

DRAFT
ENGINEERING EVALUATION
Franklin McKinley School District
Plant No. 7190
Application No. 16098

BACKGROUND

Franklin McKinley School District has applied for an Authority to Construct and/or Permit to Operate a standby generator powered by a natural gas engine (S-2).

S-2 Emergency Standby Generator Set: Natural Gas Engine, Make Generac, Model 13.3GTA, Model Year 2006, Rated Horsepower 385 HP; Abated by 3-way catalyst unit, Make Generac.

The engine will be located at 645 Wool Creek Drive, San Jose, CA 95112. It provides emergency power (in the event of a blackout) for all essential electrically powered equipment at the above site. The emergency engine must be periodically tested to ensure that it will generate electricity when needed.

EMISSIONS

The 385 HP natural gas engine was tested per Generac Power Systems and the emission factors are listed below in table (1). For this report, it is assumed that the emission value of Total Unburned Hydrocarbons (THC) is equivalent to the emission value of POC.

This engine is equipped with Abatement Device “Generac 3-way catalyst”. The emission achieved through this device is indicated in the following Table (1)

Table (1)

| Component | Emission With Abatement Device (grams/brake horsepower-hr) |
|------------------------|---|
| NO_x | 0.69 |
| CO | 1.30 |
| POC | 0.89 |
| PM₁₀ | Negligible |

**The emission factor for SO₂ is from Chapter-3, Table 3.2-2 of the EPA Document AP-42, Emission Factors for 4-Stroke Rich-Burn Engines. SO₂:5.88E-4 lb/MMBtu*

Annual Emissions:

$$\begin{aligned}
 \text{NO}_x &= (0.69 \text{ g/hp-hr}) (385 \text{ hp}) (100 \text{ hr/yr}) (\text{lb}/454\text{g}) = 58.51 \text{ lb/yr} = 0.029 \text{ TPY} \\
 \text{CO} &= (1.30 \text{ g/hp-hr}) (385 \text{ hp}) (100 \text{ hr/yr}) (\text{lb}/454\text{g}) = 110.24 \text{ lb/yr} = 0.055 \text{ TPY} \\
 \text{POC} &= (0.89 \text{ g/hp-hr}) (385 \text{ hp}) (100 \text{ hr/yr}) (\text{lb}/454\text{g}) = 75.47 \text{ lb/yr} = 0.038 \text{ TPY}
 \end{aligned}$$

$$\text{PM}_{10} = (0.00 \text{ g/hp-hr}) (385 \text{ hp}) (100 \text{ hr/yr}) (\text{lb}/454\text{g}) = 0.00 \text{ lb/yr} = 0.000 \text{ TPY}$$

$$\text{SO}_2 = (5.88\text{E-}04 \text{ lb/MMBtu}) (3.51 \text{ MMBtu/hr}) (100 \text{ hr/yr}) = 0.21 \text{ lb/yr} = 0.0001 \text{ TPY}$$

Maximum Daily Emissions:

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

$$\text{NO}_x = (0.69 \text{ g/hp-hr}) (385 \text{ hp}) (24 \text{ hr/day}) (\text{lb}/454\text{g}) = 14.04 \text{ lb/day}$$

$$\text{CO} = (1.30 \text{ g/hp-hr}) (385 \text{ hp}) (24 \text{ hr/day}) (\text{lb}/454\text{g}) = 26.46 \text{ lb/day}$$

$$\text{POC} = (0.89 \text{ g/hp-hr}) (385 \text{ hp}) (24 \text{ hr/day}) (\text{lb}/454\text{g}) = 18.11 \text{ lb/day}$$

$$\text{PM}_{10} = (0.00 \text{ g/hp-hr}) (385 \text{ hp}) (24 \text{ hr/day}) (\text{lb}/454\text{g}) = 0.00 \text{ lb/day}$$

$$\text{SO}_2 = (5.88\text{E-}04 \text{ lb/MMBtu}) (3.51 \text{ MMBtu/hr}) (24 \text{ hr/day}) = 0.05 \text{ lb/day}$$

Plant Cumulative Increase: (tons/year):

| Pollutant | Current | Application Increase | New Total |
|------------------|---------|----------------------|-----------|
| NO _x | 0 | 0.029 | 0.029 |
| CO | 0 | 0.055 | 0.055 |
| POC | 0 | 0.038 | 0.038 |
| PM ₁₀ | 0 | 0.000 | 0.000 |
| SO ₂ | 0 | 0.0001 | 0.0001 |

Toxic Risk Screening:

Emissions factors for a 4-stroke rich-burn natural gas engine will be used to estimate the toxic air contaminant emissions from the engine. Emissions factors are from EPA AP-42 Table 3.2-3. As seen in Appendix A of this report, estimated emission of Acrolein exceeds the District Risk Screening Trigger. However, toxic risk screening analysis is not performed according to Section D3 of District's Health Risk Screening Guidelines, which states:

D3. Assessment of Acrolein Emissions: Currently, CARB does not have certified emission factors or an analytical test method for acrolein. Therefore, since the appropriate tools needed to implement and enforce acrolein emission limits are not available, the District will not conduct a HRSA for emissions of acrolein. In addition, due to the significant uncertainty in the derivation, OEHHA is currently re-evaluating the acute REL for acrolein. When the necessary tools are developed, the District will re-evaluate this specific evaluation procedure and the HRSA guidelines will be revised.

Public Notification:

The project is within 1000 feet of a public school and therefore subject to the public notification requirements of Reg. 2-1-412. The public notice will be posted on the Internet and mailed to all Parents or Guardians with children enrolled at Shirakawa Elementary

School and Yerba Buena High School. It will also be mailed to all residential neighbors located within 1000 feet of the proposed new source of pollution.

STATEMENT OF COMPLIANCE

S-2 is subject to the monitoring and record keeping requirements of Regulation 9-8-530 and the SO₂ limitations of 9-1-301 (ground-level concentration) and 9-1-304 (0.5% by weight in fuel). Regulation 9-8-530 requirements are incorporated into the proposed permit conditions. Like all sources, S-2 is subject to Regulation 6 ("Particulate and Visible Emissions"). This engine is not expected to produce visible emissions or fallout in violation of this regulation and it will be assumed to comply with Regulation 6 pending a regular inspection.

California Environmental Quality Act (CEQA):

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 outlined in the Permit Handbook Chapter 2.3 and therefore is not discretionary as defined by CEQA.

Best Available Control Technology (BACT):

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, NO_x, CO, SO₂ or PM₁₀.

Based on the emission calculations above, the owner/operator of S-2 is subject to BACT for the following pollutants: POC, NO_x, and CO. Hence, the owner/operator has to meet BACT limits presented below:

| POLLUTANT | BACT | TYPICAL TECHNOLOGY |
|-----------------|---|---|
| | 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice | |
| POC | 1. <i>n/d</i> 2. <i>1.0 g/bhp-hr^a</i> | 1. <i>n/d</i> 2. <i>lean burn technology^a</i> |
| NO _x | 1. <i>n/d</i> 2. <i>1.0 g/bhp-hr^a</i> | 1. <i>n/d</i> 2. <i>lean burn technology^a</i> |
| CO | 1. <i>n/d</i> 2. <i>2.75 g/bhp-hr^a</i> | 1. <i>n/d</i> 2. <i>lean burn technology^a</i> |

For POC, NO_x, and CO, the emission limits set by BACT 2 are met, as shown in table below

| Pollutant | Engine Emission Factors with Catalyst (g/hp-hr) | Emission Factor Limits as set by BACT 2 (g/hp-hr) | Have the limits been met? |
|-----------------|---|---|---------------------------|
| POC | 0.89 | 1.00 | YES |
| NO _x | 0.69 | 1.00 | YES |
| CO | 1.30 | 2.75 | YES |

Therefore, S-2 is determined to comply with the BACT 2 limits for POC, NO_x 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 NO_x. Based on the emission calculations above, offsets are not required for this application.

PSD, NSPS, and NESHAPS do not apply.

PERMIT CONDITIONS

Conditions for S-2 Emergency Standby Generator Set, at Plant #7190

PC 23625

1. The owner or operator shall operate the stationary emergency standby engine, only to mitigate emergency conditions or for reliability-related activities (maintenance and testing). Operating while mitigating emergency conditions and while emission testing to show compliance with this part is unlimited. Operating for reliability-related activities are limited to 100 hours per year.
(Basis: Emergency Standby Engines, Hours of Operation Regulation 9-8-330)
2. The Owner/Operator shall equip the emergency standby engine with a non-resettable totalizing meter that measures hours of operation or fuel usage.
(Basis: Emergency Standby Engines, Monitoring and Recordkeeping 9-8-530)
3. The Owner/Operator shall not operate unless the natural gas fired engine is abated with the Generac 3-way catalyst unit.
(Cumulative Increase and BACT)
4. Records: The Owner/Operator shall maintain the following monthly records in a District- approved log for at least 24 months from the date of entry. 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 (maintenance and testing).
 - b. Hours of operation for emission testing.
 - c. Hours of operation (emergency).
 - d. For each emergency, the nature of the emergency condition.
 - e. Fuel usage for engine.
(Basis: Emergency Standby Engines, Monitoring and Recordkeeping 9-8-530)

RECOMMENDATION

Issue an Authority to Construct to Franklin McKinley School District located at 645 Wool Creek Drive, San Jose, CA:

S-2 Emergency Standby Generator Set: Natural Gas Engine, Make Generac, Model 13.3GTA, Model Year 2006, Rated Horsepower 385 HP; Abated by 3-way catalyst unit, Make Generac.

By: _____ Date: 7/5/07

Xuna Cai
Air Quality Engineer

| Acronyms | | | |
|------------------|---------------------------------------|---------|---|
| S-2 | Source two | NPOC | Non- Precursor Organic Compound |
| HP | Horse Power | TBACT | Best Available Control Technology for Toxics |
| CARB | California Air Resource Board | BACT | Best Available Control Technology |
| NOx | Oxides of Nitrogen as NO ₂ | BAAQMD | Bay Area Air Quality Management District |
| CO | Carbon Monoxide | CEQA | California Environmental Quality Act |
| POC | Precursor Organic Compound | EPA | Environmental Protection Agency |
| HC | Hydrocarbons | NESHAPS | National Emission Standard for Hazardous Air Pollutants |
| PM ₁₀ | Particulate Matter | PSD | Prevention of Significant Deterioration |
| SO ₂ | Sulfur Dioxide | NSPS | New Source Performance Standard |
| O ₂ | Oxygen | TPY | Tons per year |

Appendix A

Toxic Air Contaminants from S-2 Emergency Standby Generator Set: AP-42 Emissions for Natural Gas-fired Reciprocating Engines 3.2 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines

| Toxic Air Contaminant | AP-42 | Emissions | Trigger Level | Trigger? | Emissions | Trigger Level | Trigger? |
|---------------------------|---------------|-----------|---------------|----------|-----------|---------------|----------|
| | EF (lb/MMBTU) | (lb/year) | (lb/year) | (Yes/No) | (lb/hr) | (lb/hr) | (Yes/No) |
| 1,1,2,2-Tetrachloroethane | 2.53E-05 | 8.89E-03 | 3.20E+00 | No | | | |
| 1,1,2-Trichloroethane | 1.53E-05 | 5.38E-03 | 1.10E+01 | No | | | |
| 1,1-Dichloroethane | 1.13E-05 | 3.97E-03 | 1.10E+02 | No | | | |
| 1,3-Butadiene | 6.63E-04 | 2.33E-01 | 1.10E+00 | No | | | |
| Acetaldehyde | 2.79E-03 | 9.81E-01 | 6.40E+01 | No | | | |
| Acrolein | 2.63E-03 | 9.24E-01 | 2.30E+00 | No | 9.24E-03 | 4.20E-04 | Yes |
| Benzene | 1.58E-03 | 5.55E-01 | 2.90E+00 | No | 5.55E-03 | 6.40E+00 | No |
| Carbon Tetrachloride | 1.77E-05 | 6.22E-03 | 4.30E+00 | No | 6.22E-05 | 4.20E+00 | No |
| Chlorobenzene | 1.29E-05 | 4.53E-03 | 3.90E+04 | No | | | |
| Chloroform | 1.37E-05 | 4.82E-03 | 3.30E-01 | No | 4.82E-05 | 3.40E+01 | No |
| Ethylbenzene | 2.48E-05 | 8.72E-03 | 7.70E+04 | No | | | |
| Ethylene Dibromide | 2.13E-05 | 7.49E-03 | 2.60E+00 | No | | | |
| Formaldehyde | 2.05E-02 | 7.21E+00 | 3.00E+01 | No | 7.21E-02 | 2.10E-01 | No |
| Methanol | 3.06E-03 | 1.08E+00 | 1.50E+05 | No | 1.08E-02 | 6.20E+01 | No |
| Methylene Chloride | 4.12E-05 | 1.45E-02 | 1.80E+02 | No | 1.45E-04 | 3.10E+01 | No |
| Naphthalene | 9.71E-05 | 3.41E-02 | 5.30E+00 | No | | | |
| PAH or derivative | | | | | | | |
| TOTAL | 2.04E-07 | 7.18E-05 | 1.10E-02 | No | | | |
| Styrene | 1.19E-05 | 4.18E-03 | 3.50E+04 | No | 4.18E-05 | 4.60E+01 | No |
| Toluene | 5.58E-04 | 1.96E-01 | 1.20E+04 | No | 1.96E-03 | 8.20E+01 | No |
| Vinyl Chloride | 7.18E-06 | 2.52E-03 | 2.40E+00 | No | 2.52E-05 | 4.00E+02 | No |
| Xylene | 1.95E-04 | 6.85E-02 | 2.70E+04 | No | 6.85E-04 | 4.90E+01 | No |