard indices do not exceed 1.0, this proposed project complies with the Air District's Regulation 2-5-302 project risk requirements, for projects located in an Overburdened Community, as defined in Regulation 2-1-243.

Regulation 6, Rule 1

6-1-303 – Ringelmann No. 2 Limitation
Opacity and visible emissions from S-2 and S-3 are limited by Regulations 6-1-303.1 (internal combustion engines of less than 25 liters (1500 in^3) displacement), since S-2 and S-3 each have a displacement of 4.5 liters (275 in^3).

6-1-305 – Visible Particles
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-2 and S-3 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-2 and S-3's compliance with Regulation 6, Rule 1 will be confirmed by the Air District's Compliance & Enforcement staff during their routine inspections.

6-1-310 – Total Suspended Particulate (TSP) Concentration Limits
S-2 and S-3 will each comply with 0.15 gr/dscf in Section 6-1-310.1, as shown below:

PM_{10} emission rate = (0.11 lbs/day) / (24 hours/day) = 0.0046 lbs/hour
Exhaust flowrate = 171 dscfm (445 acfm @ 752 F, 12.5% moisture)
Outlet grain loading rate = (0.0046 lbs/hr * 7000 gr/lb / (171 dscfm * 60 min/hr)) = 0.0031 gr/dscf

Section 6-1-310.2 and 6-1-311.2 don't apply to S-2 or S-3 since the PTE per engine to emit total suspended particulate (TSP) is significantly lower than 1,000 kilograms per hour (kg/hr). Also, the above sections apply to processes that handle or process materials (not ICE).

Regulation 9, Rule 1
S-2 and S-3 are subject to and are expected to comply with the applicable SO_2 limitations in Regulation 9, Rule 1 ("Inorganic Gaseous Pollutants – Sulfur Dioxide"). Because SO_2 emissions from S-2 and S-3 are negligible, MIDD will not be required to conduct ground level monitoring of SO_2 because of this project. Regulation 9, Rule 1, Section 304 states "A person shall not burn any liquid fuel having a sulfur content

in excess of 0.5% by weight". The California Air Resources Board (CARB) requires all diesel engines to burn Ultra Low Sulfur Diesel with a sulfur content of 15 ppm by weight or less (≤ 0.0015% by wt.), which is less than 0.5% by wt. requirement in Section 9-1-304. Part 2 of the proposed permit condition 100708 will require S-2 and S-3 to exclusively burn CARB diesel.

Regulation 9, Rule 8
Since S-2 and S-3 are portable, the engines are subject to Section 209(e) of the Federal Clean Air Act and are not subject to Regulation 9-8, which applies to stationary internal combustion engines.

State Rules

CARB Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines
S-2 and S-3 are subject to and meet the emission standards in 93116.3(a). 93116.3(b)(1) requires all portable diesel-fueled engines to be certified to meet a federal or California standard for newly manufactured engines pursuant to 40 CFR Part 1039 or the equivalent categories in Title 13 of the California Code of Regulations.

For engines greater than or equal to 100 hp and less than 175 with model year newer than 2015, the applicable emission standards found in Table 4 of the ATCM (corresponds to Table 1 of 40 CFR 1039.101) that apply to S-2 and S-3 are:

NOx = 0.40 gram/kW-hour (0.30 g/bhp-hour)
POC = 0.19 gram/kW-hour (0.14 g/bhp-hour)
CO = 5.0 gram/kW-hour (3.7 gram/bhp-hour)
PM = 0.02 gram/kW-hour (0.01 gram/bhp-hour)

As shown in Table 1 of this evaluation report, S-2 and S-3's emission rates comply with the requirements in Table 4 of the ATCM.

Federal Rules

New Source Performance Standards (NSPS)
40 CFR Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines applies to stationary reciprocating internal combustion engines. S-2 and S-3 are portable and are not considered stationary reciprocating combustion engines. Therefore, S-2 and S-3 are not subject to any parts of 40 CFR Part 60, Subpart IIII.

National Emissions Standards for Hazardous Air Pollutants (NESHAP)
40 CFR Part 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (RICE) applies to stationary reciprocating internal combustion engines. S-2 and S-3 are portable and are not considered a stationary reciprocating combustion engines. Therefore, S-2 and S-3 are not subject to any parts of 40 CFR Part 63, Subpart ZZZZ.

Prevention of Significant Deterioration (PSD)
A major PSD facility with a significant net increase in emissions of a PSD pollutant is considered a PSD project. The emissions increase of PSD pollutants from S-2 and S-3 summarized in Table 1 of this evaluation report are below the significant thresholds in 2-2-227. Therefore, PSD does not apply to this application.

PERMIT CONDITIONS

Permit Condition #100708 for S-2 and S-3

1. To retain the portable source and nonroad engine designations, the owner/operator of S-2 and S-3 shall not operate each engine in one location as defined in § 93116.2 for more than 12 consecutive months, following the date of initial operation. Any backup engine, which replaces either S-2 or S-3 at the same location and that is intended to perform the same function as the engine it replaced will count towards this limitation. The owner/operator of S-2 and S-3 shall not move either source and then return it back to the same location in an attempt to circumvent the portable equipment residence time requirements. The owner/operator of S-2 and S-3 shall operate each engine within the boundaries of Facility #22155. If either S-2 or S-3 is no longer a portable source as defined in § 93116.2, the owner/operator shall submit an application to BAAQMD to operate the engine as a stationary source. In this case, the engine shall be subject to BAAQMD Regulation 2, Rules 1, 2, and 5 as if it was a "New Source" per BAAQMD Regulation 2, Rule 1, Section 232.
   [Basis: Regulation 2, Rule 5, 17 CCR 93116]

2. The owner/operator of S-2 and S-3 shall fire the engines exclusively on CARB diesel fuel.
   [Basis: Cumulative Increase, Regulation 2-5, 17 CCR 93116.3(a)]

3. The owner/operator of S-2 and S-3 shall not operate each engine for more than 365 hours in any consecutive 12-month period.
   [Basis: Cumulative Increase, Regulation 2-5-302]

4. The owner/operator of S-2 and S-3 shall equip each portable engine with either:
   a. A non-resettable totalizing meter with a minimum display capability of 9,999 hours that measures the hours of operation for the engine; or
   b. A non-resettable fuel usage meter, the maximum hourly fuel rate shall be used to convert fuel usage to hours of operation.

   [Basis: Cumulative Increase]

5. To determine compliance, the owner/operator of S-2 and S-3 shall maintain the following records in an Air District-approved log and provide all of the data necessary to evaluate compliance with the above conditions, including the following information:
   a. Monthly consumption of fuel (in gallons)
   b. Hours of operation and amount of diesel fuel in part a. shall be totaled on a rolling consecutive 12-month basis.
   c. Location at which the engine operates and the duration of operation at each location.
   d. The owner/operator of S-2 and S-3 shall maintain all records in an Air District-approved log. The owner/operator shall retain the records with the equipment for two years from the date of entry and make them available for inspection by Air District staff upon request. These recordkeeping requirements shall not replace the recordkeeping requirements in any applicable Air District Regulations.

   [Basis: Cumulative Increase, Regulation 2-5]

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 Air 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 the following sources:

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S-3 Portable Prime Direct-Drive Diesel Fire Pump Generator Set
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Location: Northeast portion of dock

Christopher Ablaza Date
Air Quality Engineer
Engineering Division