

Mankato Energy Center Start profile for winter months

No Auxiliary Boiler						With Auxiliary Boiler			
Hot						Hot			
Hour	CT Gas	AXB Gas	CT %load	STG % load		Hour	CT Gas	AXB Gas	CT %load
1	1200	0	60	0		1	1200	0	60
2	1450	0	60	35	AGC Available	2	1450	0	60
Fuel	2650	0		Total Fuel	2650	Fuel	2650	0	
Warm						Warm			
	CT Gas	AXB Gas	CT %load	STG % load			CT Gas	AXB Gas	CT %load
1	1000	0	30	0		1	0	70	0
1.55	1450	0	60	0		2	1000	70	30
2	1450	0	60	0		2.55	1450	70	60
3	1450	0	60	10		3	1450	5	60
4	1450	0	60	35	AGC Available	4	1450	5	60
Fuel	6800	0		Total Fuel	6800	Fuel	5350	220	
Cold						Cold			
	CT Gas	AXB Gas	CT %load	STG % load			CT Gas	AXB Gas	CT %load
1	1000	0	30	0		1	0	70	0
2	1000	0	30	0		2	0	70	0
3.05	1450	0	60	0		3	1000	70	30
4	1450	0	60	0		4	1000	70	30
5	1450	0	60	10		5.05	1450	5	60
6	1450	0	60	20		6	1450	5	60
6.5	675	0	60	35	AGC Available	6.5	675	5	60
Fuel	8475	0		Total Fuel	8475	Fuel	5575	295	

Hot = Steam turbine offline less than 8 hours - CT in compliance within 60 minutes
 Warm = Steam turbine offline between 8 and 48 hours - CT in compliance within 95 minutes
 Cold = Steam turbine offline more than 48 hours - CT in compliance within 185 minutes

Fuel is based on 20 degrees F ambient and in the units of MMBTU

Summary:

Total fuel to AGC in MMBTU

	W/O AXB	W/AXB
Hot	2650	2650
Warm	6800	5570
Cold	8475	5870

Above "Assume starts" is based on a plant dispatch of 3 time a week.

CO	Nox	CO lbs saved	Nox saved
		869.8144752	79.30856585

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LMEC Aux Boiler

1133.861	85.47474722
1122.725	85.48254509
1111.589	85.49034296
1100.453	85.49814083
1089.317	85.50593869
1078.18	85.51373656
1067.044	85.52153443
1055.908	85.5293323
1044.772	85.53713017
1033.636	85.54492803
1022.5	85.5527259
1011.364	85.56052377
1000.228	85.56832164
989.0917	85.5761195
977.9556	85.58391737
966.8195	85.59171524
955.6834	85.59951311
944.5473	85.60731098
933.4112	85.61510884
922.2751	85.62290671
911.139	85.63070458
900.0029	85.63850245
888.8668	85.64630032
877.7307	85.65409818
866.5946	85.66189605
850.5137	85.00047651
834.4328	84.33905698
818.3519	83.67763744
802.271	83.01621791
786.1901	82.35479837
770.1092	81.69337883
754.0282	81.0319593
737.9473	80.37053976
721.8664	79.70912022
705.7855	79.04770069
689.7046	78.38628115
673.6237	77.72486161
657.5428	77.06344208
641.4619	76.40202254
625.381	75.74060301
609.3	75.07918347
593.2191	74.41776393
577.1382	73.7563444
561.0573	73.09492486

544.9764 72.43350532
528.8955 71.77208579
512.8146 71.11066625
496.7337 70.44924671
480.6528 69.78782718
464.5718 69.12640764
448.4909 68.46498811
432.41 67.80356857
416.3291 67.14214903
400.2482 66.4807295
384.1673 65.81930996
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384.1673 65.81930996
384.1673 65.81930996
382.5264 65.13730136
380.8854 64.45529276
379.2445 63.77328415
377.6036 63.09127555
375.9627 62.40926695
374.3218 61.72725835
372.6809 61.04524975
371.0399 60.36324115
369.399 59.68123254
367.7581 58.99922394
366.1172 58.31721534
364.4763 57.63520674
362.8354 56.95319814
361.1944 56.27118954
359.5535 55.58918093
357.9126 54.90717233
356.2717 54.22516373
354.6308 53.54315513
352.9899 52.86114653
351.3489 52.17913793

104377.7 9517.027902

869.8145 79.30856585

STG % load		
0		
35	AGC Available	
Total Fuel		2650
STG % load		
0		
0		
0		
10		
35	AGC Available	
Total Fuel		5570
STG % load		
0		
0		
0		
0		
10		
20		
35	AGC Available	
Total Fuel		5870

mmbtu/hr

lb/mmbtu

0.0109375
0.036875

Nox
CO

505

Emissions Saved Warm Starts*	Emissions 50 Warm Starts	Aux Boiler Emissions Warm Start	Total Aux Boiler 50 starts	Total Warm Start Emissions
405	20250	10.325	516.25	19734
30	1500	3.0625	153.125	1347

ts on the SU/SD spreadsheet.