04/13/2001
Delta Power
Chino Site Performance
Black & Veatch Project 066561.0040
Simple Cycle Emissions Estimates, Revision 0

Case Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CTG Model	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint	LM6000Sprint
Diluent	Water/30	Water/30	Water/30	Water/30	Water/30	Water/30	Water/30	Water/30	Water/30	Water/30	Water/30	Water/30	Water/30	Water/30	Water/30
CTG Fuel Type	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
CTG Load	100%	75%	50%	100%	100%	100%	75%	50%	100%	100%	100%	75%	50%	100%	100%
CTG Inlet Air Conditioning In Operation?	Chiller OFF	Chiller OFF	Chiller OFF	Chiller OFF	Chiller ON	Chiller OFF	Chiller OFF	Chiller OFF	Chiller OFF	Chiller ON	Chiller OFF	Chiller OFF	Chiller OFF	Fogger ON	Fogger ON
SPRINT System In Operation?	SPRINT OFF	SPRINT OFF	SPRINT OFF	SPRINT ON	SPRINT ON	SPRINT OFF	SPRINT OFF	SPRINT OFF	SPRINT ON	SPRINT ON	SPRINT OFF	SPRINT OFF	SPRINT OFF	SPRINT ON	SPRINT ON
SCR / CO Catalyst In Operation?	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON	SCR/CO ON
Silencer installed?	No Silencer	No Silencer	No Silencer	No Silencer	No Silencer	No Silencer	No Silencer	No Silencer	No Silencer	No Silencer	No Silencer	No Silencer	No Silencer	Silencer Installed	ncer Not Installed
Ambient Temperature, F	24	24	24	66	66	66	66	66	114	114	114	114	114	92	92
Fuel Sulfur Content (grains/100 standard cubic feet)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Stack															
Stack Exit Temperature, F	604.3 799	657.6 724	636.5 686	731.5 857	725.37 846	708.37 801	668.15 779	664.8 737	885	846	845	822	788	848	848
Stack Diameter, ft (estimated)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Stack Flow, lb/h	1,091,160	1,002,600	867,960	989,640	1,031,400	931,480	849,960	749,160	787,320	1,031,400	725,400	662,040	599,760	928,800	928,800
Stack Flow, acfm	244,784	223,747	192,976	223,329	232,237	213,607	190,249	167,063	177,934	232,237	162,973	148,407	134,046	210,218	210,218
Stack Flow, scfm	608,867	523,190	436,729	581,084	599,072	532,194	465,636	395,057	472,786	599,072	420,248	375,818	330,568	543,193	543,193
Stack Exit Velocity, ft/s	129.2	111.0	92.7	123.3	127.1	112.9	98.8	83.8	100.3	127.1	89.2	79.8	70.1	115.3	115.3
Post Combustion Emissions Control															
CO Catalyst															
CO removed in CO Catalyst, %wt	90%	90%	90%	89%	90%	86%	85%	84%	60%	90%	60%	60%	60%	60%	60%
CO removed in CO Catalyst, lb/h (includes CO correction as applied to CTG)	110.62	88.88	62.44	44.02	62.19	29.85	22.87	16.44	6.24	62.19	5.16	4.36	3.55	7.55	7.54
SO2 Catalyst															
SO2 removed in SO2 Scrubber, %wt	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
SO2 removed in SO2 Scrubber, lb/h (includes SO2 correction as applied to CTG)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Selective Catalytic Reduction (SCR)															
NOx Removed, lb/h as NO2	42.05	33.11	25.32	38.83	40.56	33.58	27.63	21.44	28.44	40.56	23.56	19.90	16.19	34.43	34.43
NOx Removed, percent	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%	83.0%
NH3 Slip, lb/h	3.1	2.5	1.9	2.9	3.0	2.5	2.0	1.6	2.1	3.0	1.7	1.5	1.2	2.5	2.5
Assumed stoichiometric ratio for NH3 consumption	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Total NH3 (19% aqueous) consumption, lb/h	131.1	103.2	78.9	121.1	126.4	104.7	86.1	66.8	88.6	126.4	73.4	62.1	50.5	107.4	107.4

Notes:
1. The emissions estimates shown in the table above are per stack. They are for information ONLY and are NOT to be guaranteed.
2. The dry air composition used is 0.98% Ar, 78.03% N2 and 20.99% O2.
3. Standard conditions are defined as 60 F, 14.696 psia, Norm conditions are defined as 0 C, 1.103 bar.
4. The CTG performance is a General Electric APPS estimate. Actual Performance Data from GE will need to be obtained to verify Emissions Estimates.
5. The effects of an SCR were included for all cases. As requested, the SCR was assumed to control the NOx level to 5 ppmvd @ 15%O2 at the stack. An NH3 slip of 5 ppmvd was assumed for the SCR.
6. The effects of a CO catalyst were included for all cases. The CO catalyst was assumed to control the CO level to 6 ppmvd @ 15 % O2 at stack, unless this required a CO reduction rate greater than 90% which is typically the maximum reduction rate used by Black & Veatch.
7. As requested, the VOC level was assumed to be reduced by the catalyst to 2 ppmvd @ 15% O2 at the stack.
8. UHC calculations do not include the effects of oxidation in the CO catalyst.
9. The front half catch of particulate emissions is assumed to be half the amount of the front and back half catch.
10. The VOC/UHC ratio is assumed to be 20% for natural gas firing (typical for GE turbines).
11. The SO2 oxidation rate was assumed to be 75% when the CO catalyst was operating.
12. The fuel used had a LHV of 20,796 Btu/lb. A fuel Sulfur content of 0.25 grains/100SCF was assumed.
13. Aqueous ammonia was assumed to be used, and its concentration was assumed to be 19%.
14. ALL PART LOAD CASES ARE BASED ON THE CORRESPONDING CASES WITH SPRINT SYSTEM OFF AND CHILLER OFF.
15. In case 14, an additional (as compared to case 15) pressure loss was accounted for to simulate the presence of a silencer.
16. A fogger (fogging to within 1 Deg.F of the ambient wet bulb temperature) was used instead of a chiller for cases 14-15.

SR4/1 Preparer: M.Delahaye Filepath: c:\projects\chino\[chino_emissions.xls]calculations Reviewer: J.Schwarz