

## Section I: AQMD BACT Determinations

**Application No.: C-1010958**

### Equipment Category – I.C. Engine, Emergency, Compression-Ignition

<b>1. GENERAL INFORMATION</b>			DATE: 2/8/2006		
A. MANUFACTURER: Caterpillar					
B. TYPE: Diesel, 4-stroke, turbocharged/aftercooled			C. MODEL: 3516B		
D. STYLE: V-16					
E. APPLICABLE AQMD RULES:					
F. COST: \$ (NA)		SOURCE OF COST DATA:			
G. OPERATING SCHEDULE:		HRS/DAY	DAYS/WK	WKS/YR	
<b>2. EQUIPMENT INFORMATION</b>			APP. NO.: C-1010958		
A. FUNCTION: Drives electricity generator used for emergency and peaking power. Enables facility to be on SCE interruptible rate schedule.					
B. MAXIMUM HEAT INPUT: 110.1 gph			C. MAXIMUM THROUGHPUT: 2848 BHP		
D. BURNER INFORMATION: NO.: TYPE:					
E. PRIMARY FUEL: Diesel			F. OTHER FUEL: None		
G. OPERATING CONDITIONS: Intermittent					
<b>3. COMPANY INFORMATION</b>			APP. NO.: C-1010958		
A. NAME: Kings County Dept. of Public Works				B. SIC CODE:	
C. ADDRESS: 1400 Lacey Blvd.					
CITY: Hanford		STATE: CA		ZIP:	
D. CONTACT PERSON: Harry Verheul			E. PHONE NO.: 559-582-3211 x2690		
<b>4. PERMIT INFORMATION</b>			APP. NO.: C-1010958		
A. AGENCY: SJVAPCD			B. APPLICATION TYPE: modification		
C. AGENCY CONTACT PERSON: Brian Clerico			D. PHONE NO.: 559-230-5892		
E. PERMIT TO CONSTRUCT/OPERATE INFORMATION:		P/C NO.:		ISSUANCE DATE:	
<input type="checkbox"/> CHECK IF NO P/C		P/O NO.: C-1010958		ISSUANCE DATE: 4/10/2001	
F. START-UP DATE: Diesel particulate filter installed January 2002					

**5. EMISSION INFORMATION**

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**A. PERMIT**

A1. PERMIT LIMIT: Engine must be equipped with turbocharger, aftercooler, positive crankcase ventilation or 90% control of crankcase emissions, and oxidation catalyst/particulate filter. Operation is restricted to 614 hours per year. Emission limits (g/bhp-hr): NO<sub>x</sub>-5.187, VOC-.0026, CO-.035, PM<sub>10</sub>-.0116. Fuel must be CARB certified to contain no more than .0015 wt. % sulfur.

A2. BACT/LAER DETERMINATION: Catalytic particulate filter with ultra-low sulfur (15 wt. ppm) fuel.

A3. BASIS OF THE BACT/LAER DETERMINATION: SJVAPCD BACT guideline for emergency engine converted to "limited use" status.

**B. CONTROL TECHNOLOGY**

B1. MANUFACTURER/SUPPLIER: CleanAir Systems

B2. TYPE: "PERMIT" catalytic particulate filter

B3. DESCRIPTION: The engine exhaust passes through six particulate filters arranged in parallel within an acoustic enclosure. Each filter is a porous ceramic cylinder with oxidation catalyst applied to its surface. The catalyst allows oxidation of the carbonaceous fraction of the collected particulate to occur when the filter reaches sufficient temperature (approx. 570F), prolonging filter use before pluggage occurs. The catalyst also oxidizes condensable organics, which are included in total particulate as measured by California methods (impinger catch), and also oxidizes CO and VOC.

B4. CONTROL EQUIPMENT PERMIT APPLICATION DATA:	P/C NO.:	C-724-8-1	ISSUANCE DATE:	9/20/2001
	P/O NO.:	C-724-8-1	ISSUANCE DATE:	1/24/2002

B5. WASTE AIR FLOW TO CONTROL EQUIPMENT:	FLOW RATE:
ACTUAL CONTAMINANT LOADING:	BLOWER HP:

B6. WARRANTY: CleanAir guarantees the following removal efficiencies: PM<sub>10</sub>-85%, VOC-90%, CO-95%. The 85% PM<sub>10</sub> removal efficiency is based on weighted-average results at three test loads and does not necessarily imply that the 85% removal efficiency will be achieved at all engine loads.

B7. PRIMARY POLLUTANTS: NO<sub>x</sub>, CO, VOC, PM<sub>10</sub>

B8. SECONDARY POLLUTANTS: None

B9. SPACE REQUIREMENT:



**5. EMISSION INFORMATION**

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D7. SOURCE TEST/PERFORMANCE DATA RESULTS AND ANALYSIS:

DATE OF SOURCE TEST: Jan and Aug 2002

CAPTURE EFFICIENCY:

DESTRUCTION EFFICIENCY:

OVERALL EFFICIENCY:

SOURCE TEST/PERFORMANCE DATA:

	Pre-Retrofit (Jan 3-4)			Post-Retrofit (Jan 30-31)				Durability (Aug 27-29)			
	g/bhp-hr			% Removal				% Removal			
Load	50%	75%	100%	50%	75%	100%	Avg.	50%	75%	100%	Avg.
Filterable PM	.0636	.0526	.0452	100	97	97		95	95	90	
Condensibles:											
Organic	.0023	.0054	.0075	0	67	80		100	100	60	
Inorganic	.0114	.0091	.0113	80	50	53		50	70	27	
Total PM	.0772	.0671	.0641	96	88	87	89.3	90	92	75	86.5
ppmvd@15%O2											
NOx	443	351	351	-5	-3	-7		-3	-1	-7	
CO	58	41	40	98	97	97		97	97	97	
VOC	26	19	21	93	93	94		94	96	95	

OPERATING CONDITIONS:

TEST METHODS: PM tests were triplicate one-hour tests, and gaseous emissions tests were triplicate 40-minute tests. CARB Methods 5 (PM) and 100 (gaseous) were used. Average PM removals are based on weighting factors of 0.2, 0.5, and 0.3 at 50, 75 and 100% load, respectively. CARB verifies the filter based on average PM removal.

**6. COMMENTS**

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This product (CleanAir Systems PERMIT filter) has been verified by CARB to achieve 85% PM removal based on a weighted average of results at 50, 75 and 100% load (see above 5D7). CARB restricts its verification of this technology to certain diesel engines (basically those that produce less than 0.1 g/bhp-hr PM). The filter manufacturer is to evaluate the suitability of the technology in each case based on the engine characteristics and its duty cycle. CARB does not consider the apparent affect of the filter on NOx to be statistically significant.

This listing is not meant to demonstrate that a particulate filter can work well on an emergency engine since this is not an emergency engine. However, the listing is useful in the emergency engine category because it presents data showing the effectiveness of a particulate filter in cleaning diesel engine exhaust.

If the engine is run at only, say, 20% load and can run for only 4 hours before the filter needs to be cleared (see above, B10) and the engine is run two hours at 40% load to clear the filter, the total PM controlled by the filter is about 0.26 lb versus about 21 lb NOx emitted during filter clearing. Therefore, filter clearing by some means other than operating the engine should be required. CleanAir offers to clear the filter if it is shipped to them.

An inlet pressure monitor/alarm system should be required so the operator knows when the filter needs to be cleared.