



South Coast
Air Quality Management District

Engineering Division
Application Processing & Calculations

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PERMIT TO CONSTRUCT EVALUATION

APPLICANT:

Southern California Edison
2244 Walnut Grove Ave
Rosemead, CA 91770

EQUIPMENT LOCATION:

1 Pebbly Beach Road
Avalon, CA 90704

EQUIPMENT DESCRIPTION:

Section H of the SCE, Pebbly Beach Facility Permit, ID #4477 (proposed changes are shown in **underline** or **strikethrough**)

Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions and Requirements	Conditions
Process 1: Internal Combustion					
System 1: Power Generation					
INTERNAL COMBUSTION ENGINE, UNIT NO. 7, DIESEL FUEL, EMD, MODEL 16-567-C, 1500 HP, WITH A/N: 404268 <u>483412</u> GENERATOR, 1000 KW	D1	C54	NOX: MAJOR SOURCE	CO: 2000 PPMV DIESEL (5) [RULE 1110.2]; PM: (9) [RULE 404]; ROG: 300 PPMV DIESEL (5) [RULE 1110.2] NOx: 9.76 LBS/MW HR (5) [RULE 2009.1] NOx: 7.5 LBS/MW HR (5) [RULE 2009.1]	A195.1 A195.8 , D29.1, D29.2, D90.1 I331.1 D425.1 E73.1 K40.2, H23.3
CO OXIDATION CATALYST A/N: <u>402942</u>	C76	D1			
INTERNAL COMBUSTION ENGINE, UNIT NO. 8, DIESEL FUEL, EMD, MODEL 16-567-C, TWO CYCLE, LEAN BURN, WITH TURBOCHARGER, 2150 HP, WITH A/N: 404268 <u>483412</u> GENERATOR, 1000 KW	D2	C59	NOX: MAJOR SOURCE	CO: 2000 PPMV DIESEL (5) [RULE 1110.2]; PM: (9) [RULE 404]; ROG: 300 PPMV DIESEL (5) [RULE 1110.2] NOx: 9.76 LBS/MW HR (5) [RULE 2009.1] NOx: 7.5 LBS/MW HR (5) [RULE 2009.1]	A195.6 A195.8 , D29.1, D29.2, D90.1 I331.1 D425.1 E73.1 K40.2, H23.3
CO OXIDATION CATALYST A/N: <u>405151</u>	C77	D2			
INTERNAL COMBUSTION ENGINE, UNIT NO. 10, DIESEL	D3	C55	NOX: MAJOR SOURCE	CO: 2000 PPMV DIESEL (5) [RULE 1110.2]; PM: (9) [RULE	A195.3 A195.8 , D29.1



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Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions and Requirements	Conditions
Process 1: Internal Combustion					
System 1: Power Generation					
FUEL, EMD, MODEL 16-645-E1, 1575 HP, WITH A/N: 404270 <u>483414</u> GENERATOR, 1125 KW				404]; ROG: 305 PPMV DIESEL (5) [RULE 1110.2] NOx: 11.80 LBS/MW HR (5) [RULE 2009.1] NOx: 7.5 LBS/MW HR (5) [RULE 2009.1]	D29.2, <u>D90.1</u> I331.1 D425.1 E73.1 K40.2, H23.3
CO OXIDATION CATALYST A/N: 403322	<u>C78</u>	<u>D3</u>			
INTERNAL COMBUSTION ENGINE, UNIT NO. 12, DIESEL FUEL, EMD, MODEL 12-645-E4, 2200 HP, WITH A/N: 404274 <u>483415</u> GENERATOR, 1500 KW	D5	C56	NOX: MAJOR SOURCE	CO: 2000 PPMV DIESEL (5) [RULE 1110.2]; PM: (9) [RULE 404]; ROG: 301 PPMV DIESEL (5) [RULE 1110.2] NOx: 11.45 LBS/MW HR (5) [RULE 2009.1] NOx: 7.5 LBS/MW HR (5) [RULE 2009.1]	A195.4 <u>A195.8</u> D29.1 D29.2, <u>D90.1</u> D323.2 I331.1 D425.1 E73.1 K40.2
CO OXIDATION CATALYST A/N: 402940	<u>C79</u>	<u>D5</u>			
INTERNAL COMBUSTION ENGINE, UNIT NO. 14, DIESEL FUEL, EMD, MODEL S16-645-E1, 1950 HP A/N: 404272 <u>483416</u> GENERATOR, 1400 KW	D6	C57	NOX: MAJOR SOURCE	CO: 2000 PPMV DIESEL (5) [RULE 111.2]; PM: (9) [RULE 404]; ROG: 294 PPMV DIESEL (5) [RULE 1110.2] NOx: 13.71 LBS/MW HR (5) [RULE 2009.1] NOx: 7.5 LBS/MW HR (5) [RULE 2009.1]	A195.5 <u>A195.8</u> , D29.1 D29.2, <u>D90.1</u> D323.2 I331.1 D425.1 E73.1 K40.2
CO OXIDATION CATALYST A/N: 403321	<u>C80</u>	<u>D6</u>			

BACKGROUND:

The diesel engines at Pebbly Beach provide power to the residents and businesses on Catalina Island. The 5 engines listed above have been in operation since about the 1970's. There is also a newer engine, Unit #15, which was installed in the mid 1990's, but that engine is not a part of the changes being proposed under these applications. The facility is located approximately 1.8 miles southeast of the city of Avalon.

The engines are all subject to AQMD Rule 2009.1, which was adopted in 2001. The rule was intended to insure that Reclaim facilities would install NOx control equipment in a timely manner, so that they could



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meet their annual NOx allocations. In order to comply with the rule, SCE installed SCRs on all their engines. Previously, the engines had no post combustion NOx control (except Unit #15). As part of the rule compliance, an annual NOx limit in lbs/MWh was placed on all the engines.

SCE has received NOV's for exceeding this annual NOx limit on Units 7 and 10. SCE has indicated that the reason these engines are not meeting their limits is that the units must be 'dragged', or operated at low loads, during certain operating periods. This causes the engine exhaust temperature to fall below the range for effective SCR control, therefore, the engines are operated without SCR, and the NOx emissions increase. The NOV's are summarized in the following table:

NOV	Violation Date	Violation
P45273	12/31/04	Unit #10 exceeded its 11.80 lbs/MWh and Unit #7 exceeded its 9.76 lbs/MWh annual NOx average
P45277	12/31/06	Unit #10 exceeded its 11.8 lbs/MWh annual NOx average
P47997	1/1/07-12/31/07	Violation of AQMD Rules 2004(b)(1) and 2004(d)(1)

AQMD and SCE are currently in negotiations for a Settlement Agreement to address this issue. SCE has proposed that instead of individual lbs/MWh limits on each engine, a system-wide limit should be imposed. This will allow them more flexibility in operating individual units, and the overall NOx from the facility will not increase and may actually decrease based on a comparison of the proposed facility-wide limit and the actual emissions from previous years data. Also, as part of the SA, within 2 years, SCE is proposing to install a large battery and 22 micro-turbines. The battery will be charged by the diesel engines, its stored power can then be used during low load situations, or to supplement the power generated by the engines, which in turn should reduce dragging. The micro-turbines will be used to supplement the power generated by the diesel units. After installation of the battery and micro-turbines, SCE will submit another set of applications to reduce the system-wide NOx limit to 6.5 lbs/MWh.

The following applications were submitted for this project:

A/N	Unit
483412	7
483413	8
483414	10
483415	12
483416	14
483418	Title V Amendment

A/N 483412 will serve as the LEAD application. Please refer to this application file for reference documents.



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COMPLIANCE RECORD REVIEW:

The AQMD's Compliance database shows that for the last 5 years, in addition to the above violations, SCE has been subject to several other compliance issues, summarized as follows:

Notice #	Violation Date	Description
C71670	7/8/05	Provide documentation on Unit #7 original configuration
C98685	5/10/06	Report annual emission on APEP
C98696	7/13/07	Report NOx lbs/MW-hr for 2006
C98698	8/24/07	Report NOx lbs/MW-hr on quarterly basis from Q4 01 to Q4 03
D13865	12/2/08	Provide requested items for 2006 and 2007 audits
P45263	1/18/06	Unit #15 exceeded BACT limit on 1/18/06
P45266	3/15/06	Unit #15 exceeded BACT limit on 3/15/06
P45267	3/27/06	Unit #15 exceeded BACT limit on 3/27/06

The Pebbly Beach facility is subject to RECLAIM and Title V. It is a major source of HAP emissions.

PROCESS DESCRIPTION:

The six diesel engines on site are used to generate power for the island. Each engine is controlled with SCR and oxidation catalysts, installed in 2003. The SCRs operate with urea as the catalyst, not ammonia, since storage of ammonia on the island was deemed by SCE to be unsafe. Total generating capacity for the site is 9.3 MW. The engines are supplied diesel fuel from one of two 3,000 barrel diesel storage tanks.

Units 7, 10, and 14 are Roots-blown two-stroke carburetor-type units. These units are the ones that can be 'dragged' if need be. The other units - 8, 12, and 15, are all turbocharged units.

Units 7, 8, and 10 are all 16 cylinder EMD units, model #'s 567C, 567D, and 645E respectively. Unit #12 is a 12 cylinder EMD model 645E, and Unit #14 is a 16 cylinder GM model 645E. These units are all old diesel locomotive engines, the 567C and D series originally built in the 1960's, and the 645 series built from the late 1960's to the 1980's.

SCE provided the following information on their engines:

Engine	Model	Cylinders	HP	Date of Manufacture
7	16-567-C	16	1500	1/1/1967
8	16-567-D4	16	2150	1/1/1964
10	16-645-E1	16	1575	1/1/1968
12	12-645-E4	12	1575	1/1/1976
14	S16-645-E1	16	1950	1/1/1985



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EMISSIONS:

SCE provided data showing the annual NOx emissions per MWh from all engines on site, summarized as follows:

Year	Annual Average NOx (actual) Lbs/MWh
2004	8.26
2005	6.54
2006	8.84
2007	6.87
2008*	7.82

* Qtr 1 and Qtr 2 only

Currently the individual NOx limits are as follows:

Unit	Rated Capacity	NOx Limit
	MW	Lbs/MWh
7	1.0	9.79
8	1.5	10.03
10	1.125	11.8
12	1.5	11.45
14	1.4	13.71
15*	2.8	2.13

* The Unit 15 limit is not proposed to be replaced by the system-wide limit, although its emissions will be included in the calculation of the limit.

Under this set of applications, SCE has proposed a system-wide NOx limit of 7.5 lbs/MWh, to take effect immediately. Although there are no further controls being proposed for the engines, as can be seen from the above data, the facility-wide limit will require SCE to minimize the dragging of the units as much as possible, and use their cleanest unit, #15, as much as possible. SCE has proposed to achieve this through new system modeling software and NOx dispatch procedure, and a new CEMS and real-time emissions data monitoring.

The system-wide energy-weighted average NOx emissions, based on potential emissions, is 8.6 lbs/MWh (calculated by summing each engines MW rating times its annual NOx limit divided by the total capacity of the site).

Actual NOx emissions from individual units may increase, while others may decrease under the proposed changes depending on how the units are operated. There is no way to determine quantitatively the increases or decreases associated with each unit, because each unit will be allowed to operate at any NOx emission rate, as long as the annual average limit is met for all the engines in the aggregate.



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AQMD management and legal staff have made the determination that execution of the SA and all of its provisions, including installation of the battery, the micro-turbines, and the imposition of the system-wide NO_x limit, overall will have the effect of reducing NO_x emissions at the Catalina site by reducing dragging, and switching some of the power production to the cleaner burning propane-fueled micro-turbines. SCE has done some studies which indicate that the installation of the battery alone could reduce NO_x emissions by over 30,000 lbs/yr by reducing the need for dragging.

NSR emissions assigned to each unit will not be changed. Appendix A contains the emission calculations and summaries.

RECOMMENDATION:

Based on AQMD management's decision to implement the proposed Settlement Agreement, approval of these applications is recommended, subject to the following conditions (proposed new conditions are shown in **bold underline**, conditions to be deleted are shown in ~~strikethrough~~, and all other conditions are existing and unchanged).

Additionally it is recommended that the oxidation catalysts be included in the permit description. They were installed in 2003 along with the SCRs, but they were never listed in the permit.

As a Title V facility, the proposed permit will be subject to a 45 day EPA review and comment period.

CONDITIONS:

A. PROPOSED NEW CONDITIONS

The following conditions will be added to reflect the change to a new system-wide lbs/MWh NO_x limit, and to require the measurement and recording of each engine's output.

A195.8

The 7.5 lbs/MW hr NO_x emission limit is averaged over 1 calendar year. The limit is calculated based on the total mass NO_x emitted from Units 7, 8, 10, 12, 14, and 15 combined.

1. To demonstrate compliance with the Nox emission rate, the facility permit holder shall comply with the following:

(a) Determine the mass NO_x emissions from the all engines pursuant to Rule 2012 including any required data substitution.

(b) For each quarter, report the quarterly NO_x emissions and the energy produced in megawatts-hour for the quarter from all engines. The report shall



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be filed along with the Quarterly Certificate of Emission Report (QCER) as required by Rule 2004.

[RULE 2004, 5-11-2001; RULE 2009.1, 5-11-2001]

D90.1

The operator shall monitor the power output of the engine generator according to the following specifications:

The operator shall install and maintain a device to accurately indicate the net power output of the engine generator. The data will be used to calculate the emissions in lbs/MWh.

The device shall be accurate to within +/- 5 percent and shall be calibrated at least once every 12 months.

The operator shall also install and maintain a device to continuously record the parameter being measured.

[RULE 2004, 5-11-2001; RULE 2009.1, 5-11-2001]

B. CONDITIONS TO BE DELETED

The following conditions are the existing individual lbs/MW hr NOx limits which are proposed for deletion under these applications.

D1 (Unit #7)

A195.1

~~The 9.76 LBS/MW HR NOx emission limit(s) is averaged over 1 year.~~

~~1. To demonstrate compliance with the NOx emission rate for Device D1, the facility permit holder shall comply with the following:~~

~~(a) Determine the NOx emissions from the device pursuant to Rule 2012 including any required data substitution.~~

~~(b) For each quarter starting from the fourth quarter of compliance year 2001, report the quarterly NOx emissions and the energy produced in megawatts-hour for the quarter from this device. The report shall be filed along with the Quarterly Certificate of Emission Report (QCER) as required by Rule 2004.~~

~~2. The SCR control equipment shall be capable of achieving a NOx reduction of at least 70%.~~

~~[RULE 2004, 5-11-2001; RULE 2009.1, 5-11-2001]~~



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D2 (Unit #8)

A195.6

The 10.03 LBS/MW-HR NOX emission limit(s) is averaged over 1 year.

1. To demonstrate compliance with the NOx emission rate for Device D2, the facility permit holder shall comply with the following:

- (a) Determine the NOx emissions from the device pursuant to Rule 2012 including any required data substitution.
- (b) For each quarter starting from the fourth quarter of compliance year 2001, report the quarterly NOx emissions and the energy produced in megawatts-hour for the quarter from this device. The report shall be filed along with the Quarterly Certificate of Emission Report (QCER) as required by Rule 2004.

2. The SCR control equipment shall be capable of achieving a NOx reduction of at least 70%.
[RULE 2004, 5-11-2001; RULE 2009.1, 5-11-2001]

D3 (Unit #10)

A195.3

The 11.80 LBS/MW-HR NOX emission limit(s) is averaged over 1 year.

1. To demonstrate compliance with the NOx emission rate for Device D3, the facility permit holder shall comply with the following:

- (a) Determine the NOx emissions from the device pursuant to Rule 2012 including any required data substitution.
- (b) For each quarter starting from the fourth quarter of compliance year 2001, report the quarterly NOx emissions and the energy produced in megawatts-hour for the quarter from this device. The report shall be filed along with the Quarterly Certificate of Emission Report (QCER) as required by Rule 2004.

2. The SCR control equipment shall be capable of achieving a NOx reduction of at least 70%.
[RULE 2004, 5-11-2001; RULE 2009.1, 5-11-2001]

D5 (Unit #12)

A195.4

The 11.45 LBS/MW-HR NOX emission limit(s) is averaged over 1 year.

1. To demonstrate compliance with the NOx emission rate for Device D5, the facility permit holder shall comply with the following:

- (a) Determine the NOx emissions from the device pursuant to Rule 2012 including any required data substitution.
- (b) For each quarter starting from the fourth quarter of compliance year 2001, report the quarterly NOx emissions and the energy produced in megawatts-hour for the



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quarter from this device. The report shall be filed along with the Quarterly Certificate of Emission Report (QCER) as required by Rule 2004.

2. The SCR control equipment shall be capable of achieving a NO_x reduction of at least 70%.
[RULE 2004, 5-11-2001; RULE 2009.1, 5-11-2001]

D6 (Unit #14)

A195.5

The 13.71 LBS/MW-HR NO_x emission limit(s) is averaged over 1 year.

1. To demonstrate compliance with the NO_x emission rate for Device D6, the facility permit holder shall comply with the following:

(a) Determine the NO_x emissions from the device pursuant to Rule 2012 including any required data substitution.

(b) For each quarter starting from the fourth quarter of compliance year 2001, report the quarterly NO_x emissions and the energy produced in megawatts-hour for the quarter from this device. The report shall be filed along with the Quarterly Certificate of Emission Report (QCER) as required by Rule 2004.

2. The SCR control equipment shall be capable of achieving a NO_x reduction of at least 70%.
[RULE 2004, 5-11-2001; RULE 2009.1, 5-11-2001]

C. EXISTING CONDITIONS

The following are the existing conditions on each engine, which will remain the same. Note that the testing required under condition D29.1 has already been performed for each unit, and no new testing is being required under these applications. The condition will be removed when the final Permits to Operate are issued.

Facility Condition

F14.2

The operator shall not purchase fuel oil containing sulfur compounds in excess of 15 ppm by weight as supplied by the supplier.

This condition shall become effective on or after June 1, 2004.
[RULE 431.2, 9-15-2000]



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Device Conditions

D29.1

The operator shall conduct source test(s) for the pollutant(s) identified below.

Pollutant to be Tested	Required Test Methods	Averaging Time	Test Location
NOx emissions	District Method 100.1	1 hour	Outlet stack
CO emissions	District Method 100.1	1 hour	Outlet stack
SOx emissions	District Method 6.1	1 hour	Outlet stack
ROG emissions	Approved District Method	1 hour	Outlet stack
PM emissions	Approved District Method	District approved averaging time	Outlet stack
NH3 emissions	District Method 207.1 and 5.3 or EPA Method 17	1 hour	Outlet stack

The District shall be notified of the date and time of the test at least 10 days prior to the test

The test(s) shall be conducted after approval of the test protocol, but no later than 180 days after initial start-up of the internal combustion engine(s) with SCR

The test shall be conducted to determine the oxygen levels in the exhaust. In addition, the test shall measure the fuel flow rate (CFH), the flue gas flow rate, and the generator output (MW)

The test shall be conducted when the equipment is operating at loads of 100, 75, and 50 percent of maximum load

The test shall be conducted in accordance with a AQMD approved source test protocol. The protocol shall be submitted to the AQMD engineer no later than 45 days before the test date and shall be approved by the AQMD before the test commences. The test protocol shall include the proposed operating conditions of the ICE(s) during the test, the identity of the testing lab, a statement from the testing lab certifying that it meets the criteria of R304, and a description of all sampling and analytical procedures.



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[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(b)(2)-Offset, 5-10-1996; RULE 2005, 4-9-1999; RULE 2005, 4-20-2001]

D29.2

The operator shall conduct source test(s) for the pollutant(s) identified below.

Pollutant to be Tested	Required Test Methods	Averaging Time	Test Location
NH3 emissions	District Method 207.1 and 5.3 or EPA Method 17	1 hour	Outlet stack

The test shall be conducted at least quarterly during the first 12 months of operation of the SCR, and at least annually thereafter.

The test shall be conducted to determine the NH3 emissions at the outlet using the specified method measured over a 60 minute averaging time period. The NOx concentration, as determined by the CEMS, shall be simultaneously recorded during the ammonia slip test. If the CEMS is inoperable, a test shall be conducted to determine the NOx emissions using District method 100.1.

The test shall be conducted when the equipment is operating at 80 percent load or greater.

The test shall be conducted and the results submitted to the District within 45 days after the test date.

[RULE 1303(a)(1)-BACT, 5-10-1996]

D425.1

The operator shall have the existing NOx CEMS monitoring this device reevaluated by the District by submitting a CEMS application. If the CEMS is not recertified within 90 days of the start-up of this device, the facility permit holder shall calculate and report NOx emissions in accordance with Rule 2012, Appendix A, Chapter 2, Paragraph (B)(17)-Recertification Requirements.

[RULE 2012, 3-16-2001; RULE 2012, 12-5-2003]

E73.1

Notwithstanding the requirements of Section E conditions, the operator may, at his discretion, choose not to use urea injection during start ups when the exhaust temperature at the inlet of the SCR reactor is less than 550 Deg F, not to exceed 1 hour.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 402, 5-7-1976]

H23.3 This equipment is subject to the applicable requirements of the following rules or regulations:



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Contaminant	Rule	Rule/Subpart
PM	District Rule	1470

These engines operating with SCR, are exempt from the PM standards of this rule [RULE 1470, 6-1-2007]

I331.1

The conditions and requirements for this device in Section H shall take effect, and shall supersede those in Section D, when the modifications authorized in Section H are completed. The operator shall notify the AQMD when the modifications are completed.
[RULE 202, 5-7-1976]

K40.2

The operator shall provide to the District a source test report in accordance with the following specifications:

Source test results shall be submitted to the District no later than 60 days after the source test was conducted.

Emission data shall be expressed in terms of mass rate (lbs/hr). In addition, solid PM emissions, if required to be tested, shall also be reported in terms of grains per DSCF.

All exhaust flow rate shall be expressed in terms of dry standard cubic feet per minute (DSCFM) and dry actual cubic feet per minute (DACFM).

All moisture concentration shall be expressed in terms of percent corrected to 15 percent oxygen.

Source test results shall also include engine fuel; exhaust gas rate, and engine and generator output under which the test was conducted.

In addition, NOx emission data shall be expressed in terms of lbs/MW-hr

Emission data shall be expressed in terms of concentration (ppmv), corrected to 15 percent oxygen, dry basis.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(b)(2)-Offset, 5-10-1996; RULE 2005, 4-9-1999; RULE 2005, 4-20-2001]



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Appendix A

Emissions

The emissions data and calculations are taken from the previous set of applications.

Data

Engine	Exhaust Flow, DSCFM	Max Fuel Use, gph	HP	MW	Uncontrolled NOx, ppm @ 15%	Uncontrolled CO, ppm @ 15%
7	5000	65	1500	1	966	257
8	5333	87	2150	1.5	966	257
10	5500	69	1575	1.1	1400	300
12	5417	91	2200	1.5	822	199
14	6667	92	1950	1.4	1026	257

Controlled NOx is based on assumed 90% control, controlled CO is based on assumed 50% control.

ROG, PM10, and SOx are based on Form B-1 Factors as follows:

Pollutant	Factor, lbs/1000 gals
ROG	37.5
PM10	33.5
SOx	7.1

Calculations

Unit #7 (Previous A/N 404268)

Pollutant	Uncontrolled		Controlled		
	Lbs/hr	Lbs/day	Lbs/hr	Lbs/day	Annual
NOx	35.2	844.8	3.52	84.48	18501
CO	5.70	136.8	2.85	68.4	14980
ROG	2.44	58.56	2.44	58.56	12825
PM10	2.19	52.56	2.19	52.56	11511
SOx	0.462	11.09	0.462	11.09	2428

Assumes 24 hrs/day operation, 60% annual capacity factor

Unit #8 (Previous A/N 405149)

Pollutant	Uncontrolled		Controlled		
	Lbs/hr	Lbs/day	Lbs/hr	Lbs/day	Annual
NOx	37.52	900.48	3.75	90.00	19710
CO	6.08	145.92	3.04	72.96	15978
ROG	3.26	78.24	3.26	78.24	17135
PM10	2.91	69.84	2.91	69.84	15295
SOx	0.618	14.83	0.618	14.83	3248

Assumes 24 hrs/day operation, 60% annual capacity factor



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Unit #10 (Previous A/N 404270)

Pollutant	Uncontrolled		Controlled		
	Lbs/hr	Lbs/day	Lbs/hr	Lbs/day	Annual
NOx	56.1	1346.4	5.61	134.64	29486
CO	7.31	175.44	3.6	86.40	18922
ROG	2.59	62.16	2.59	62.16	13613
PM10	2.32	55.68	2.32	55.68	12194
SOx	0.531	12.74	0.531	12.74	2791

Assumes 24 hrs/day operation, 60% annual capacity factor

Unit #12 (Previous A/N 404271)

Pollutant	Uncontrolled		Controlled		
	Lbs/hr	Lbs/day	Lbs/hr	Lbs/day	Annual
NOx	32.4	777.6	3.24	77.76	17029
CO	4.78	114.72	2.39	57.36	12562
ROG	3.41	81.84	3.41	81.84	17923
PM10	3.1	74.4	3.1	74.40	16294
SOx	0.646	15.50	0.646	15.50	3395

Assumes 24 hrs/day operation, 60% annual capacity factor

Unit #14 (Previous A/N 404272)

Pollutant	Uncontrolled		Controlled		
	Lbs/hr	Lbs/day	Lbs/hr	Lbs/day	Annual
NOx	49.8	1195.2	4.98	119.52	26175
CO	7.6	182.4	3.8	91.20	19973
ROG	3.45	82.8	3.45	82.80	18133
PM10	2.88	69.12	2.88	69.12	15137
SOx	0.653	15.67	0.653	15.67	3432

Assumes 24 hrs/day operation, 60% annual capacity factor

Sample calculations:

Unit #7 Uncontrolled NOx, lbs/hr:

$$(5000 \text{ cfm} * 60 \text{ min/hr} * 46 \text{ lbs/lb-mole} * 966 \text{ ppm}) / 379E+6 \text{ cf/lb-mole} = 35.2 \text{ lbs/hr}$$

Unit #7 PM10, lbs/hr:

$$33.5 \text{ lbs/1000 gals} * 65 \text{ gph} = 2.18 \text{ lbs/hr}$$

Conversion of SO2 to SO3 (considered a PM10):

Assume 1% of the SO2 is converted to SO3

One mole of SO3 reacts with 2 moles of NH3 to form one mole of ammonium sulfate (NH4)2(SO4)

Molecular weight of SO2 = 64 lbs/lb-mole

Molecular weight of SO3 = 80 lbs/lb-mole

Molecular weight of (NH4)2(SO4) = 132 lbs/lb-mole

So, on a mass basis, every lb of SO2 will form 2 lbs of (NH4)2(SO4).

$$0.462 \text{ lbs/hr SO2} * 1\% * 2 = 0.01 \text{ lbs/hr PM10}$$



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Total PM10 = 2.18 + 0.01 = 2.19 lbs/hr



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Appendix B

Summary of NOx Data

The following data was submitted by SCE:

Pebble Beach Generating Station LB NOx per MWH Summary

Unit No	2007				2008	
	Q1	Q2	Q3	Q4	Q1	Q2
7	13.39	11.59	5.49	6.03	8.13	6.26
8	8.00	9.75	7.49	9.24	10.51	9.58
10	9.25	8.75	8.51	9.86	9.16	8.28
12	9.55	11.51	8.29	6.78	7.93	9.43
14	9.32	8.01	7.17	11.00	12.86	10.22
15	0.89	0.97	0.65	0.71	0.93	0.58



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Appendix C

Application Data and Fees

A/N	Submittal Date	Equip	Bcat	Fee Sch	Fee
483412	6/3/08	Unit #7	040202/81	C	1,758.90
483413	6/3/08	Unit #8	040202/81	C	1,758.90
483414	6/3/08	Unit #10	040202/81	C	1,758.90
483415	6/3/08	Unit #12	040202/81	C	1,758.90
483416	6/3/08	Unit #14	040202/81	C	1,758.90
483418	6/3/08	Title V	555009	C	1,687.63
Expedited Permit Processing					4,397.25
Total					14,879.38

