

**TABLE 1A
BAAQMD Marsh Landing Generating Station**

**CO Catalyst Control Costs/Combined Cycle
CAPITAL COST SUMMARY**

***** Incremental Costs for CO Control from 2 to 0.9 ppmv *****

DIRECT CAPITAL COSTS (2009 \$)		Explanation of Cost Estimates per Turbine/HRSG
1. Purchased Equipment:		Base Cost
A) Pollution Control Equipment	\$104,000	Additional catalyst cost per NE and EPA*
B) Instrumentation & Controls(No CEMS)	\$10,400	EPA1998 10% of Base Cost
C) Freight & Taxes	<u>\$14,872</u>	8% Taxes; 5% Freight; on 1A & 1B
Total Purchased Equip. Costs (TEC):	\$129,272	Sum 1A,1B,1C
2. Installation Costs:		
A) Foundation & Supports	\$0	EPA1998 8% of TEC
B) Erection and Handling	\$18,100	EPA1998 14% of TEC
C) Electrical	\$0	EPA1998 4% of TEC
D) Piping	\$0	EPA1998 2% of TEC
E) Insulation	\$0	1% of TEC
F) Painting	\$0	EPA1998 1% of TEC
G) Site Preparation	<u>\$0</u>	0% of TEC
Total Installation Costs (TINC):	\$18,100	Sum 2A,2B,2C,2D,2E,2F,2G
Total Direct Capital Costs (TDCC):	\$147,372	Sum TEC,TINC
INDIRECT CAPITAL COSTS		
1. Engineering & Supervision	\$12,900	EPA1998 10% of TEC
2. Construction and Field Exp.	\$6,500	OAQPS 5% of TEC
3. Contractor Fees	\$12,900	OAQPS 10% of TEC
4. Start-up	\$2,600	OAQPS 2% of TEC
5. Performance Testing	<u>\$1,300</u>	OAQPS 1% of TEC
Total Indirect Capital Costs (TICC):	\$36,200	Sum 1,2,3,4,5,6
Total Direct & Indirect Capital Costs (TDICC):	\$183,572	Sum TDCC,TICC
Contingency (@12%):	\$22,000	20% TDICC (std engineering accuracy)
TOTAL CAPITAL COSTS (TCC):	<u>\$205,600</u>	Sum TDICC,Contingency

TABLE 1A Cont'd
BAAQMD Marsh Landing Generating Station

CO Catalyst Control Costs/Combined Cycle
ANNUAL OPERATING COST SUMMARY

DIRECT OPERATING COSTS (2003 \$)		Explanation of Cost Estimates
		per Turbine/HRSG
1. Operating Labor	\$0	EPA1998 3 hr/day, @41.50 hr
2. Supervisory Labor	\$0	OAQPS 15% Operating Labor
3. Maintenance Labor & Materials	\$7,574	0.5 hr/day, \$41.50/hr, + 100% materials
4. Electricity Expense (\$0.0527/kWh)	\$0	
5. Catalyst Cost (replace)	\$0	Additional catalyst cost per BASF
6. Fuel Penalty (\$0.0041/scf gas)	\$30,008	.15% fuel increase/inch wc, assumed 0.5" bp
7. Annual Catalyst Cost	\$0	Initial Catalyst will last 15 years
Total Direct Operating Costs (TDOC):	\$37,582	Sum 1 through 7 Annualized Costs Only
INDIRECT OPERATING COSTS		
1. Overhead	\$0	OAQPS 60% Total Labor
Total Indirect Operating Costs (TIOC):	\$0	Sum 1
CAPITAL CHARGES COSTS		
1. Property Tax	\$2,100	OAQPS 1% TCC
2. Insurance	\$2,100	OAQPS 1% TCC
3. General Administrative	\$4,100	OAQPS 2% TCC
4. Capital Recovery Cost (7%, 15 years)	\$22,600	10.98%, TCC
Total Capital Charges Costs (TCCC):	\$30,900	Sum 1,2,3,4
TOTAL ANNUALIZED OPERATING COSTS:	\$68,482	Sum TDOC,TIOC,TCCC

TABLE 1A Cont'd

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Controlled Case Emissions		per Turbine/HRSG
Base Concentration-Controlled	2	ppm
Annual Emission Rate	7.8	tpy (0.00446 lb/MMBtu, 1997 MMBtu/hour, 1752 l Startup/Shutdown Excluded)
 Incremental Controlled Emissions Case		
CO Concentration	0.9	ppm
Annual Emission Rate:	3.5	tpy (0.00201 lb/MMBtu, 1997 MMBtu/hour, 1752 l
CO Reduction from Uncontrolled Case:	4.3	tpy
Control Cost Effectiveness:	\$15,900	per ton CO

References:

OAQPS - OAQPS Cost Control Manual, 5th ED., February 1996.

EPA1998 - Cost Effectiveness fo Oxidation Catalyst Control of HAP Emissions from Stationary Combustion Turbines, EPA, 1998.

* NE estimated cost for additional catalyst to achieve 90% control of CO per EPA study.

* EPA memo dated 12-30-99, Emissions Stds Division, Docket A-95-51, and May 14, 1999 memo on Stationary CT control cost options.