DRAFT ENGINEERING EVALUATION
MILLS COLLEGE
PLANT NO. 17745
APPLICATION NO. 14502

BACKGROUND

Mills College is applying for an Authority to Construct and/or Permit to Operate for the following equipment:

S-1 Emergency Standby Generator: Diesel Engine; Make: John Deere, Model: 4045HF275; Rated Horsepower: 145 HP

abated by:

A-1 Sud-Chemie Envi-Catalized Diesel Particulate Filter

The generator set will provide emergency power (in the event of a blackout) for all essential electricity power at 5000 MacArthur Blvd in Oakland California. This emergency engine must be periodically tested to ensure that they will generate when needed.

EMISSIONS SUMMARY

Annual Emissions:

The CARB Certified emission factors for S-1 abated by A-1 (145HP- diesel engine, U-R-004-0208) are listed in Table 1 below:

Table (1)

Component	Emission (g/kW-hr)	Emission (g/hp-hr)
NOx	6.1	4.55
CO	1.0	0.7453
POC	2.0	1.5
**PM_{10}	0.081	0.0604
SO_2	0.247	0.184

**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 (0.05% S) (454 g/lb) = 0.184 g/hp-hr

*** Abatement equipment of a CDPF with an efficiency of 70%*

Component		g/bhp-hr	hp	hr/yr	lb/g		lb/yr		TPY
NOx	=	4.547	145	50	0.0022026	=	72.6044	=	0.0363022
CO	=	0.745	145	50	0.0022026	=	11.9024	=	0.0059512
POC	=	1.500	145	50	0.0022026	=	23.9537	=	0.0119769
PM10	=	0.060	145	50	0.0022026	=	0.96409	=	0.000482
SO2	=	0.184	145	50	0.0022026	=	2.93833	=	0.0014692

Maximum Daily Emissions:

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

POLLUTANT		g/bhp-hr	hp	hr/day	lb/g		lb/day
NOx	=	4.547	145	24	0.0022026	=	34.8501
CO	=	0.745	145	24	0.0022026	=	5.713131
POC	=	1.500	145	24	0.0022026	=	11.4978
PM10	=	0.060	145	24	0.0022026	=	0.462764
SO2	=	0.184	145	24	0.0022026	=	1.410396

Plant Cumulative Increase: (tons/year)

POLLUTANT	Existing	New	Total
NOx		0.036302	0.036302
CO		0.005951	0.005951
POC		0.011977	0.011977
PM10		0.000482	0.000482
SO2		0.001469	0.001469

Toxic Risk Screening:

The toxic emission of diesel particulate does exceed the District Risk Screening Trigger, as shown in Table (1) below. A Risk Screening Analysis has been performed.

Table 1

Source	PM_{10} Emission Factor (g/bHP-hr)	HP	Annual Usage (Hours/year)	Diesel Exhaust Particulate Emissions (lb/year)	Trigger Level (lb/yr)	Risk Screen Required? (Yes/No)
1	0.060372034	145	50	0.964090854	0.58	YES

Since the engine meets Best Available Control Technology for Toxics (TBACT) requirements (emission level of 0.15 g/hp-hr or less), the maximum acceptable cancer risk is estimated at 10 in a million. Results from the health risk screening analysis show that for 50 hours of operation per year, excluding periods when operation is required due to emergency conditions, the risk to the maximally exposed nearest receptor is 2.93 in a million. The analysis was performed at a PM_{10} emission of 0.964 lb/year. In accordance with the District's Regulation 2, Rule 5, this risk level is considered acceptable.

The ISCST3 air dispersion computer model was used to estimate annual average ambient air concentrations. Stack and building parameters for the analysis were based on information provided by the applicant. Estimates of residential risk assume potential exposure to annual average TAC concentrations occur 24 hours per day, 350 days per year, for a 70-year lifetime. Risk estimates for offsite workers assume potential exposure occurs 8 hours per day, 245 day 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.

The manufacturer supplied the CARB Executive Order #U-R-004-0208. The CARB staff has determined that the Deere engine model listed above is not in compliance with the PM emission requirements (0.15g/bhp-hr) from California Code of Regulations Title 17, Section 93115 (e)(2)(A) 3., (Table 1: Summary of the Emission Standards and Operating Requirements for New Stationary Emergency Standby Diesel-Fueled CI Engines > 50 BHP). The facility has agreed to install abatement equipment so that the engine will be in compliance with the PM emission level. Therefore, the above Deere engine model with abatement equipment qualifies for use in California for standby generator set applications operating at 50 hours per year for maintenance and testing.

STATEMENT OF COMPLIANCE

S-1 will be operated as an emergency standby engine and therefore is not subject to the emission rate limits in Regulation 9, Rule 8 ("NOx and CO from Stationary Internal Combustion Engines"). S-1 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. Compliance with Regulation 9-1 is expected since diesel fuel with a 0.05% by weight sulfur is mandated for use in California. Like all sources, S-1 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 they will be assumed to be in compliance with Regulation 6 pending a regular inspection.

This diesel engine is subject to the Stationary Diesel Engine Air 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 include in the permit conditions.

This application is considered to be ministerial under the District's proposed CEQA guidelines (Regulation 2-1-312) 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 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 is subject to BACT for the following pollutants: NOx, POC. 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 meet the BACT 2 limits presented below.

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
NOx	1. *1.5 g/bhp-hr [107 ppmvd @ 15% O_2] a,b* 2. *6.9 g/bhp-hr [490 ppmvd @ 15% O_2] a,b,c* 3. *6.9 g/bhp-hr [490 ppmvd @ 15 % O_2]*	1. *Selective Catalytic Reduction (SCR) + Timing Retard + Turbocharger w/ Intercooler a,b* 2. *Timing Retard $\leq 4^o$ + Turbocharger w/ Intercooler a,b,c* 3. *Timing Retard $\leq 4^o$ + Turbocharger w/ Intercooler*
POC	1. *1.1 g/bhp-hr [216 ppmvd @ 15% O_2] a,b* 2. *1.5 g/bhp-hr [309 ppmvd @ 15% O_2] b,c*	1. *Catalytic Oxidation and/or CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine a,b* 2. *CARB or EPA (or equivalent) low-total hydrocarbon emitting certified engine b,c*

For NOx and POC the emission limits are set by BACT 2 are met, as shown in Table (2) below.

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	4.55	6.9	YES
POC	1.50	1.5	YES

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

Since CARB certification data was used to establish the NOx emission factors, the BACT 2 emission limits have not been incorporated into the permit conditions and are assumed to be complied with through the design standards demonstrated by the CARB certification testing.

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.

PSD, NSPS, and NESHAPS do not apply.

PERMIT CONDITIONS

Application 14502; Mills College – 5000 MacArthur Blvd, Oakland
Plant 17745
Conditions for S-1 Emergency Diesel Generator Set:

PC # 22850

1. Operating for reliability-related activities is limited to **50 hours** per year per engine.

[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 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: “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 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: “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 for Mills College – 5000 MacArthur Blvd, Oakland Plant 17745; for the following source:

S-1 Emergency Standby Generator: Diesel Engine; Make: John Deere, Model: 4045HF275; Rated Horsepower: 145 HP

abated by

A-1 Sud-Chemie Envi-Catalized Diesel Particulate Filter

By:_____ Date: 12/15/06

Irma Salinas
Air Quality Engineering II