2x1 SWPC 501FD2/DLN Combined Cycle, Estimated Heat Balance Summary – CTG/HRSG Continental – Montana Combined Cycle Performance Estimated

2x1 SWPC 501FD2 Combined Cycle, Estimated Heat Balance Summary – CTG/HRSG Continental – Montana Combined Cycle Performance – B&V Project

Case Name		Case 5	Case 1	Case 8
Ambient Temperature		39.0 F	100 F	-20.0 F
Number of CTG/HRSG Units operating		2	2	2
CTG Model		501FD	501FD	501FD
CTG Fuel		Natural Gas	Natural Gas	Natural Gas
CTG Load Level (percent of base load)		100.0%	100.0%	100.0%
HRSG Firing		Fired	Fired	Fired
STG Output		251.5 MW	232.3 MW	274.7 MW
STG Model		WEC-1x32.5	WEC-1x32.5	WEC-1x32.5
STG Throttle Conditions, psia/F		2291.9/1040F	1920.9/1050F	2265.5/1021F
Condenser Pressure HgA		3.52 In.	3.54 In.	3.93 In.
Combustion Turbine Generator (per unit)				
Ambient Conditions Dry Bulb	Pressure, psia	12.017	12.017	12.017
	Temperature, F	39.0	100.0	-20.0
	Relative Humidity	62%	35%	73%
	Elevation, ft	5.500	5.500	5.500
Compressor Inlet Conditions	Temperature, F	39.0	100.0	-20.0
	Relative Humidity	62%	35%	73%
Evaporative Cooler Used?		No	No	No
CTG Fuel Input	HC, Mbtu/h (LHV)	3,078.4	2,449.1	3,160.8
	HC, Mbtu/h (HHV)	3,414.3	2,716.3	3,505.8
Fuel Type		Natural Gas	Natural Gas	Natural Gas
Fuel Gas Temperature, F		280	280	280
Performance Bases Temperature, F		280	280	280
Steam Injection	Flow, lb/h	111,130	0	0
CTG Exhaust	Flow, lb/h	3,203,125	2,682,815	3,323,095
	Pressure, in. H2O	15.5	15.5	15.5
	Temperature, F	1,097	1,140	1,056
CTG Exhaust Analysis	Ar, C02, H20, N2,)2 % volume	*N/A	*N/A	*N/A
CTG Emissions	NOx, ppmvd @ 15%	*N/A	*N/A	*N/A
	Nox, lb/h as NO2	*N/A	*N/A	*N/A
	CO, ppmvd @ 15%	*N/A	*N/A	*N/A
	CO, lb/h	*N/A	*N/A	*N/A
	VOC, ppmvd @ 15	*N/A	*N/A	*N/A
	VOC, lb/h as CH4	*N/A	*N/A	*N/A
	Particulates, lb/h	*N/A	*N/A	*N/A
Stack Exhaust	Flow, lb/h	3,049,803	2,799,278	3,272,295
	Temperature, F	190	189	193

*Note: See Air Analysis

2x1 SWPC 501FD2/DLN Combined Cycle, Estimated Heat Balance Summary – CTG/HRSG Continental – Montana Combined Cycle Performance Estimated

2x1 SWPC 501FD2 Combined Cycle, Estimated Heat Balance Summary – Overall Plant Performance Continental – Montana Combined Cycle Performance – B&V Project 61405

Case Name	Case 5	Case 1	Case 8
Ambient Temperature	39.0F	100F	-20.0F
Number of CTG/HRSG Units per Block	2	2	2
CTG Model	501FD	501FD	501FD
CTG Fuel	Natural Gas	Natural Gas	Natural Gas
CTG Load Level (percent of base load)	100.0%	100.0%	100.0%
HRSG Firing	Fired	Fired	Fired
STG Output	251.5 MW	232.3 MW	270.7 MW
STG Model	WEC-1x32.5	WEC-1x32.5	WEC-1x32.5
STG Throttle Conditions, psia/F	2291/1040F	1920.9/1050F	2265.5/1021F
Condenser Pressure HgA	3.52 in.	3.54 in.	3.93 in.
New & Clean Performance – CTG Performance NOT Adjusted for Effects of Different Fuel Gas Temperatures			
Number of CTG/HRSG Units per Block	1	1	1
Gross CTG Output, kW (each)	172,110	126,960	174,690
Gross CTG Output, kW (total)	344,220	253,920	349,380
Gross CTG Heat Rate, Btu/kWh (LHV)	8,943	9,645	9,047
Gross CTG Heat Rate, Btu/kWh (HHV)	9,919	10,697.6	10,034.3
Performance Basis Fuel Gas Temperature, F	280	280	280
CTG Heat Input, Mbtu/h (LHV) (total)	3,078.4	2,449.1	3,160.8
CTG Heat Input, Mbtu/h (HHV) (total)	3,414.3	2,716.3	3,505.8
Duct Burner Heat Input, Mbtu/h (LHV) (each)	504.2	408.9	509.4
Duct Burner Heat Input, Mbtu/h (HHV) (each)	559.3	453.5	565
Duct Burner Heat Input, Mbtu/h (LHV) (total)	1,008.5	817.8	1,018.8
Duct Burner Heat Input, Mbtu/h (HHV) (total)	1,118.6	907.0	1,130.0
Gross STG Output, kW	251,500	232,300	270,600
STG Output, percent of CTG Output	42.3%	47.77%	43.64%
Gross Plant Output, kW	595,720	486,270	620,040
Auxiliary Power/Losses, kW	13,380	12,390	13,840
Auxiliary Power/Losses, percent of gross	2.32%	2.55%	2.23%
Plant Heat Input, Mbtu/h (LHV)	4,086.9	3,266.8	4,179.6
Plant heat Input, Mbtu/h (HHV)	4,532.9	3,623.8	4,635.5
Net Plant Output, kW	581,890	473,830	606,200
Net Plant Heat Rate, Btu/kWh (LHV)	2,023	6,894	6,895
Net Plant heat Rate, Btu/kWh (HHV)	7,790	7,647	7,647
Net Plant Efficiency (LHV)	48.58%	49.49%	49.49%
Net Plant Efficiency (HHV)	43.80%	44.62%	44.62%