DRAFT

ENGINEERING EVALUATION
UC BERKELEY, CLARK KERR CAMPUS
PLANT NO. 16869
APPLICATION NO. 011997

BACKGROUND

UC Berkeley, Clark Kerr Campus is applying for an Authority to Construct and/or Permit to Operate for the following equipment:

S-1 Emergency Standby Generator Set: Diesel Engine; Make: Cummins; Model: 6CTA8.3-G2; Rated Horsepower: 277HP

The standby generator will be used at 2601 Warring Street, Berkeley, CA 94720.

The generator set will provide emergency power (in the event of a blackout) for all essential electricity power at the UC Berkeley, Clark Kerr Campus facility. This emergency engine must be periodically tested to ensure that they will generate when needed.

EMISSIONS SUMMARY

Annual Emissions:

The 277HP diesel engine at S-1 is CARB Certified and the emission factors are listed below.

Component	(g/bhp-hr)
NOx	6.264
CO	0.373
POC	0.298
PM_{10}	0.134
SO2*	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

Component		g/bhp-hr	hp	hr/yr	lb/g		lb/yr		TPY
NOx	=	6.264	277	50	0.0022026	=	191.09	=	0.0955448
CO	=	0.373	277	50	0.0022026	=	11.3787	=	0.0056894
POC	=	0.298	277	50	0.0022026	=	9.09079	=	0.0045454
PM10	=	0.134	278	50	0.0022026	=	4.10256	=	0.0020513
SO2	=	0.184	278	50	0.0022026	=	5.63337	=	0.0028167

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	=	6.264	277	24	0.0022026	=	91.72303
CO	=	0.373	277	24	0.0022026	=	5.461796
POC	=	0.298	277	24	0.0022026	=	4.36358
PM10	=	0.134	277	24	0.0022026	=	1.962147
SO2	=	0.184	277	24	0.0022026	=	2.694291

Plant Cumulative Increase: (tons/year)

POLLUTANT	Existing	New	Total
NOx		0.095545	0.095545
CO		0.005689	0.005689
POC		0.004545	0.004545
PM10		0.002051	0.002051
SO2		0.002817	0.002817

Toxic Risk Screening:

The toxic emission of diesel particulate exceeds the District Risk Screening Trigger, as shown in Table (1) below, and 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)
2	0.134	277	50	4.0914903	0.64	Yes

Results from the health risk screening analysis show that for 50 hours of operation per year when, excluding periods when operation is required due to emergency conditions, the maximum cancer risk is 3.1 in a million when the analysis was performed at a PM_{10} emission 4.0915 lb/year. Thus, in accordance with the District's Toxic Risk Management Policy, the screen passes for operations that meet TBACT.

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 continuous 70-year exposure to annual average TAC concentrations.

STATEMENT OF COMPLIANCE

S-1 will be operated as emergency standby engines and therefore are 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"). These engines are 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 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 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 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*

CO	1. *n/s* 2. 2.75 *g/bhp-hr [319 ppmvd @ 15% O2]* [b,c]	1. *Catalytic Oxidation* [b] 2. *CARB or EPA (or equivalent) low-CO emitting certified engine b,c*

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

Table (2)

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?
NOx	6.264	6.9	YES
CO	0.373	2.75	YES

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

Since CARB certification data was used to establish the NOx and CO 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 15 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 011997; UC Berkeley, Clark Kerr Campus; Plant 16869; Conditions for S-1 Emergency Diesel Generator Set:

PC #21911

1. Hours of Operation: The owner/operator shall operate the emergency standby engine(s) only to mitigate emergency conditions or for reliability-related activities. Operating while mitigating emergency conditions is unlimited. Operating for reliability-related activities is limited to 50 hours per any calendar year.
   [Basis: Regulation 9-8-330]

   "Emergency Conditions" is defined as any of the following:
   a. Loss of regular natural gas supply.
   b. Failure of regular electric power supply.
   c. Flood mitigation.
   d. Sewage overflow mitigation.

e. Fire.
f. Failure of a primary motor, but only for such time as needed to repair or replace the primary motor.

[Basis: Regulation 9-8-231]

"Reliability-related activities" is defined as any of the following:

a. Operation of an emergency standby engine to test its ability to perform for an emergency use, or
b. Operation of an emergency standby engine during maintenance of a primary motor.

[Basis: Regulation 9-8-232]

2. The owner/operator shall equip the emergency standby engine(s) with either:
   a. a non-resettable totalizing meter 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: Regulation 9-8-530]

3. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 2 years and shall make the log available for District inspection upon request:
   a. Hours of operation (total).
   b. Hours of operation (emergency).
   c. For each emergency, the nature of the emergency condition.
   d. Fuel usage for engine(s) if a non-resettable fuel usage meter is utilized.

   [Basis: Regulations 9-8-530 and 1-441]

RECOMMENDATION

Issue an Authority to Construct to UC Berkeley, Clark Kerr Campus for the following source:

S-1 Emergency Standby Generator Set: Diesel Engine; Make: Cummins; Model: 6CTA8.3-G2; Rated Horsepower: 277HP

EXEMPTIONS
None.

By:_____ Date:_____
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