Table 3.10-5 Comparative Analysis of Alternative Cooling Technologies

Cooling System		Wet Cooling		Dry Cooling		Wet / Dry Cooling	
Ambient Temperature	°F	112	62	112	62	112	62
Relative Humidity	%	15	70	15	70	15	70
HRSG Duct Burner Status		On	Off	On	Off	On	Off
Evaporative Cooler Status		On	On	On	On	On	On
GTG Load	%	100	100	100	100	100	100
STG Exhaust Pressure (calculated)	inHgA	2.86	1.60	10.74	2.72	10.74	2.72
STG Exhaust Steam Flow Rate (calculated)	lb/h	1,375,600	1,076,300	1,390,100	1,083,900	1,390,100	1,083,900
Estimated Performance							
GTG Gross Power Output (Each)	kW	158,700	168,600	158,700	168,600	158,700	168,600
STG Gross Power Output (Each)	kW	244,495	187,464	205,621	173,193	205,621	173,193
Gross Power Output	kW	1,123,790	1,049,328	1,046,042	1,020,786	1,046,042	1,020,786
Total Auxiliary Power	kW	26,815	23,535	30,301	23,142	28,558	23,339
Net Power Ouput	kW	1,096,975	1,025,793	1,015,741	997,644	1,017,484	997,447
Total Fuel Gas Consumption, LHV	kBtu/h	7,031,920	6,322,500	7,032,823	6,322,500	7,032,823	6,322,500
Net Heat Rate, LHV	Btu/kWh	6,410	6,164	6,924	6,337	6,912	6,339
Estimated CT Makeup Water, Chemical and Fuel Costs							
Plant Availability Factor		0.92		0.92		0.92	
Operating Hours per Year	h/y	8,059		8,059		8,059	
Fuel Gas Consumption, HHV	mm Btu/y	62,338,812	56,049,721	62,346,824	56,049,721	62,346,824	56,049,721
Fuel Gas Price, HHV	US$/mmBtu	3.000		3.000		3.000	
Fuel Gas Cost	mm US$/y	187.016	168.149	187.040	168.149	187.040	168.149
CT Makeup Water Usage	USgpm	3,050	1,663	0	0	1,525	832
CT Makeup Water Usage	acre-ft/y	4,526	2,468	0	0	2,263	1,234
CT Makeup Water Usage	mm ft³/y	197	108	0	0	99	54
CT Makeup Water & Treatment Cost ($0.92)	US$/100 ft³	0.92		0		0.92	
CT Makeup Water & Treatment Cost	mm US$/y	1.814	0.989	0.000	0.000	0.907	0.495
Chemicals Cost (2)	mm US$/y	0.025		0.001		0.013	
ZLD Salt Disposal Costs	mm US$/y	0.207		0.005		0.103	
Total CT Makeup Water, Chemical and Fuel Cost	mm US$/y	189.063	169.371	187.046	168.155	188.064	168.760
Average Electricity Sales Price	$/MWH	35.00		35.00		35.00	
Lost Generation	mm US$/y	—	—	22.914	7.940	22.422	7.995
Air Cooled Condenser (for 1 unit)							
Steam Flow Rate	lb/h	—	—	1,390,100	1,083,900	695,050	541,950
Total Fan Power	kW	—	—	5,243	4,004	2,622	2,142
Plot Length x Width / Height	ft	—		302 x 190 / 103		151 x 190 / 103	
Number of Cells		—		40		20	
Fan Diameter	ft	—		32		32	
Noise Level		—		67 dBA @ 400 ft		67 dBA @ 400 ft	
Estimated Cost	US$			19,940,000		8,308,000	
Surface Condenser (for 1 unit)							
Steam Flow Rate	lb/h	1,375,600	1,076,300	—	—	695,050	541,950
Circulating Water Flow Rate	USgpm	140026	140026	—	—	70,013	70,013
Size - Ht Surface	ft²	112,680		—		56,340	
Estimated Cost	US$	1,500,000				900,000	
Cooling Tower (for 1 unit)							
Makeup Water	USgpm	3,050	1,663	—	—	1,525	832
Blowdown at 20 Cycles of Concentration	USgpm	153	83	—	—	76	42
Total Fan Power	kW	1,838	1,614	—	—	836	683
Drift Rate @ 0.0005%	USgpm	0.7		—		0.4	
Plot Length x Width / Height	ft	529 x 43 / 55.5		—		124 x 93 / 41	
Number of Cells		11		—		5	
Fan Diameter	ft	28		—		28	
Noise Level		53 dBA @ 400 ft		—		53 dBA @ 400 ft	
Estimated Cost	US$	2,300,000				1,400,000	
Cooling System ROM Installed Cost Estimate for 2 units (1)	US$	15,200,000		79,760,000		54,000,000	

Notes:

1. Cooling system ROM installed cost estimate does not include cost of financing.
2. Water treatment chemicals are shown in Table 3.4-17 of the AFC.