DRAFT ENGINEERING EVALUATION
Monolithic Power Systems, Plant: 20412
6409 Guadalupe Mines Road, San Jose, CA 95120
Application: 22585

BACKGROUND

Monolithic Power Systems is applying for an Authority to Construct and/or Permit to Operate a Standby Emergency Generator.

S1 Stationary Standby Generator Set: Diesel Engine; Make: Iveco/FPT; Model: F4GE9485A*J; Model Year; 2010; Rated Horsepower: 131 HP

The standby generator S1 will be located at the above address. S1 is equipped with the best available control technology (BACT) for minimizing the release of air borne criteria pollutants and harmful air toxins due to fuel combustion. The criteria pollutants are nitrogen oxides (NOx), carbon monoxide (CO), precursor organic compounds (POC) from unburned diesel fuel, sulfur dioxide (SO2) and particulate matter (PM10). POC is also denoted as Non-Methane Hydro-Carbon (NMHC). All of these pollutants are briefly discussed on the District's web site at www.baaqmd.gov.

The engine meets the Environmental Protection Agency and California Air Resources Board (EPA/CARB) Tier 3 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.

EMISSIONS CALCULATIONS

Annual Emissions:

S1 has been certified by CARB to be a cleaner burning engine. Except for SO2, the emission factors for these engines are from the manufacturer's emission data. The POC emission factor is assumed to be 5% of the total NOx and POC (NMHC+NOx) factor based on District Policy.

The CARB certified (CARB Executive Order U-R-015-0186) emission factors for S1 (131 HP diesel engine) are shown below.

Pollutant	Emission Factors (g/bhp-hr)
NOx	2.693
CO	0.671
POC	0.142
PM10	0.119
SO2	0.000055

**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) = 0.000055 g/hp-hr

Annual emissions are calculated based on the number of hours per year of operation for testing and maintenance.

S1

Annual Emissions										
NOx	2.693	(g/hp×hr) x	131	(hp) x	50	(hr/yr) ÷ 453.6 (g/lb) =	38.887	(lb/yr) =	0.01944	TPY
CO	0.671	(g/hp×hr) x	131	(hp) x	50	(hr/yr) ÷ 453.6 (g/lb) =	9.6893	(lb/yr) =	0.00484	TPY
POC	0.142	(g/hp×hr) x	131	(hp) x	50	(hr/yr) ÷ 453.6 (g/lb) =	2.0505	(lb/yr) =	0.00103	TPY
PM10	0.119	(g/hp×hr) x	131	(hp) x	50	(hr/yr) ÷ 453.6 (g/lb) =	1.7184	(lb/yr) =	0.00086	TPY
SO2	0.000055	(g/hp×hr) x	131	(hp) x	50	(hr/yr) ÷ 453.6 (g/lb) =	0.0008	(lb/yr) =	4E-07	TPY

Maximum Daily Emissions:

Daily emissions are calculated to establish whether a source triggers the requirement for BACT (10 lb/highest day total source emissions for any class of pollutants). A full 24-hour day will be assumed since no daily limits are imposed on intermittent and unexpected operations.

S1

Annual Emissions								
NOx	2.693	(g/hp×hr) x	131	(hp) x	24	(hr/day) ÷ 453.6 (g/lb) =	18.666	(lb/day)
CO	0.671	(g/hp×hr) x	131	(hp) x	24	(hr/day) ÷ 453.6 (g/lb) =	4.6508	(lb/day)
POC	0.142	(g/hp×hr) x	131	(hp) x	24	(hr/day) ÷ 453.6 (g/lb) =	0.9842	(lb/day)
PM10	0.119	(g/hp×hr) x	131	(hp) x	24	(hr/day) ÷ 453.6 (g/lb) =	0.8248	(lb/day)
SO2	0.000055	(g/hp×hr) x	131	(hp) x	24	(hr/day) ÷ 453.6 (g/lb) =	0.0004	(lb/day)

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

Table 1. Calculated incremental increase in diesel exhaust particulate matter for S1

Source:	**PM_{10} Emission Factor (g/HP-hr)**	**HP**	**Annual Usage (Hours/year)**	**Diesel Exhaust Particulate Emissions (lb/year):**	**Regulation 2-5 Trigger Level (lb/yr)**	**Risk Screen Required? (Yes/No)**
1	0.119	131	50	1.72	0.34	Yes

S1 meets Best Available Control Technology for toxics (TBACT) since the diesel particulate emissions are less than 0.15 g/bhp-hr. For an engine that meets the TBACT requirement, it must also pass the toxic risk screening level of less than ten in a million. Estimates of residential risk assume exposure to annual average toxic air contaminant concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Risk estimates for offsite workers assume exposure occurs 8 hours per day, 245 days per year, for 40 years. Risk estimates for students assume a higher breathing rate, and exposure is assumed to occur 10 hours per day, 36 weeks per year, for 9 years.

Based on 50 hours per year of operation of S1, the emergency generator passed the Health Risk Screening Analysis (HRA) conducted on January 4, 2011 by the District's Toxic Evaluation Section. The source poses no significant toxic risk, since the increased cancer risk to the maximally exposed receptor (worker) is 9.2 in a million with a hazard index for of 0.0065. The increased cancer risk to residents is 3.1 in a million with a hazard index of 0.0011. The increased cancer risk to students at Los Gatos Christian School is 0.82 in a million with a hazard index of 0.00066. In accordance with the District's Regulation 2, Rule 5, this risk level is considered acceptable, as it has been determined that S1 meets the current TBACT standards.

BACT/TBACT REVIEW

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 S1 is subject to BACT for the following pollutant: NOx. Please refer to the discussion on "Maximum Daily Emissions" on page 2 of this evaluation. 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 6 dated 4/13/2009. 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.

For NOx, the engine has to meet the current BACT 2 standard, which is the current tier standard for NOx at the applicable horsepower rating.

Source Category

Source:	***IC Engine – Compression Ignition: Stationary Emergency, non-Agricultural, non-direct drive fire pump***	**Revision:**	***6***
		Document #:	***96.1.3***
Class:	***> 50 BHP Output***	**Date:**	***04/13/2009***

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
POC	*1. n/s[d]* *2. Current tier[a,b] standard for POC at applicable horsepower rating.*	*1. n/s[d]* *2. Any engine certified or verified to achieve the applicable standard.[a,b]*
NOx	*1. n/s[d]* *2. Current tier[a,b] standard for NOx at applicable horsepower rating.*	*1. n/s[d]* *2. Any engine certified or verified to achieve the applicable standard.[a,b]*
SO_2	*1. n/s[d]* *2. Fuel sulfur content not to exceed 0.0015% (wt) or 15 ppm.*	*1. n/s[d]* *2. CARB Diesel Fuel (Ultra Low Sulfur Diesel).*
CO	*1. n/s[d]* *2. The more stringent of either 2.75 g/bhp-hr [319 ppmvd @ 15% O_2][c] or the current Tier[a,b] standard.*	*1. n/s[d]* *2. Any engine certified or verified to achieve the applicable standard.*

PM_{10}	*1. n/s[d]* *2. More stringent of either 0.15 g/bhp-hr or the current Tier standard.* *3. TBACT: The more stringent of either 0.15 g/bhp-hr or the current Tier standard.*	*1. n/s[d]* *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*

References

a. Current tier standard (listed on http://www.baaqmd.gov/pmt/bactworkbook/96-1-2.pdf): The current CARB or EPA off-road tier standard for the pollutant of concern within the appropriate horsepower range. 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 a current certified engine for that pollutant.

b. For pollutants NOx, POC and CO, an engine which does not meet the current EPA or CARB off-road tier standard may represent BACT2, providing 1) the engine met the most stringent EPA Tier Standard in effect at the time of installation (Tier 1 minimum) or 2) the engine met the most stringent EPA Tier Standard in effect prior to the Tier change for that horsepower rating with the permit application submitted within 6 months of the effective date of the Tier change. [Source: California Health & Safety Code Section 93116.3(b)(7)]

c. Previous BACT determination dated 01/11/02.

d. Cost effectiveness analysis must be based on lesser of 50 hr/yr or as limited by toxic risk screen.

The NOx emission limit set by BACT 2 are met for S1:

Pollutant	Engine Emission Factors (g/hp-hr)	Emission Factor Limits as set by BACT 2 (g/hp-hr)	Have the limits been met?
NOx	2.693	2.85	YES

Therefore, S1 is determined to be in compliance with the BACT 2 limits for NOx.

PLANT CUMULATIVE INCREASE AND OFFSETS
(since April 5, 1991)

Offsets must be provided for any new or modified source at a facility that emits more than 10 tons/yr of POC or NOx per Regulation 2-2-302. The following table summarizes the increase in criteria pollutant emissions that will result from the operation of S1.

Pollutant	Current plant emissions (TPY)	Increase in plant emissions associated with this application (TPY)	Cumulative emissions (Current + Increase) (TPY)	Regulation 2-2-302 and 2-2-303 Offset Triggers (TPY)
NOx	0	0.019	0.019	> 10; < 35
CO	0	0.005	0.005	NA
POC	0	0.001	0.001	> 10; < 35
PM10	0	0.001	0.001	> 1*
SO2	0	0.000	0.000	> 1*

It can be seen from the table above that S1 does not trigger any offset. Therefore, offsets are not warranted for any emissions.

STATEMENT OF COMPLIANCE

The owner/operator of S1 shall comply with Regulation 1-301 (Public Nuisance), Regulation 6-1-303 (Particulate Matter and Visible Emissions), Regulation 9-1 (Sulfur Dioxide) and Regulation 9-8 (NOx and CO from Stationary Internal Combustion Engines). In order to ensure compliance with the requirements of these regulations, the facility will be conditionally permitted to meet the requirements.

S1 is subject to the limitations of Regulation 6-1-303 (Particulate Matter). Regulation 6, Rule 1, Section 303 states that a person shall not emit for a period or periods aggregating more than three minutes in any hour, a visible emission that is as dark or darker than No. 2 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree, nor shall said emission, as perceived by an opacity sensing device in good working order, where such device is required by District Regulations, be equal to or greater than 40% opacity. Since S1 is a low PM10 emitting engine that meets TBACT for PM10 (<0.15 g/hp-hr), it is not expected to produce visible emissions or fallout in violation of this regulation, and it will be assumed to be in compliance with Regulation 6-1 pending a regular inspection.

S1 is also subject to the SO_2 limitations of Regulation 9-1-301 (Limitations on Ground Level Concentrations of Sulfur Dioxide), Regulation 9-1-302 (Limitations Sulfur Dioxide Emissions) and 9-1-304 (Burning of Solid and Liquid Sulfur Dioxide Fuel). From Regulation 9-1-301, the ground level concentrations of SO_2 will not exceed 0.5 ppm continuously for 3 consecutive minutes or 0.25 ppm averaged over 60 consecutive minutes, or 0.05 ppm averaged over 24 hours. Per Regulation 9, Rule 1, Section 302, a person shall not emit from any source a gas stream containing sulfur dioxide in excess of 300 ppm (dry). And Regulation 9, Rule 1, Section 304, states that a person shall not burn any liquid fuel having sulfur content in excess of 0.5% by weight. Compliance with Regulation 9, Rule 1 is very likely since diesel fuel with a 0.0015% by weight sulfur is mandated for use in California.

From Regulation 9, Rule 8 (NOx and CO from Stationary Internal Combustion Engines), Section 110.5 (Emergency Standby Engines), S1 is exempt from the requirements of Regulations 9-8-301 (Emission Limits on Fossil Derived Fuel Gas), 9-8-302 (Emission Limits on Waste Derived Fuel Gas), 9-8-303 (Emissions Limits –

Delayed Compliance, Existing Spark-Ignited Engines, 51 to 250 bhp or Model Year 1996 or Later), 9-8-304 (Emission Limits – Compression-Ignited Engines), 9-8-305 (Emission Limits – Delayed Compliance, Existing Compression-Ignited Engines, Model Year 1996 or Later), 9-8-501 (Initial Demonstration of Compliance) and 9-8-503 (Quarterly Demonstration of Compliance). However, it is subject to the monitoring and record keeping procedures described in Regulation 9-8-530 (Emergency Standby Engines, Monitoring and Recordkeeping). The requirements of this Regulation are included in the permit conditions below.

S1 is also subject to and expected to comply with Regulation 9-8-330 (Emergency Standby Engines, Hours of Operation) since non-emergency hours of operation will be limited in the permit conditions to 50 hours per year.

This application is considered to be ministerial under the District's 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 emission factors in accordance with Permit Handbook Chapter 2.3.

The project is within 1000 feet of a public school and therefore subject to the public notification requirements of Reg. 2-1-412. A public notice was prepared and posted on the Internet. The public notice was distributed to all Parents or Guardians with children enrolled at Los Gatos Christian School and all residential and business neighbors located within 1000 feet of the proposed new source of pollution.

PSD is not triggered.

CARB Stationary Diesel Engine ATCM: The State Office of Administrative Law approved the Airborne Toxic Control Measure (ATCM) on November 8, 2004. State law requires the local Air Districts to implement and enforce the requirements of the ATCM. Effective January 1, 2005, there is a prohibition on the operation of new diesel emergency standby engines greater than 50 bhp unless the following operating requirements and emission standards are met:

“Stationary Diesel Engine ATCM” section 93115, title 17, CA Code of Regulations.

Diesel PM – General Requirements

1. Meet 0.15 g/bhp-hr PM standard
2. Operate 50 hours per year, or less, for maintenance and testing (except emergency use and emissions testing)

or

1. Meet 0.01 g/bhp-hr PM standard
2. Operate up to 100 hours per year for maintenance and testing (except emergency use and emissions testing), upon approval by the District.

HC,NOx, NMHC+NOx, CO

1. Meet standards for off-road engines of the same model year and horsepower rating as specified in the OFF-Road Compression Ignition Engine Standards;
or if no standards have been established
2. Meet the Tier 3 standards for an off-road engine for the same maximum rated power.

This emergency standby diesel engine (S1) is in compliance with the above ATCM requirements. The diesel engine will operate for no more than 50 hours per year for maintenance and reliability testing. This engine is subject to the Tier 3 off-road CI engine standards for HC, NOx, NMHC+NOx and CO. As shown in the table below, the engine meets these requirements.

ATCM Tier 3 Compliance

	Manufacture Certified g/bhp-hr	ATCM Tier 3 g/bhp-hr
NMHC+NOx	2.83	3.0
NOx	N/A	N/A
NMHC (POC)	N/A	N/A
CO	0.67	3.7
PM	0.12	0.3

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 4.5 liters. Each cylinder has a volume of less than 10 liters. The engine is a 2010 engine. 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)(2) requires that engines over 50 hp must meet the EPA standards in 40 CFR 89.112 and 40 CFR 89.113.

For engines between 100 and 175 hp, these standards are:

- NOX+NMHC: 4.0 g/HP-hr
- CO: 5.0 g/HP-hr
- PM: 0.3 g/HP-hr
- 20% opacity during acceleration
- 15% opacity during lugging
- 50% opacity during peaks in acceleration or lugging

According to CARB Executive Order U-R-015-0186, the engine will comply with these 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 the emission or operating limitations in 40 CFR 63, Subpart ZZZZ, National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, because it is an emergency stationary reciprocating internal combustion engine (40 CFR 63.6600(c)).

PERMIT CONDITIONS

Application 22585: Monolithic Power Systems: Plant 20412: Conditions for S1 (Condition #22850)

COND# 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)(A)(3) or (e)(2)(B)(3)]

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)]

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

RECOMMENDATION
Issue an Authority to Construct to Monolithic Power Systems for:

S1 Stationary Standby Generator Set: Diesel Engine; Make: Iveco/FPT; Model: F4GE9485A*J; Model Year; 2010; Rated Horsepower: 131 HP

EXEMPTIONS
None.

By:_____ Date:_____
Jimmy Cheng
Air Quality Engineer