**DRAFT**
**ENGINEERING EVALUATION**
**The City of Palo Alto Mayfield Pump Station**
**PLANT NO. 21273**
**APPLICATION NO: 24383**

## BACKGROUND

The City of Palo Alto Mayfield Pump Station of Stanford California is applying for an Authority to Construct and/or Permit to Operate two Standby Emergency Generators.

**S-1 Stationary Standby Generator Set: Diesel Engine; Make: Volvo; Model: TAD1641GE; Model Year; 2012; Rated Horsepower: 757 HP; Abated by DCL International Inc. (Mine-X Scootfilter Diesel Particulate Filter System)**

**S-2 Stationary Standby Generator Set: Diesel Engine; Make: Volvo; Model: TAD1641GE; Model Year; 2012; Rated Horsepower: 757 HP; Abated by DCL International Inc. (Mine-X Scootfilter Diesel Particulate Filter System)**

The standby generators will be located at 1711 Stanford Avenue, Stanford, CA 94305

## EMISSIONS SUMMARY

### Annual Emissions:

The Manufacturer's Statement of Exhaust emission factors for S-1 and S-2 (757 HP- diesel engine) are listed below.

| Pollutant | Emission Factors (g/bhp-hr) | Abatement Efficiency 85% Reduction |
|---|---|---|
| NOx | 3.80 | |
| CO | 0.50 | |
| POC | 0.20 | |
| PM10 | 0.14 | **0.02** |
| SO2 | 0.0055 | |

**The emission factor for SO2 is from Chapter 3, Table 3.4-1 of the EPA Document AP-42, Compilation of Air Pollutant Emission Factors.*

*$SO_2$ 8.09E-3 (% S in fuel oil) lb/hp-hr = 8.09E-3 (0.0015% S) (454 g/lb) = 0.0055 g/hp-hr*

**S-1 and S-2**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NOx | = | (3.8 g/hp-hr) | (757 hp) | (50 hr/yr) | (lb/454g) | = 316.8 lb/yr | = 0.158 TPY |
| CO | = | (0.50 g/hp-hr) | (757 hp) | (50 hr/yr) | (lb/454g) | = 41.6 lb/yr | = 0.021 TPY |
| POC | = | (0.20 g/hp-hr) | (757 hp) | (50 hr/yr) | (lb/454g) | = 17.5 lb/yr | = 0.008 TPY |
| PM10 | = | (0.02 g/hp-hr) | (757 hp) | (50 hr/yr) | (lb/454g) | = 1.67 lb/yr | = 0.000 TPY |
| SO2 | = | (0.0055g/hp-hr) | (757 hp) | (50 hr/yr) | (lb/454g) | = 0.458 lb/yr | = 0.000 TPY |

**Maximum Daily Emissions:**

A full 24-hour day will be assumed since no daily limits are imposed on intermittent and unexpected operations.

***For S-1 and S-2:***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| NOx | = | (3.8 g/hp-hr) | (757 hp) | (24 hr/day) | (lb/454g) | = | 152 lb/day |
| CO | = | (0.50 g/hp-hr) | (757 hp) | (24 hr/day) | (lb/454g) | = | 20.0 lb/day |
| POC | = | (0.20 g/hp-hr) | (757 hp) | (24 hr/day) | (lb/454g) | = | 8.0 lb/day |
| PM10 | = | (0.02 g/hp-hr) | (757 hp) | (24 hr/day) | (lb/454g) | = | 0.80 lb/day |
| SO2 | = | (0.0055 g/hp-hr) | (757 hp) | (24 hr/day) | (lb/454g) | = | 0.220 lb/day |

**Plant Cumulative Increase: (tons/year)**

| Pollutant | Existing | New S-1 | New S-2 | Total |
|---|---|---|---|---|
| NOx | 0.000 | 0.158 | 0.158 | 0.316 |
| CO | 0.000 | 0.021 | 0.021 | 0.042 |
| POC | 0.000 | 0.008 | 0.008 | 0.016 |
| PM10 | 0.000 | 0.000 | 0.000 | 0.000 |
| SO2 | 0.000 | 0.000 | 0.000 | 0.000 |

**Toxic Risk Screening:**
The toxic emission of diesel particulate does exceed the District Risk Screening Trigger, as shown in Table (1) below, and a Risk Screening Analysis is necessary.

**Table 1.** Calculated incremental increase in diesel exhaust particulate matter for S-1 and S-2

| Source: | $PM_{10}$ Emission Factor (g/HP-hr) | Abatement Efficiency 85% Reduction | HP | Annual Usage (Hours/year)[1] | Diesel Exhaust Particulate Emissions (lb/year): | Trigger Level (lb/yr) | Risk Screen Required? (Yes/No) |
|---|---|---|---|---|---|---|---|
| 1 | 0.14 | 0.02 | 757 | 50 | 1.67 | 0.34 | Yes |
| 2 | 0.14 | 0.02 | 757 | 50 | 1.67 | 0.34 | Yes |

Per the attached 5/23/2012 memo from Judith Cutino, results from the health risk screening analysis, the maximally exposed industrial receptor is 2.2 in a million for 50 hours of

operation per year. In accordance with the District's Regulation 2-5, this risk level is considered acceptable. The engine meets current TBACT requirements.

## STATEMENT OF COMPLIANCE

The owner/operator of S-1 and S-2 shall comply with Reg. 6, Rule 1 Particulate Matter – General Requirements and Reg. 9-1-301 (Inorganic Gaseous Pollutants: Sulfur Dioxide for Limitations on Ground Level Concentrations). Since this engine meets TBACT for PM10 (<0.15 g/hp-hr), it is expected to comply with Reg. 6, Rule 1 Particulate Matter - General Requirements. Ultra-low sulfur diesel (15 PPM sulfur) will be used to meet the sulfur limitation of 0.5wt% in Reg. 9-1-304 as well as to minimize PM10 emissions. Because S-1 and S-2 are emergency standby generators, Reg. 9-8-110 (Inorganic Gaseous Pollutants: Nitrogen Oxides from Stationary Internal Combustion Engines) exempts the requirements for emission limits of Sections 9-8-301, 302, and 502. Allowable operating hours and the corresponding record keeping in Reg. 9-8-330 and 530 will be included in the Permit Conditions below. This diesel engine is subject to the Stationary Diesel Airborne Toxics Control Measure (ATCM) and is considered a new stationary emergency standby diesel engine since it will be installed after January 1, 2005 and is larger than 50 HP. The requirements of the ATCM will be included in the permit conditions.

The project is considered to be ministerial under the District's CEQA regulation 2-1-311 and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emissions factors and therefore is not discretionary as defined by CEQA. (Permit Handbook Chapter 2.3)

**The project is within 1000 feet from the nearest school and therefore is subject to the public notification requirements of Reg. 2-1-412.**

***Best Available Control Technology***:
In accordance with Regulation 2, Rule 2, Section 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, $SO_2$ or $PM_{10}$.

Based on the emission calculations above, the owner/operator of S-1 and S-2 are subject to BACT for the following pollutants: NOx and CO. BACT 1 levels do not apply for 'engines used exclusively for emergency use during involuntary loss of power' as per Reference b, Document 96.1.2 of the BAAQMD BACT Guidelines for IC Engines. Hence, the owner/operator has to the meet BACT 2 limits presented below.

| POLLUTANT | BACT<br>1. Technologically Feasible/ Cost Effective<br>2. Achieved in Practice<br>3. TBACT | TYPICAL TECHNOLOGY |
|---|---|---|
| NOx | *1.* n/s[d]<br>*2. Current tier* [a,b] standard for NOx *at applicable horsepower rating.* | *1.* n/s[d]<br>*2. Current tier* [a,b] standard for NOx *at applicable horsepower rating.* |
| CO | 1. *n/s*[d]<br>2. The more stringent of either 2.75 *g/bhp-hr [319 ppmvd @ 15% O2]*[,c] *or the current Tier* [a,b] *standard* | *1.* n/s[d]<br>*2.Any engine certified or verified to achieve the applicable standard.* |

The NOx and CO emission limits set by BACT 2 are met, as shown in Table (2).

Table (2)

| Pollutant | Engine Emission Factors (g/hp-hr) | Emission Factor Limits as set by BACT 2 (g/hp-hr) | Have the limits been met? |
|---|---|---|---|
| NOx+POC | 4.0 | 4.8 | YES |
| CO | 0.50 | 2.75 | YES |

Therefore, S-1 and S-2 are determined to be in compliance with the BACT 2 limits for NOx and CO.

***Offsets***: Offsets must be provided for any new or modified source at a facility that emits more than 10 tons/yr of POC or NOx. Based on the emission calculations above, offsets are not required for this application.

***NSPS***: The engine is subject to 40 CFR 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines because it was manufactured after April 1, 2006, as required by Section 60.4200(a)(2)(i).

The engine has a total displacement of 16.12 liters. Each cylinder has a volume of less than 10 liters. The engines are 2012 engines. Section 60.4205(b) requires these engines to comply with the standards in Section 60.4202 for all pollutants for the same model year and maximum engine power. Section 60.4202(a)(ii) requires that engines over 50 hp must meet the EPA standards in 40 CFR 89.112 and 40 CFR 89.113. For engines above 750 hp, below 3000 hp, and that have a displacement less than 10 liters per cylinder, the requirement is to comply with the certification standards in 40 CFR 89.112 and 89.113 for all pollutants.

For engines above 750 hp, the standards are:

- NOx + NMHC: 4.8 g/hp-hr
- CO: 2.6 g/hp-hr
- PM: 0.15 g/hp-hr

According to the Manufacturer's Statement of Exhaust Emissions, the engines will comply with the all standards.

Sections 60.4206 and 60.4211(a) require that the owner/operator operate and maintain the engine according to the manufacturer's written instructions or procedures developed by the owner or operator that are approved by the engine manufacturer, over the entire life of the engine.

Section 60.4207(a) requires that by October 1, 2007, the owner/operator must use fuel that complies with 40 CFR 80.510(a). This means that the fuel must have a sulfur content of 500 parts per million (ppm) maximum, a cetane index of 40 or a maximum aromatic content of 35 volume percent.

Section 60.4207(b) requires that by October 1, 2010, the owner/operator must use fuel that complies with 40 CFR 80.510(b). This means that the fuel must have a sulfur content of 15 parts per million (ppm) maximum, and the same cetane index or aromatic content.

Section 60.4209(a) requires a non-resettable hour meter. This requirement is already in the standard permit conditions.

The engine will comply with the requirements of Section 60.4211(c) because it has been certified in accordance with 40 CFR Part 89.

The engine will comply with the requirement in Section 60.4211(e) to run for less than 100 hours per year for maintenance checks and readiness testing, and the prohibition of running for any reason other than emergency operation, maintenance, and testing because they are limited by permit condition to 50 hours per year for reliability testing and otherwise may only operate for emergencies.

The owner/operator is not required to perform tests in accordance with Section 60.4212 or 60.4213.

Section 60.4214 states that owner/operators do not have to submit an initial notification to EPA for emergency engines.

Because the engine does not have a diesel particulate filter, it is not subject to Section 60.4214(c).

The owner/operator is required to comply with certain sections of 40 CFR 60, Subpart A, General Provisions.

***NESHAP*:** This engine is not subject to 40 CFR 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, because it is not located at a major facility for hazardous air pollutants.

**PSD does not apply.**

## PERMIT CONDITIONS

Application 24383: The City of Palo Alto Mayfield Pump Station: Plant 21273:
Conditions for S-1 and S-2

## PC 22850

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

   **[Basis: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(B)(3) or Regulation 2-5]**

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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(3) or (e)(2)(B)(3)]**

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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(G)(1)]**

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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(4)(I), (or, Regulation 2-6-501)]**

1. **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: "Stationary Diesel Engine ATCM" section 93115, title 17, CA Code of Regulations, subsection (e)(2)(A)(1)] or (e)(2)(B)(2)]**

## PC 25276

**DCL International Inc. MINE-X SootFilter Diesel Particulate Filter System**

1. **The owner/operator shall install, operate, and properly maintain a backpressure monitor that notifies the owner/operator when the high backpressure limit of the engine is approached.**

    **[Basis: BAAQMD Regulation 2, Rule 5]**

2. **The owner/operator shall install, operate, and properly maintain the following monitoring equipment to assure compliance with parts 3, 4, 5 and 6 of this condition.**

    a. **Temperature monitor**
    b. **Temperature recorder**
    c. **Hours of operation monitor**

    **[Basis: BAAQMD Regulation 2, Rule 5]**

3. **The engine must operate at the load level required to achieve 350 degrees Celsius ($^0$C) for a minimum of 30 percent of the engine's operating time. Operation at lower temperatures is allowed, but only for a limited duration. [CARB Executive Order DE-08-002-03, BAAQMD Regulation 2, Rule 5]**

4. **Maximum consecutive minutes operating below passive regeneration temperature is 240 minutes.**

   **[CARB Executive Order DE-08-002-03, BAAQMD Regulation 2, Rule 5]**

5. **The filter must be cleaned at least 1,000 when using Ultra Low Sulfur Diesel (<15 ppm Sulfur).**

6. **The number of consecutive cold starts and 15 minute idle sessions before regeneration required is 16.**

   **[CARB Executive Order DE-08-002-03, BAAQMD Regulation 2, Rule 5]**

**RECOMMENDATION**
Issue an Authority to Construct to the City of Palo Alto for:

**S-1 Stationary Standby Generator Set: Diesel Engine; Make: Volvo; Model: TAD1641GE; Model Year; 2012; Rated Horsepower: 757 HP; Abated by DCL International Inc. (Mine-X Scootfilter Diesel Particulate Filter System)**

**S-2 Stationary Standby Generator Set: Diesel Engine; Make: Volvo; Model: TAD1641GE; Model Year; 2012; Rated Horsepower: 757 HP; Abated by DCL International Inc. (Mine-X Scootfilter Diesel Particulate Filter System)**

**EXEMPTIONS**
None.

By:_____ Date: 05/31/2012

Sheryl Wallace
Air Quality Permit Technician