Meramec

Heat Rate Performance Reports

Attachment D

July 14, 2009

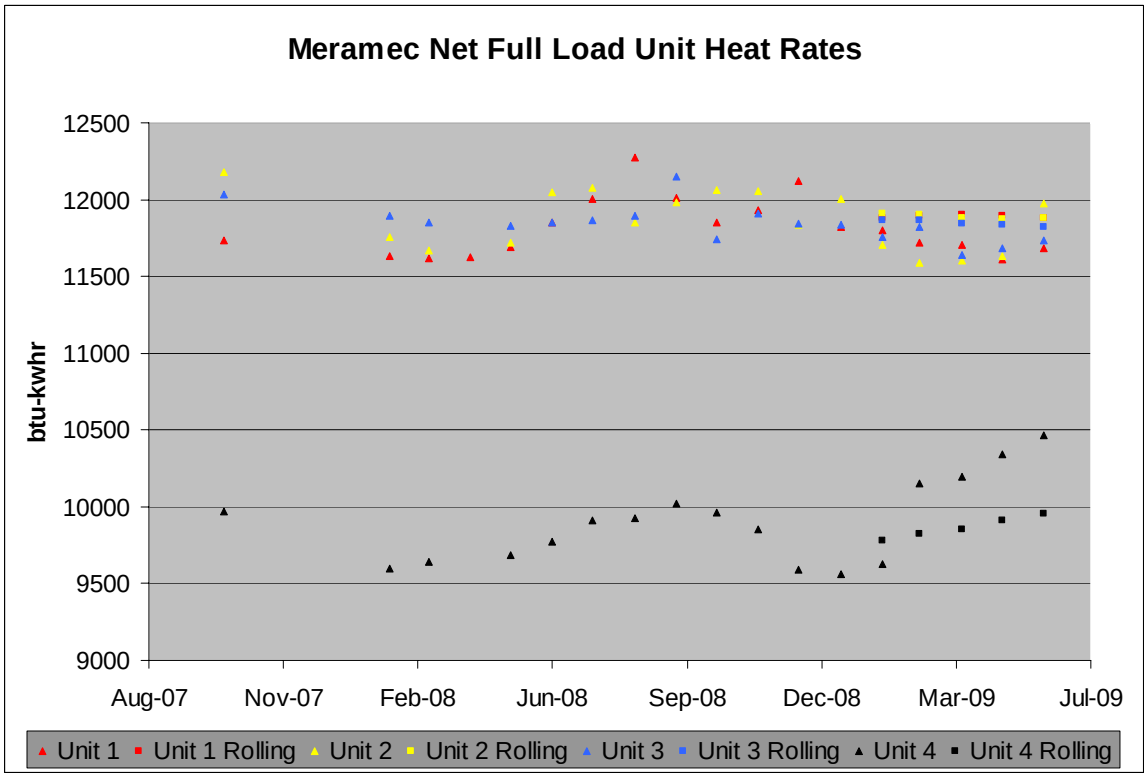
To: Tim Lafser

From: Joe Sind

CC: Bob Meiners, John Beck, Steve Schaeffer, Jim Vaughn, Tom Hart, Jeff Scott, Mike Moade, Chris Brown, Kyle Witges, Matt Wallace, Ken Stuckmeyer, Don Clayton, Jeff Colter, Scott McCormack, Chris Taylor, Jeff Shelton, Scott Hixson, Jim Barnett, Glenn Tiffin, Tim Finnell

Re: Meramec June 2009 Performance Report

Executive Summary



- All units show an increase in heat rate compared with the previous month mostly due to increased back pressure with unit's 2 and 4 showing the biggest increase in both. However all units are in the same shape or slightly better than this time last year.
- I:\MERAMEC\Performance\Instrument & other issues.xls has been updated and most issues have been JR'd and are in scheduling.

Action Items

- The plant is being asked for guidance concerning any available Pi information which could be used to determine how much each unit may be blowing down or supplying building heat (aux) steam.
- Performance Engineering has action to redesign the per-unit tabular data in the monthly reports (remove redundant information and add items to hopefully better explain heat rate changes).
- Performance Engineering has action to work with the plant concerning valve leakage and cycle isolation surveys. This has begun with Co-opt Cuong Pham doing Perf. Eng's. duties
- Performance Engineering has action to work with the plant to try and validate a primary flow for EtaPRO to use for heat rate calculations. This is done for unit 4. Unit 1's primary flow (feedwater) is in very good agreement with steam flow from turbine first stage pressure, and Unit 2's steam flow/load relation is very similar to Unit 1(feedwater flow not available on unit 2). Therefore any validation efforts for these units will be after cycle isolation checks. This leaves Unit 3 as the high priority unit.

Below is the plant heat rate YTD through June for the trend only KPI

Plant	2009 Actual	Threshold	Target	Stretch
Meramec	11164	11320	11114	10965

Unit 1

Summary of Performance Report for:

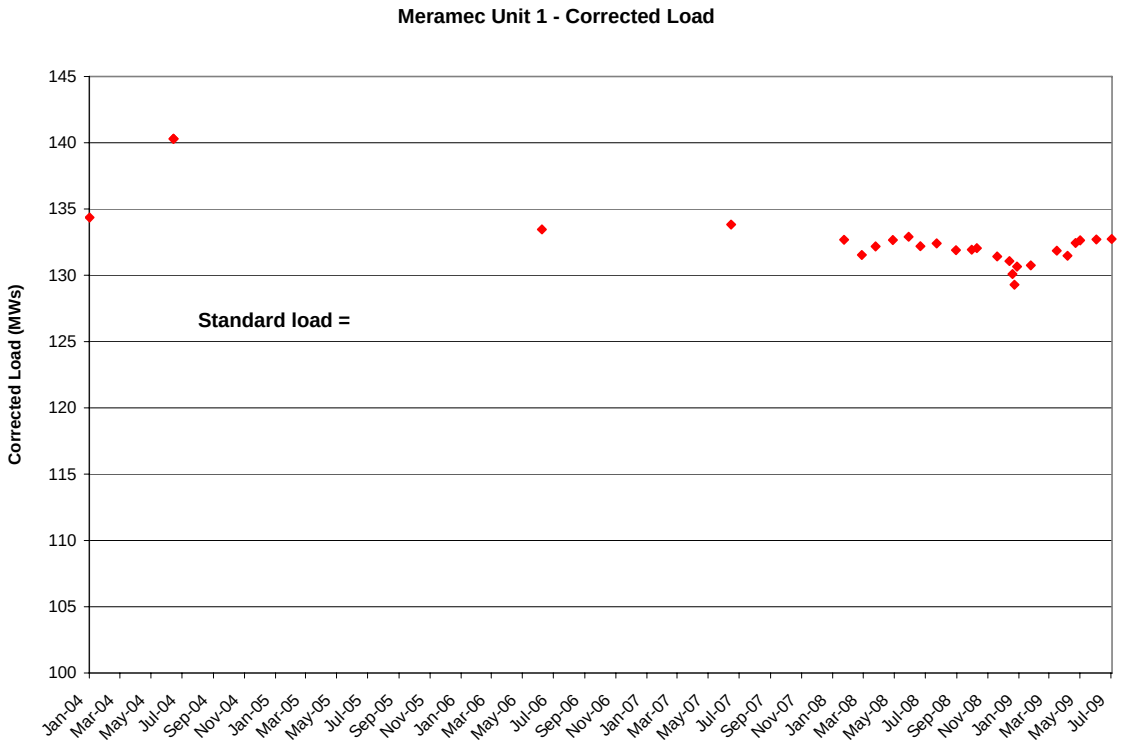
Plant	Meramec				
Unit	1				
Period			Jun-08	May-09	Jun-09
Full Load Performance					
Hours of Data			465	238	336
			Averages	**Averages**	**Averages**
GENERATOR	MEGAWATTS	MW	131	131.3	131.0
AUX POWER		MW	8.9	9.1	9.3
Net Unit Heat Rate Actual (GPHI)		BTU/KW-HR	11854	11610	11680.4
Boiler Efficiency Actual		%	85.2	85.6	85.6
CONTROL VALVE	POSITION LVDT	%	100.0	99.8	99.9
FEEDWATER TEMP	TO ECON	degF	450.3	448.5	449.6
FEEDWATER TEMP	TO HTR 1	degF	371.5	370.3	372.2
HP Turbine Efficiency Actual		%	80.4	79.0	79.1
IP Turbine Efficiency Corrected		%	86.1	80.8	89.4
Condenser Pressure HP		inHga	2.8	2.6	2.9
AIRHTR-A GAS	OUTLET TEMP	degF	318	318.2	314.1
AMBIENT AIR TEMP		degF	82.0	72.5	86.0
CIRC WTR TEMP TO COND		degF	75.5	67.0	79.7
River Temperature		degF	75.5	67.0	79.7
FWH 1 Temperature Rise		degF	78.8	78.2	77.4
Net Load		MW	122.1	122.2	121.7
Average Cond Press		inHga	2.8	2.6	2.9
Average Exit Gas Temperature		degF	318	318.2	314.1
Aux Power		%	6.8	7.0	7.1
Gross Unit Heat Rate		BTU/KW-HR	11051	10802	10850.7
Gross Turbine Heat Rate		BTU/KW-HR	9413	9250	9291.8
12 Month Rolling Average Net Unut Heat Rate				11892	11877
feedwater flow for heat rate calc. has not been validated					
erroneous IP efficiency due to intermittent bad reheat temp					
changes in cylinder efficiencies reflect proper corrections to data going forward, made late April					

In last month's report it was stated that the elevated extraction steam temps to the No. 3 feedwater heater (600 vs expected around 525) and to the No. 5 feedwater heater (735 vs expected around 220) were investigated and found to be correct. Potential causes for these elevated temperatures are excess turbine seal leakages. The effects of these potential leaks were modeled with Virtual Plant and results are as follows:

No. 3 FWH – 12000 pph from HP turbine end glands causing a loss of 0.7 MW and a heat rate increase of 0..7 %

No. 5 FWH – 11600 pph from the IP dummy piston leakoff causing a loss of 0.8 MW and a heat rate increase of 0.9%

Combined effect of 1.6 MW and 1.6 % to heat rate.


Meramec Unit 1 - Corrected Load
Corrected Load (MWs)
145
140
135
130
125
120
115
110
105
100
Standard load =
Jan-04
Mar-04
May-04
Jul-04
Sep-04
Nov-04
Jan-05
Mar-05
May-05
Jul-05
Sep-05
Nov-05
Jan-06
Mar-06
May-06
Jul-06
Sep-06
Nov-06
Jan-07
Mar-07
May-07
Jul-07
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May-08
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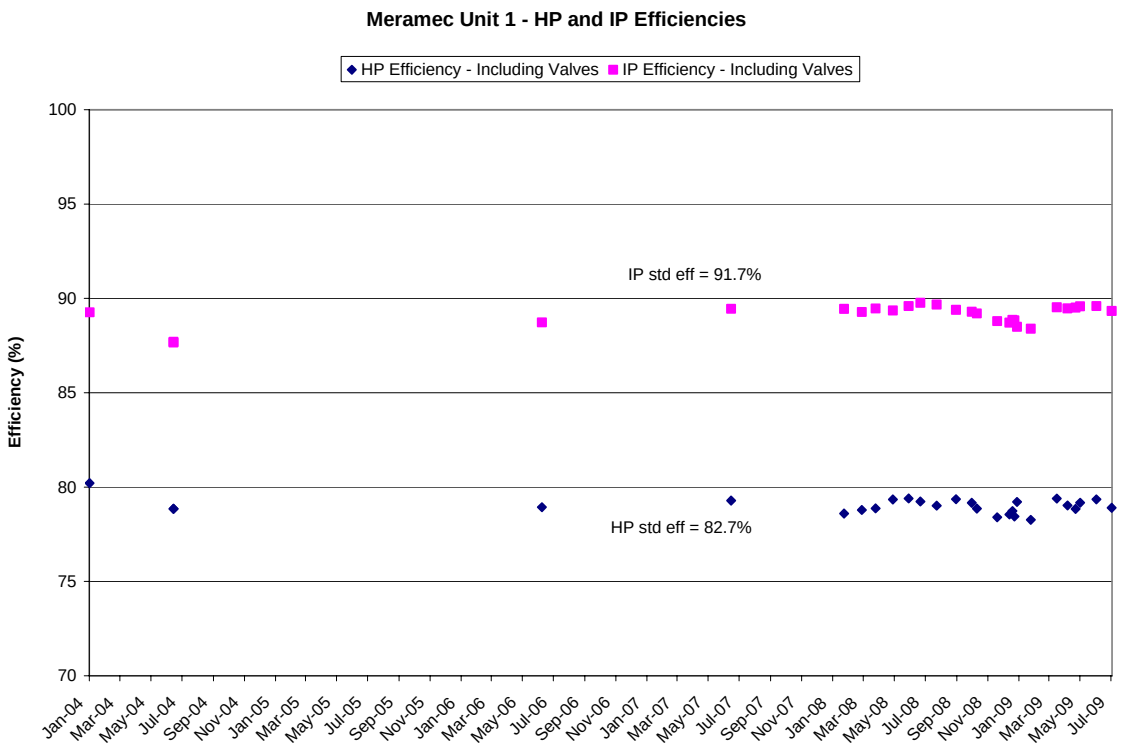
Sep-08
Nov-08
Jan-09
Mar-09
May-09
Jul-09


Meramec Unit 1 - HP and IP Efficiencies
HP Efficiency - Including Valves
IP Efficiency - Including Valves
Efficiency (%)
100
95
90
85
80
75
70
IP std eff = 91.7%
HP std eff = 82.7%
Jan-04
Mar-04
May-04
Jul-04
Sep-04
Nov-04
Jan-05
Mar-05
May-05
Jul-05
Sep-05
Nov-05
Jan-06
Mar-06
May-06
Jul-06
Sep-06
Nov-06
Jan-07
Mar-07
May-07
Jul-07
Sep-07
Nov-07
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09
Jul-09

Unit 2

Summary of Performance Report for:

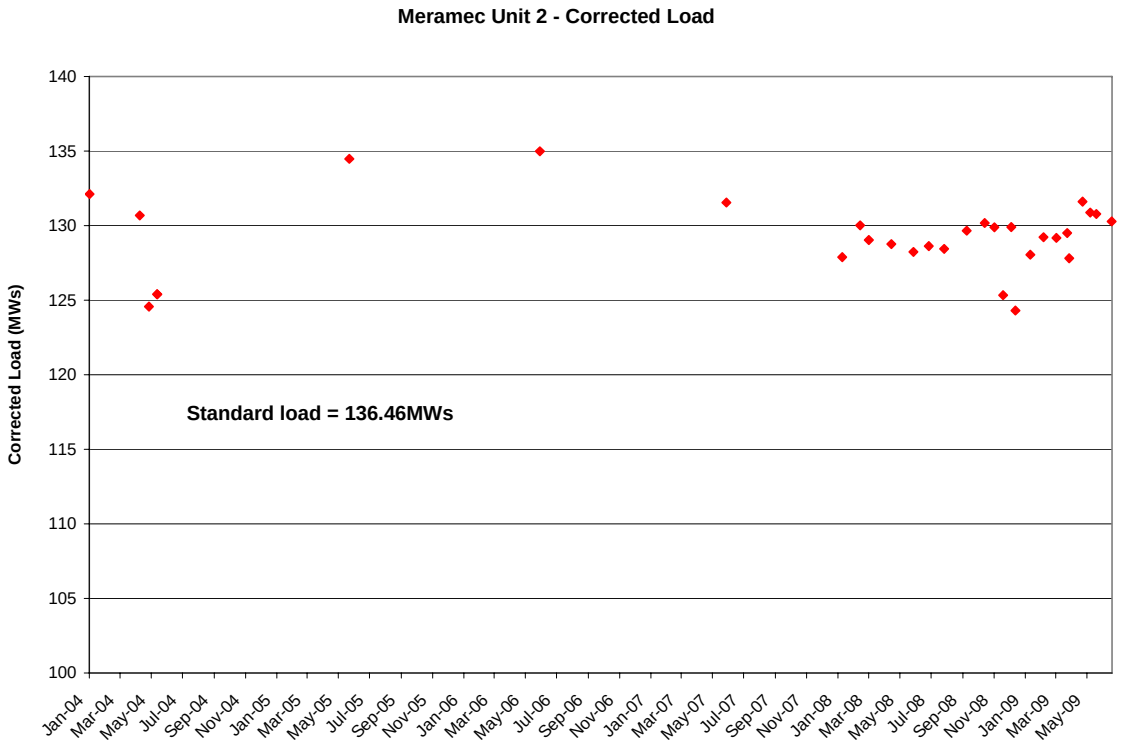
Plant	Meramec			
Unit	2			
Period		Jun-08	May-09	Jun-09
Full Load Performance Calc. GVP>97%				
Hours of Data		481	118	194
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	129.6	133.7	129.6
AUX POWER	MW	7.7	7.4	7.7
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	12049.45	11630.91	11974.7
Boiler Efficiency Actual	%	84.4	84.2	84.4
CONTROL VALVE POSITION LVDT	%	-10.0	98.3	98.3
FEEDWATER TEMP TO ECON	degF	452.8	451.9	451.5
FEEDWATER TEMP TO HTR 1	degF	370.4	371.2	370.9
HP Turbine Efficiency Actual	%	80.3	79.0	79.0
IP Turbine Efficiency Corrected	%	94.6	90.4	90.4
Condenser Pressure HP	inHga	2.7	2.3	3.0
AIRHTR-A GAS OUTLET TEMP	degF	344.9	334.0	347.7
AMBIENT AIR TEMP	degF	82.3	71.6	88.6
CIRC WTR TEMP TO LP CONDB	degF	75.8	65.7	82.3
Minimum River Temperature	degF	75.8	65.7	82.3
FWH 1 Temperature Rise	degF	82.4	80.8	80.6
Net Load	MW	121.9	126.2	121.9
Average Cond Press	inHga	2.7	2.3	3.0
Average Exit Gas Temperature	degF	344.9	334.0	347.7
Aux Power	%	5.9	5.6	5.9
Gross Unit Heat Rate	BTU/KW-HR	11338.01	10984.58	11262.7
Gross Turbine Heat Rate	BTU/KW-HR	9568.22	9254.34	9500.8
Feedwater Flow	KPPH		1035.81	1027.153
12 Month Rolling Average Net Unut Heat Rate	BTU/KW-HR		11869.3	11877.4
feedwater flow for heat rate calc. has not been validated				
changes in cylinder efficiencies reflect proper corrections to data going forward, made late April				

In last month's report it was stated that the elevated extraction steam temps to the No. 3 feedwater heater (600 vs expected around 525) and to the No. 5 feedwater heater (520 vs expected around 220) were investigated and found to be correct. Potential causes for these elevated temperatures are excess turbine seal leakages. The effects of these potential leaks were modeled with Virtual Plant and results are as follows:

No. 3 FWH – 12000 pph from HP turbine end glands causing a loss of 0.7 MW and a heat rate increase of 0..7 %

No. 5 FWH – 7250 pph from the IP dummy piston leakoff causing a loss of 0.5 MW and a heat rate increase of 0.6%

Combined effect of 1.2 MW and 1.3 % to heat rate.


Meramec Unit 2 - Corrected Load
Corrected Load (MWs)
140
135
130
125
120
115
110
105
100
Standard load = 136.46MWs
Jan-04
Mar-04
May-04
Jul-04
Sep-04
Nov-04
Jan-05
Mar-05
May-05
Jul-05
Sep-05
Nov-05
Jan-06
Mar-06
May-06
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Nov-06
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May-07
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May-08
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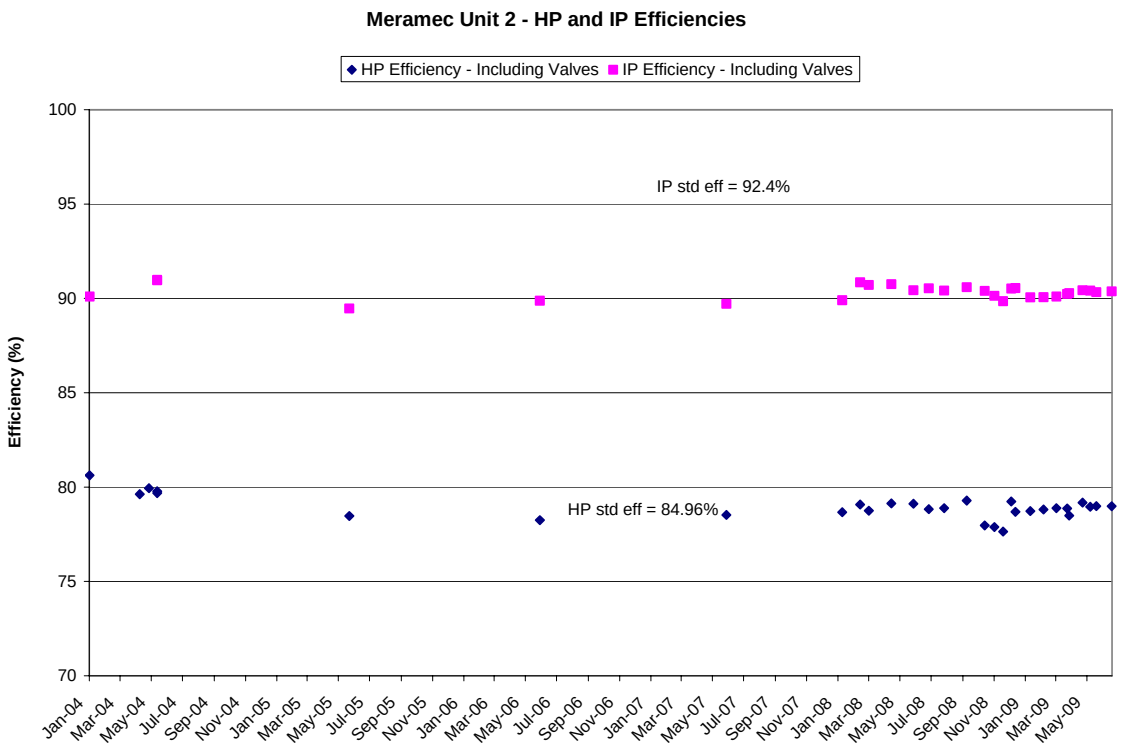
Sep-08
Nov-08
Jan-09
Mar-09
May-09


Meramec Unit 2 - HP and IP Efficiencies
HP Efficiency - Including Valves
IP Efficiency - Including Valves
Efficiency (%)
100
95
90
85
80
75
70
IP std eff = 92.4%
HP std eff = 84.96%
Jan-04
Mar-04
May-04
Jul-04
Sep-04
Nov-04
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Mar-05
May-05
Jul-05
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Jan-06
Mar-06
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Nov-07
Jan-08
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Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09

Unit 3

Summary of Performance Report for:

Plant	Meramec			
Unit	3			
Period		Jun-08	May-09	Jun-09
Full Load Performance CVcamP>85%				
Hours of Data		422	278	291
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	290.6	287.1	283.7
AUX POWER	MW	19.2	18.7	18.8
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11853.1	11682.5	11736.4
Boiler Efficiency Actual	%	82.9	82.8	82.8
CONTROL VALVE POSITION LVDT	%	81.0	86.5	86.5
FEEDWATER TEMP TO ECON	degF	477.3	478.5	478.7
FEEDWATER TEMP TO HTR 1	degF	393.8	395.5	395.6
HP Turbine Efficiency Actual	%	79.9	80.3	80.1
IP Turbine Efficiency Corrected	%	71.2	69.3	69.5
Condenser Pressure HP	inHga	3.1	2.6	3.0
AIRHTR-A GAS OUTLET TEMP	degF	417.3	408.1	410.8
AIRHTR-B GAS OUTLET TEMP	degF	389.2	376.8	379.1
AMBIENT AIR TEMP	degF	82.3	75.5	84.9
CIRC WTR TEMP TO COND	degF	78.6	70.0	80.0
Minimum River Temperature	degF	78.6	70.0	80.0
FWH 1 Temperature Rise	degF	83.4	83.0	83.1
Net Load	MW	271.3	268.4	264.8
Average Cond Press	inHga	3.1	2.6	3.0
Average Exit Gas Temperature	degF	403.3	392.5	395.0
Aux Power	%	6.6	6.5	6.6
Gross Unit Heat Rate	BTU/KW-HR	11069.5	10921.4	10956.7
Gross Turbine Heat Rate	BTU/KW-HR	9175.9	9043.2	9067.1
12 Month Rolling Average Net Unut Heat Rate			11832.8	11825.4

IP efficiency not valid, no good crossunder pressure

feedwater flow for heat rate calc. has not been validated

Unit 4

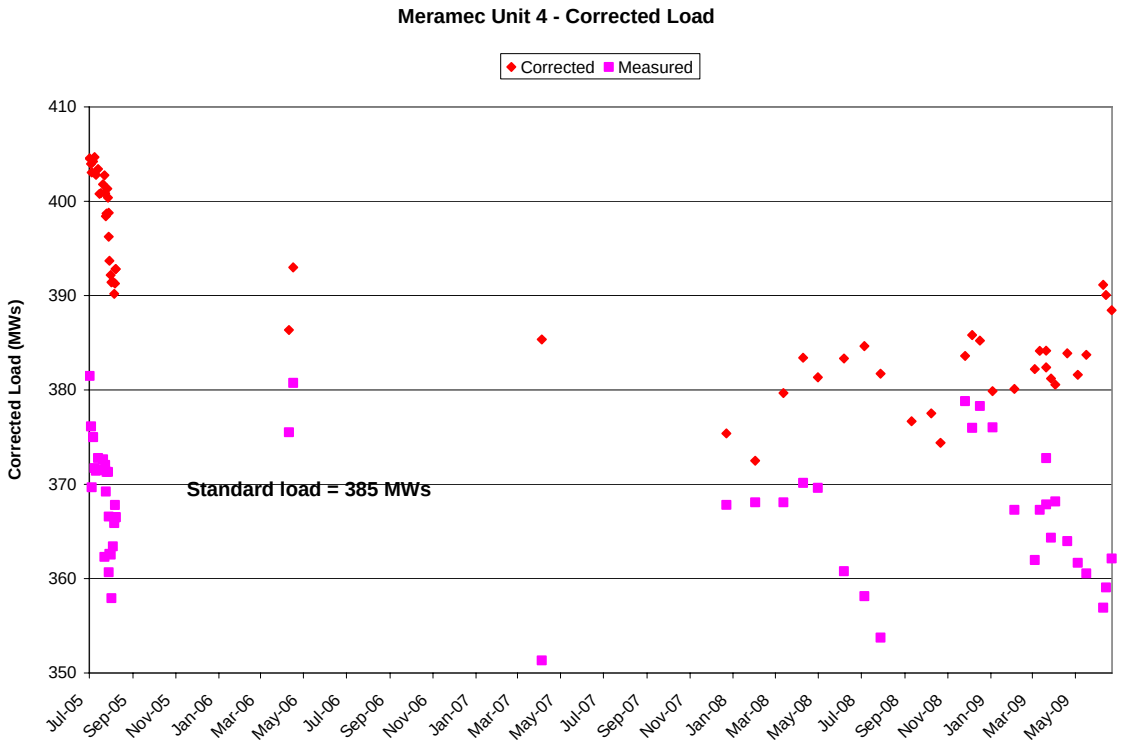
Summary of Performance Report for:

Plant	Meramec			
Unit	4			
Period		Jun-08	May-09	Jun-09
Full Load Performance = CVP>=98% and Load> 90% of capabilty table				
Hours of Data		331	410	309
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	358.3	356.6	353.9
AUX POWER	MW	20.6	21.1	21.5
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9775.8	10344.2	10465.5
Boiler Efficiency Actual	%	83.5	83.7	83.4
CONTROL VALVE POSITION LVDT	%	99.7	99.8	99.8
FEEDWATER TEMP TO ECON	degF	492.8	489.7	490.4
FEEDWATER TEMP TO HTR 1	degF	390.9	391.8	389.2
HP Turbine Efficiency Actual	%	84.7	82.9	83.5
IP Turbine Efficiency Corrected	%	87.9	89.9	89.3
Condenser Pressure HP	inHga	3.6	2.8	3.4
AIRHTR-A GAS OUTLET TEMP	degF	341.1	338.6	349.6
AIRHTR-B GAS OUTLET TEMP	degF	329.9	327.2	339.8
AMBIENT AIR TEMP	degF	81.0	71.9	84.0
CIRC WTR TEMP TO LP CONDB	degF	77.0	68.8	81.5
Minimum River Temperature	degF	77.0	68.8	81.5
FWH 1 Temperature Rise	degF	101.9	97.9	101.2
Net Load	MW	337.7	335.5	332.4
Average Cond Press	inHga	3.6	2.8	3.4
Average Exit Gas Temperature	degF	335.5	332.9	344.7
Aux Power	%	5.7	5.9	6.1
Gross Unit Heat Rate	BTU/KW-HR	9214	9732	9829.2
Gross Turbine Heat Rate	BTU/KW-HR	7696	8142	8201.2
! Month Rolling Average Net Unut Heat Rate			9910	9953

feedwater flow for heat rate calc. has not been validated

on 4/28/09 efficiency calc tags were checked and proper water legs and corrections applied.

suspect due to substituted air in temperature due to bad sensor


Meramec Unit 4 - Corrected Load
Corrected
Measured
Corrected Load (MWs)
410
400
390
380
370
360
350
Standard load = 385 MWs
Jul-05
Sep-05
Nov-05
Jan-06
Mar-06
May-06
Jul-06
Sep-06
Nov-06
Jan-07
Mar-07
May-07
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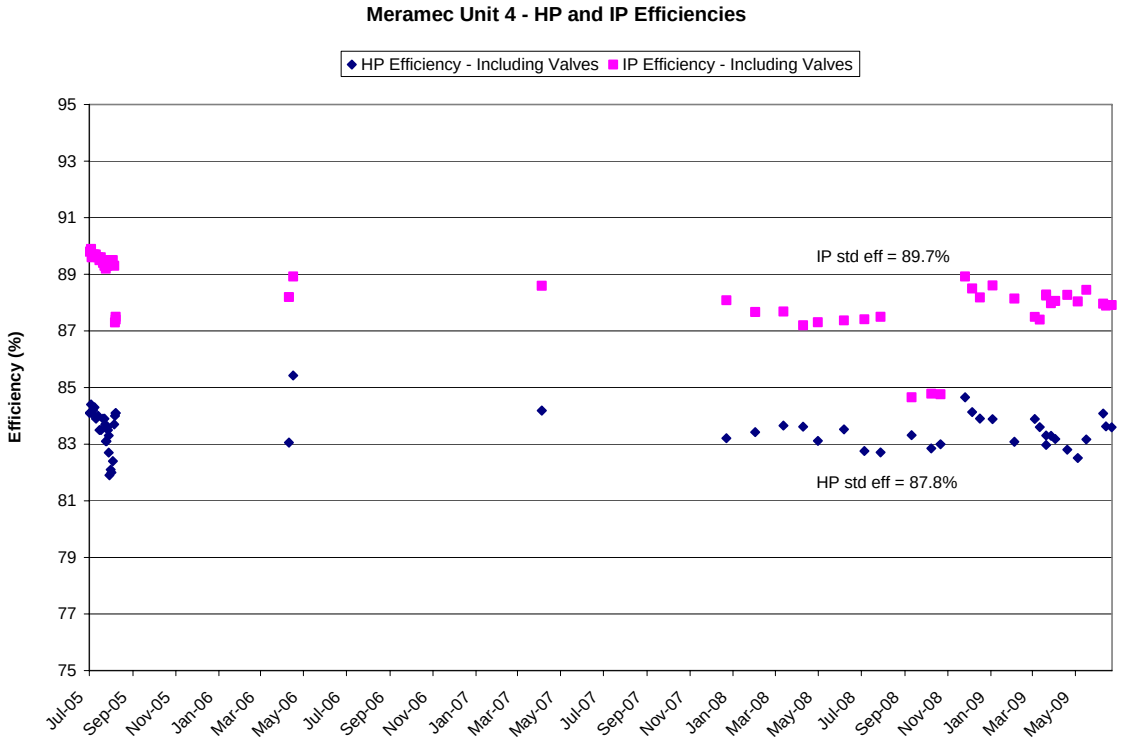
Mar-09
May-09


Meramec Unit 4 - HP and IP Efficiencies
HP Efficiency - Including Valves
IP Efficiency - Including Valves
Efficiency (%)
95
93
91
89
87
85
83
81
79
77
75
IP std eff = 89.7%
HP std eff = 87.8%
Jul-05
Sep-05
Nov-05
Jan-06
Mar-06
May-06
Jul-06
Sep-06
Nov-06
Jan-07
Mar-07
May-07
Jul-07
Sep-07
Nov-07
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May-08
Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09

June 5, 2009

To: Tim Lafser

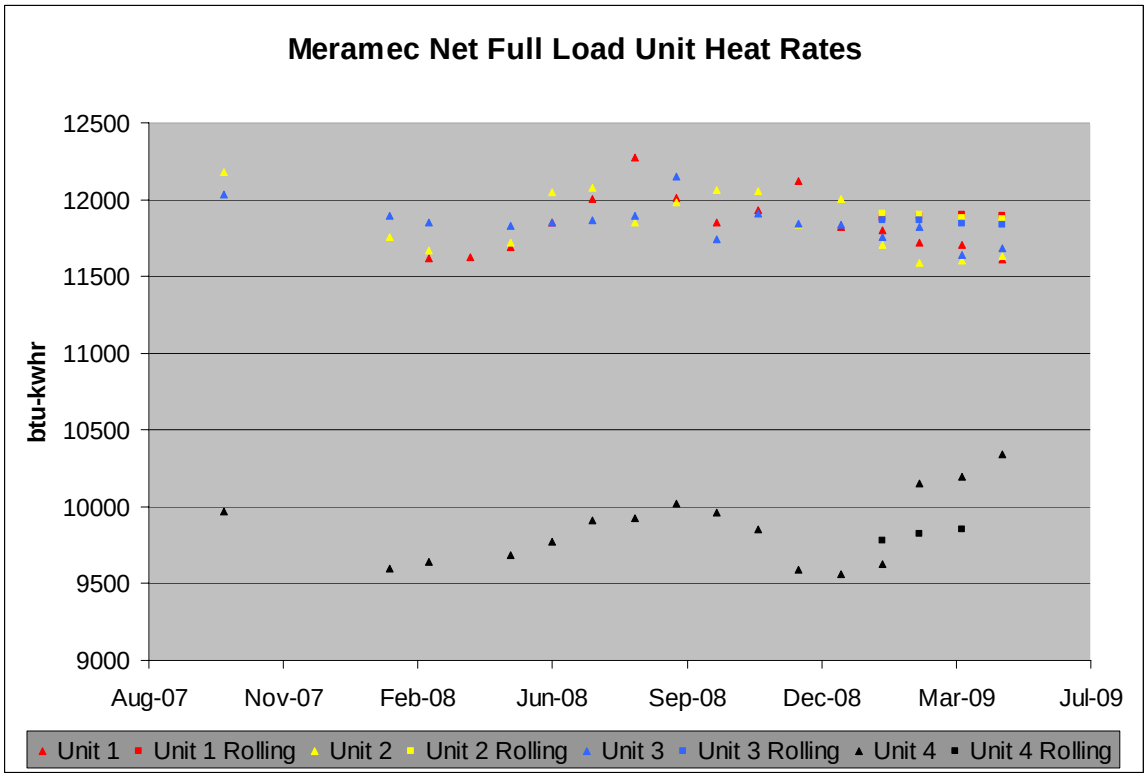
From: Joe Sind

CC: Bob Meiners, John Beck, Steve Schaeffer, Jim Vaughn, Tom Hart, Jeff Scott, Mike Moade, Chris Brown, Kyle Witges, Matt Wallace, Ken Stuckmeyer, Don Clayton, Jeff Colter, Scott McCormack, Chris Taylor, Jeff Shelton, Scott Hixson, Jim Barnett, Glenn Tiffin, Tim Finnell

Re: Meramec May 2009 Performance Report

The last report was on 4/08/2009 covering data through March.

Executive Summary



- Units 1-3 appear stable compared to the previous months, unit 4 heat rate is increasing and believed attributable to rising backpressure.
- EtaPRO turbine efficiency tags and calculations have been checked and corrected to use previous "test" instrumentation. (N/A to Unit 3)
- I:\MERAMEC\Performance\Instrument & other issues.xls has been updated and most issues have been JR'd and are in scheduling.

Action Items

- The plant is being asked for guidance concerning any available Pi information which could be used to determine how much each unit may be blowing down or supplying building heat (aux) steam.
- Performance Engineering has action to redesign the per-unit tabular data in the monthly reports (remove redundant information and add items to hopefully better explain heat rate changes).
- Performance Engineering has action to work with the plant concerning valve leakage and cycle isolation surveys.
- Performance Engineering has action to work with the plant to try and validate a primary flow for EtaPRO to use for heat rate calculations. This is done for unit 4. Unit 1's primary flow (feedwater) is in very good agreement with steam flow from turbine first stage pressure, and Unit 2's steam flow/load relation is very similar to Unit 1(feedwater flow not available on unit 2). Therefore any validation efforts for these units will be after cycle isolation checks.

Below are the heat rate numbers through April for the trend only heat rate KPI.

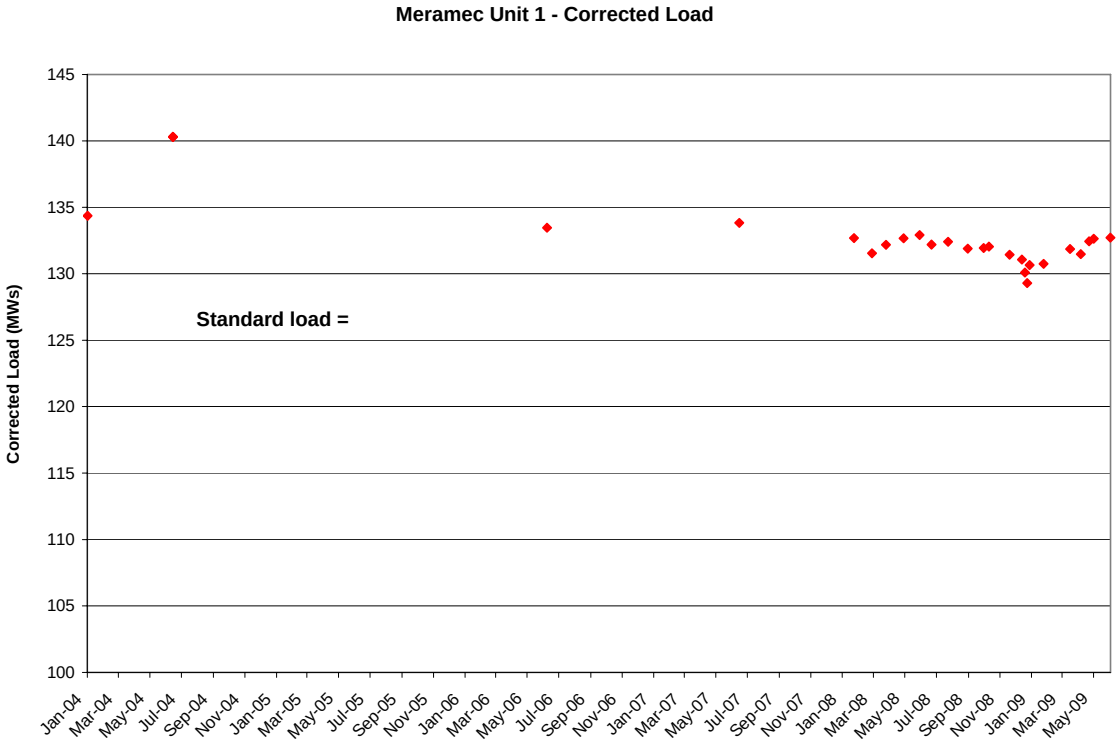
Plant	2009 Actual	Threshold	Target	Stretch
Meramec	11150	11320	11114	10965

Unit 1

Summary of Performance Report for:

Plant	Meramec				
Unit	1				
Period			May-08	Apr-09	May-09
Full Load Performance					
Hours of Data			206	234	238
			Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS		MW	134	134.5	131.3
AUX POWER		MW	9.0	9.1	9.1
Net Unit Heat Rate Actual (GPHI)		BTU/KW-HR	11687	11702	11610
Boiler Efficiency Actual		%	84.9	84.8	85.6
CONTROL VALVE POSITION LVDT		%	100.0	99.9	99.8
FEEDWATER TEMP TO ECON		degF	451.3	451.2	448.5
FEEDWATER TEMP TO HTR 1		degF	372.9	373.0	370.3
HP Turbine Efficiency Actual		%	80.5	79.6	79.0
IP Turbine Efficiency Corrected		%	85.4	87.3	80.8
Condenser Pressure HP		inHga	2.4	2.3	2.6
AIRHTR-A GAS OUTLET TEMP		degF	314	308.6	318.2
AMBIENT AIR TEMP		degF	70.0	62.7	72.5
CIRC WTR TEMP TO COND		degF	64.1	56.7	67.0
River Temperature		degF	64.1	56.7	67.0
FWH 1 Temperature Rise		degF	78.5	78.2	78.2
Net Load		MW	124.9	125.4	122.2
Average Cond Press		inHga	2.4	2.3	2.6
Average Exit Gas Temperature		degF	314	308.6	318.2
Aux Power		%	6.7	6.8	7.0
Gross Unit Heat Rate		BTU/KW-HR	10899	10911	10802
Gross Turbine Heat Rate		BTU/KW-HR	9254	9249	9250
12 Month Rolling Average Net Unut Heat Rate				11898	11892
feedwater flow for heat rate calc. has not been validated					
erroneous IP efficiency due to intermittent bad reheat temp					
changes in cylinder efficiencies reflect proper corrections to data going forward, made late April					

In the continuing effort to check EtaPRO data and results, one temperature (35th stage extraction) in particular stood out as probably wrong (indicating 700+ degF, design ~200 degF). Kirk Schweiss checked the temperature locally and reported he thought it correct. In discussions concerning what might be causing this, Dave Wetteroff pointed out a training drawing which shows some turbine gland leaks entering this extraction. J. Sind found a similar diagram from the acceptance test on this unit which more clearly shows the source of the gland leak offs. Assuming the 700 degF measurement correct, working back indicates that the IP dummy (balance) piston could be leaking about 19000 PPH. Virtual Plant has not been used to model this leakage but it is estimated that the load loss would be a little more than 1 MW and an associated heat rate increase of about 1%. These elevated temperatures go back to the beginning of Pi data.


Meramec Unit 1 - Corrected Load
Corrected Load (MWs)
Standard load =
145
140
135
130
125
120
115
110
105
100
Jan-04
Mar-04
May-04
Jul-04
Sep-04
Nov-04
Jan-05
Mar-05
May-05
Jul-05
Sep-05
Nov-05
Jan-06
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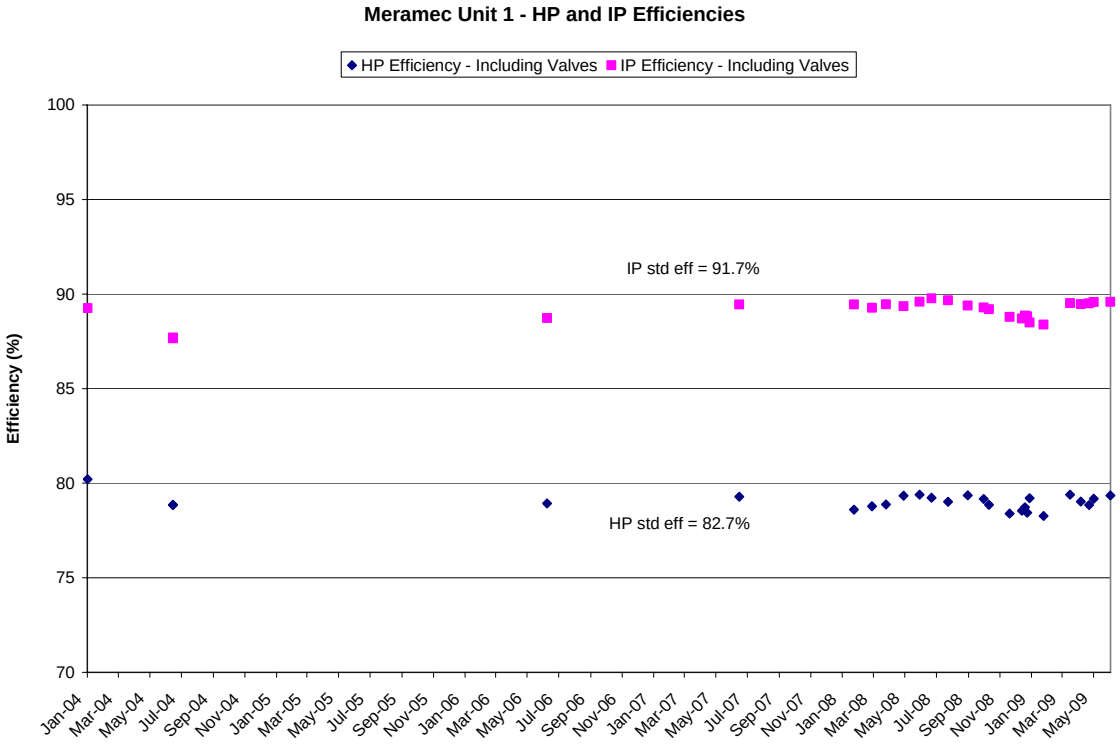
Meramec Unit 1 - HP and IP Efficiencies
HP Efficiency - Including Valves
IP Efficiency - Including Valves
Efficiency (%)
IP std eff = 91.7%
HP std eff = 82.7%
100
95
90
85
80
75
70
Jan-04
Mar-04
May-04
Jul-04
Sep-04
Nov-04
Jan-05
Mar-05
May-05
Jul-05
Sep-05
Nov-05
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May-07
Jul-07
Sep-07
Nov-07
Jan-08
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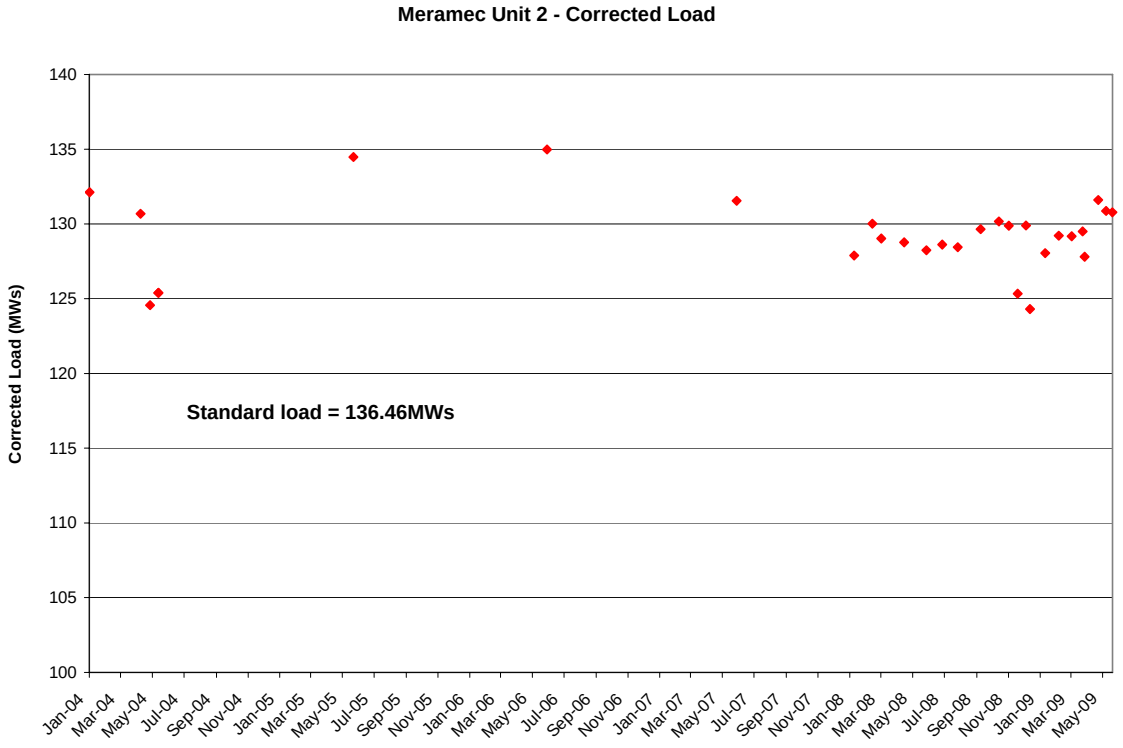
May-09

Unit 2

Summary of Performance Report for:

Plant	Meramec			
Unit	2			
Period		May-08	Apr-09	May-09
Full Load Performance Calc. GVP>97%				
Hours of Data		140	57	118
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	133.1	132.6	133.7
AUX POWER	MW	7.6	7.7	7.4
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11718.72	11599.78	11630.91
Boiler Efficiency Actual	%	85.1	84.4	84.2
CONTROL VALVE POSITION LVDT	%	-10.0	98.0	98.3
FEEDWATER TEMP TO ECON	degF	453.3	450.3	451.9
FEEDWATER TEMP TO HTR 1	degF	370.7	370.0	371.2
HP Turbine Efficiency Actual	%	80.3	80.2	79.0
IP Turbine Efficiency Corrected	%	94.7	94.4	90.4
Condenser Pressure HP	inHga	2.3	1.6	2.3
AIRHTR-A GAS OUTLET TEMP	degF	346.3	325.8	334.0
AMBIENT AIR TEMP	degF	70.7	47.8	71.6
CIRC WTR TEMP TO LP CONDB	degF	62.2	51.0	65.7
Minimum River Temperature	degF	62.2	51.0	65.7
FWH 1 Temperature Rise	degF	82.6	80.3	80.8
Net Load	MW	125.5	125.0	126.2
Average Cond Press	inHga	2.3	1.6	2.3
Average Exit Gas Temperature	degF	346.3	325.8	334.0
Aux Power	%	5.7	5.8	5.6
Gross Unit Heat Rate	BTU/KW-HR	11050.65	10929.79	10984.58
Gross Turbine Heat Rate	BTU/KW-HR	9405.13	9228.02	9254.34
12 Month Rolling Average Net Unut Heat Rate			11876.6	11869.3
feedwater flow for heat rate calc. has not been validated				
changes in cylinder efficiencies reflect proper corrections to data going forward, made late April				

Similar to the 35th stage extraction temperature on Unit 1, Unit 2 is reading about 500+degF as opposed to about 200 degF design. A detailed estimate was not done for this unit, but it is felt the load and heat rate effects would be about half that of unit 1.


Meramec Unit 2 - Corrected Load
Corrected Load (MWs)
140
135
130
125
120
115
110
105
100
Standard load = 136.46MWs
Jan-04
Mar-04
May-04
Jul-04
Sep-04
Nov-04
Jan-05
Mar-05
May-05
Jul-05
Sep-05
Nov-05
Jan-06
Mar-06
May-06
Jul-06
Sep-06
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Jan-07
Mar-07
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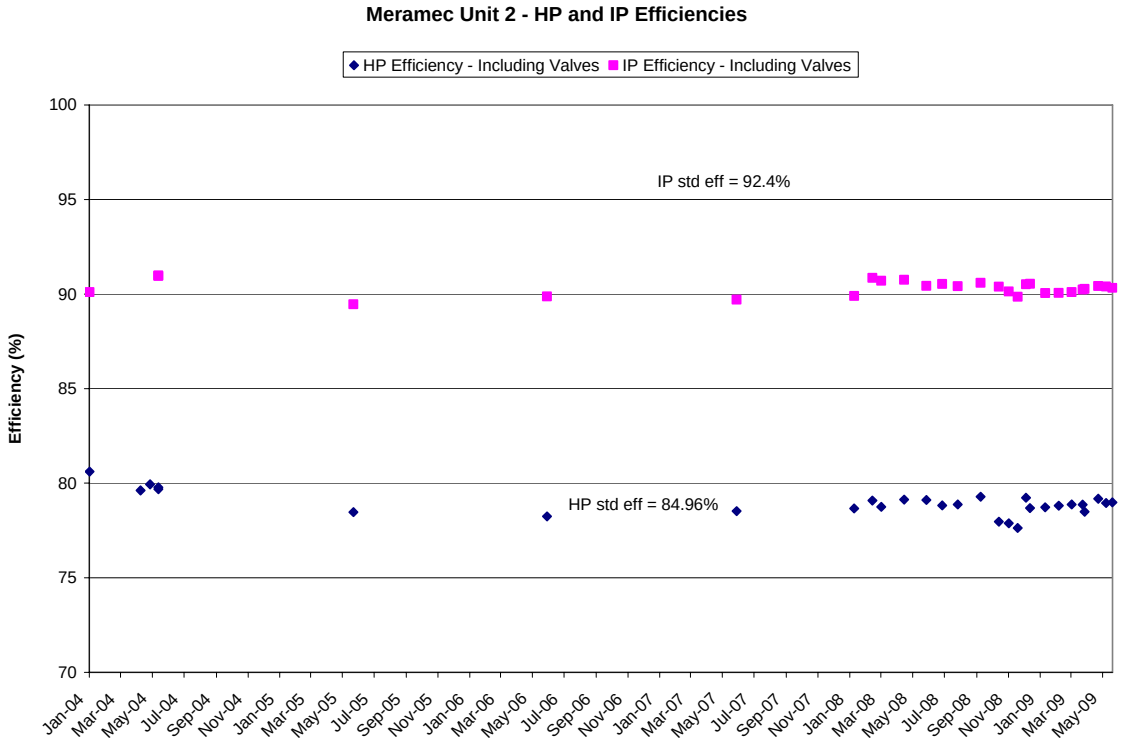
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09


Meramec Unit 2 - HP and IP Efficiencies
HP Efficiency - Including Valves
IP Efficiency - Including Valves
Efficiency (%)
100
95
90
85
80
75
70
IP std eff = 92.4%
HP std eff = 84.96%
Jan-04
Mar-04
May-04
Jul-04
Sep-04
Nov-04
Jan-05
Mar-05
May-05
Jul-05
Sep-05
Nov-05
Jan-06
Mar-06
May-06
Jul-06
Sep-06
Nov-06
Jan-07
Mar-07
May-07
Jul-07
Sep-07
Nov-07
Jan-08
Mar-08
May-08
Jul-08
Sep-08
Nov-08
Jan-09
Mar-09
May-09

Unit 3

Summary of Performance Report for:

Plant	Meramec			
Unit	3			
Period		May-08	Apr-09	May-09
Full Load Performance				
Hours of Data		328	354	278
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	290.1	287.6	287.1
AUX POWER	MW	19.1	18.8	18.7
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11827.3	11642.0	11682.5
Boiler Efficiency Actual	%	82.8	82.7	82.8
CONTROL VALVE POSITION LVDT	%	79.7	85.0	86.5
FEEDWATER TEMP TO ECON	degF	470.8	478.0	478.5
FEEDWATER TEMP TO HTR 1	degF	388.5	395.1	395.5
HP Turbine Efficiency Actual	%	79.8	80.4	80.3
IP Turbine Efficiency Corrected	%	71.1	69.4	69.3
Condenser Pressure HP	inHga	2.8	2.4	2.6
AIRHTR-A GAS OUTLET TEMP	degF	412.3	402.2	408.1
AIRHTR-B GAS OUTLET TEMP	degF	374.0	371.5	376.8
AMBIENT AIR TEMP	degF	67.9	62.5	75.5
CIRC WTR TEMP TO COND	degF	66.5	58.2	70.0
Minimum River Temperature	degF	66.5	58.2	70.0
FWH 1 Temperature Rise	degF	82.3	82.9	83.0
Net Load	MW	271.0	268.8	268.4
Average Cond Press	inHga	2.8	2.4	2.6
Average Exit Gas Temperature	degF	393.2	386.9	392.5
Aux Power	%	6.6	6.5	6.5
Gross Unit Heat Rate	BTU/KW-HR	11049.8	10880.6	10921.4
Gross Turbine Heat Rate	BTU/KW-HR	9151.6	9002.2	9043.2
12 Month Rolling Average Net Unut Heat Rate			11844.9	11832.8

Control valves cannot go to 100% - full load taken as greater than 90% of capability
IP efficiency not valid, no good crossunder pressure
feedwater flow for heat rate calc. has not been validated

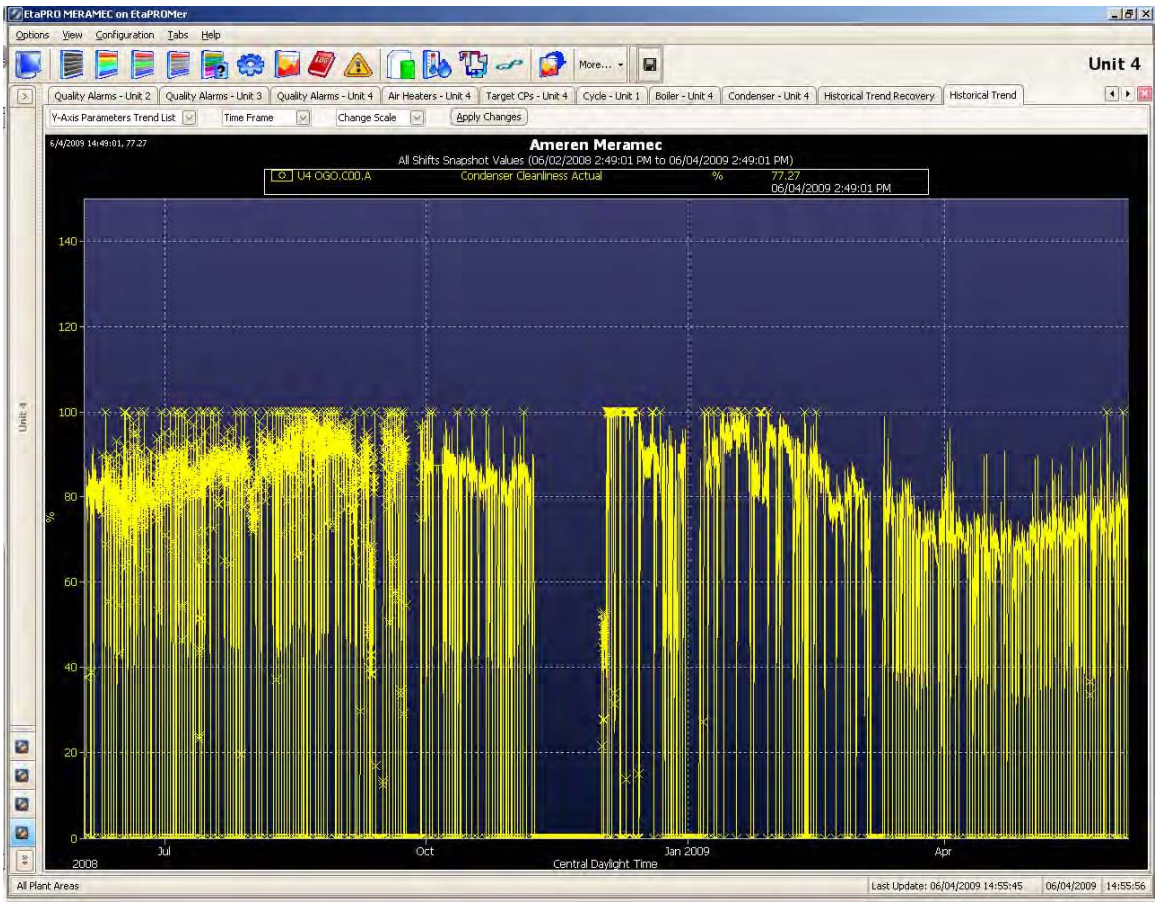
Unit 4

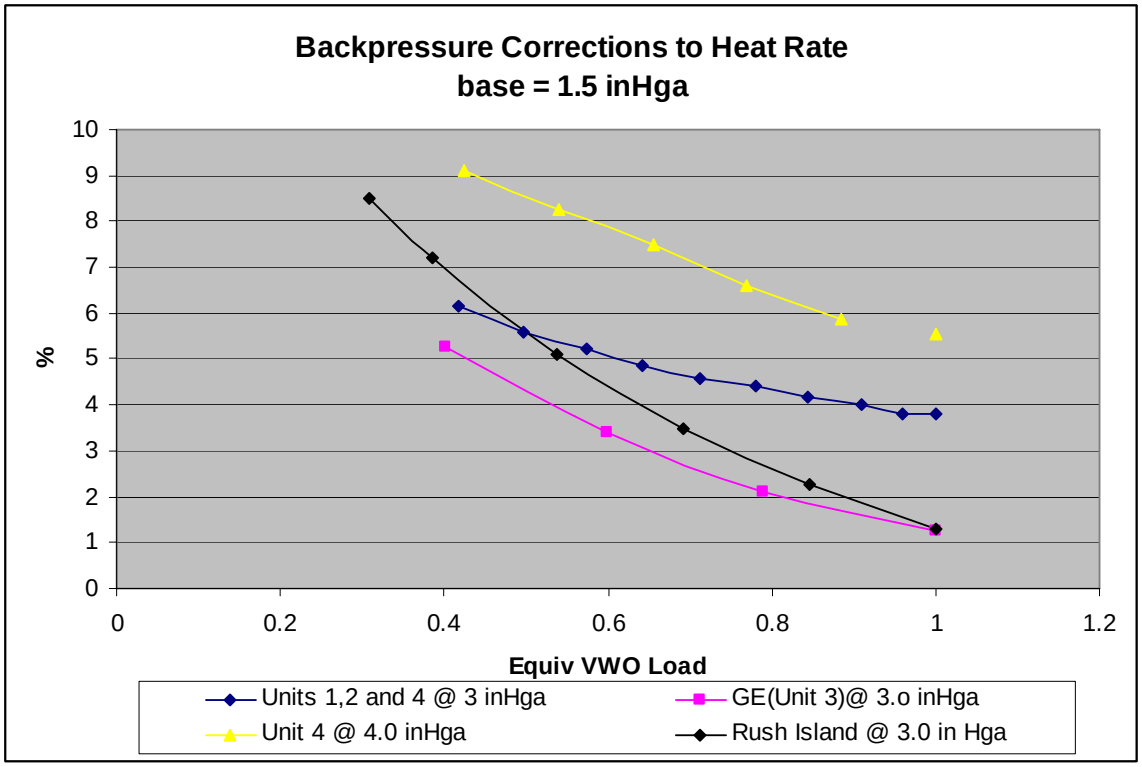
Summary of Performance Report for:

Plant		Meramec			
Unit		4			
Period			May-08	Apr-09	May-09
Full Load Performance = CVP>=98% and Load> 90% of capabilty table					
Hours of Data			339	358	410
			Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS		MW	365.4	362.1	356.6
AUX POWER		MW	20.7	21.2	21.1
Net Unit Heat Rate Actual (GPHI)		BTU/KW-HR	9688.8	10192.8	10344.2
Boiler Efficiency Actual		%	83.8	83.7	83.7
CONTROL VALVE POSITION LVDT		%	99.8	99.8	99.8
FEEDWATER TEMP TO ECON		degF	493.3	489.6	489.7
FEEDWATER TEMP TO HTR 1		degF	391.5	388.8	391.8
HP Turbine Efficiency Actual		%	84.5	84.4	82.9
IP Turbine Efficiency Corrected		%	86.9	88.5	89.9
Condenser Pressure HP		inHga	2.6	2.1	2.8
AIRHTR-A GAS OUTLET TEMP		degF	321.1	352.9	338.6
AIRHTR-B GAS OUTLET TEMP		degF	323.7	340.6	327.2
AMBIENT AIR TEMP		degF	67.4	61.7	71.9
CIRC WTR TEMP TO LP CONDB		degF	64.7	56.8	68.8
Minimum River Temperature		degF	64.7	56.8	68.8
FWH 1 Temperature Rise		degF	101.8	100.8	97.9
Net Load		MW	344.7	340.9	335.5
Average Cond Press		inHga	2.6	2.1	2.8
Average Exit Gas Temperature		degF	322.4	346.7	332.9
Aux Power		%	5.7	5.8	5.9
Gross Unit Heat Rate		BTU/KW-HR	9141	9597	9732
Gross Turbine Heat Rate		BTU/KW-HR	7659	8030	8142
1 Month Rolling Average Net Unut Heat Rate				9855	9910

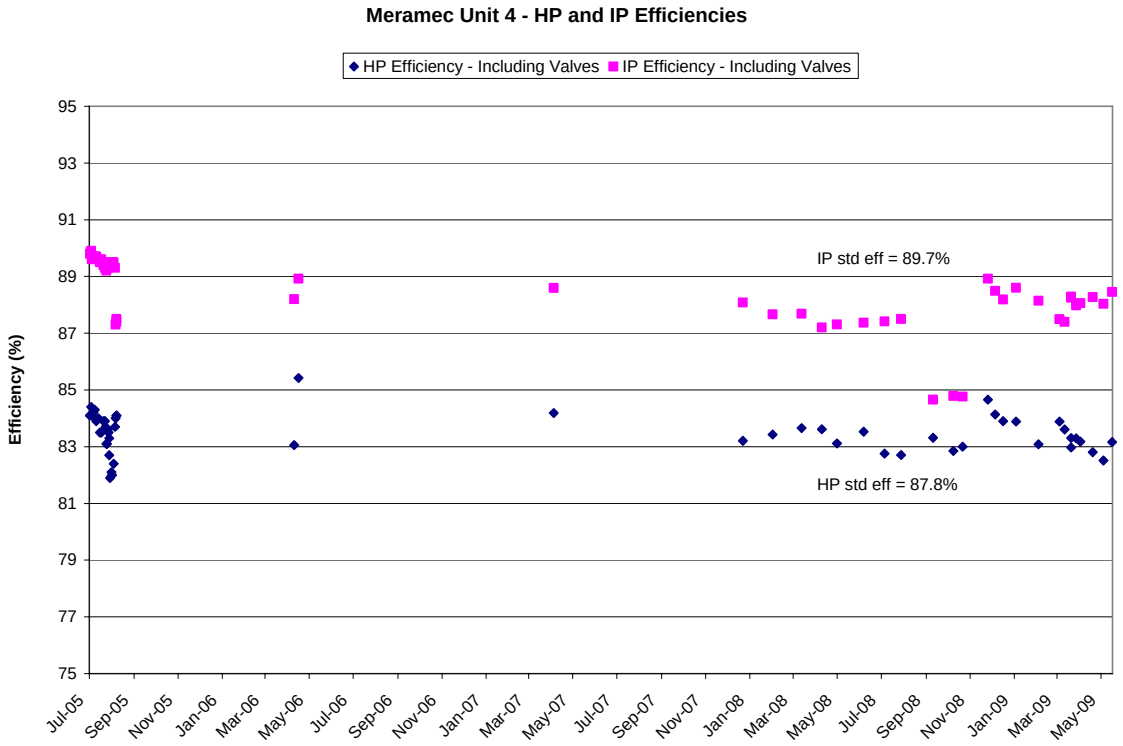
feedwater flow for heat rate calc. has not been validated
on 3/13/09 primary flow tags were changed to ones believed more realistic
on 4/28/09 efficiency calc tags were checked and proper water legs and corrections applied.
suspect due to substituted air in temperature due to bad sensor

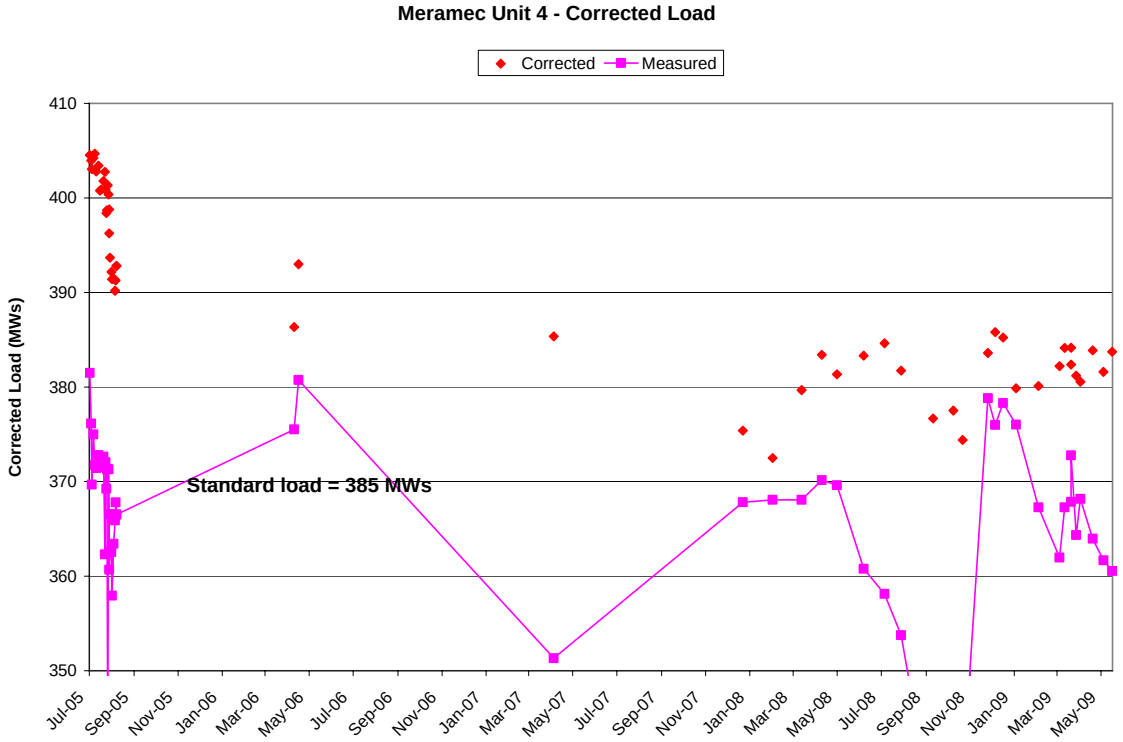
Although the boiler efficiency shown in the above table is suspect, actual excess O2 levels were slightly down (not shown) and both air heater outlet temperatures were lower compared to April. This would result in an improved boiler efficiency. Heat rates however are worse in May, and are felt most likely driven by increased back pressure. Although the average backpressure for May is slightly higher than last year the river temp is also slightly higher. The following EtaPRO trend of cleanliness factor shows the condenser to be only slightly less clean than the same time last year. Also included is a graph of the backpressure effect on heat rate which clearly shows that from design data the Meramec Westinghouse units are more sensitive.


EtaPRO MERAMEC on EtaPROMer
Options View Configuration Tabs Help
Unit 4
Quality Alarms - Unit 2
Quality Alarms - Unit 3
Quality Alarms - Unit 4
Air Heaters - Unit 4
Target CPs - Unit 4
Cycle - Unit 1
Boiler - Unit 4
Condenser - Unit 4
Historical Trend Recovery
Historical Trend
Y-Axis Parameters Trend List
Time Frame
Change Scale
Apply Changes
Ameren Meramec
All Shifts Snapshot Values (06/02/2008 2:49:01 PM to 06/04/2009 2:49:01 PM)
U4.OGO.C00.A
Condenser Cleanliness Actual
%
77.27
06/04/2009 2:49:01 PM
140
120
100
80
60
40
20
0
%
Jul
Oct
Jan 2009
Apr
2008
Central Daylight Time
All Plant Areas
Last Update: 06/04/2009 14:55:45
06/04/2009
14:55:56


Backpressure Corrections to Heat Rate
base = 1.5 inHga
10
9
8
7
6
5
4
3
2
1
0
%
0
0.2
0.4
0.6
0.8
1
1.2
Equiv VWO Load
Units 1,2 and 4 @ 3 inHga
GE(Unit 3)@ 3.o inHga
Unit 4 @ 4.0 inHga
Rush Island @ 3.0 in Hga

The following corrected load and turbine efficiency trends show a slight increase in all following the SBO in mid May. This behavior is not uncommon across the fleet and is believed due to turbine clean-up during shutdown and startup.





April 8, 2009

To: Tim Lafser

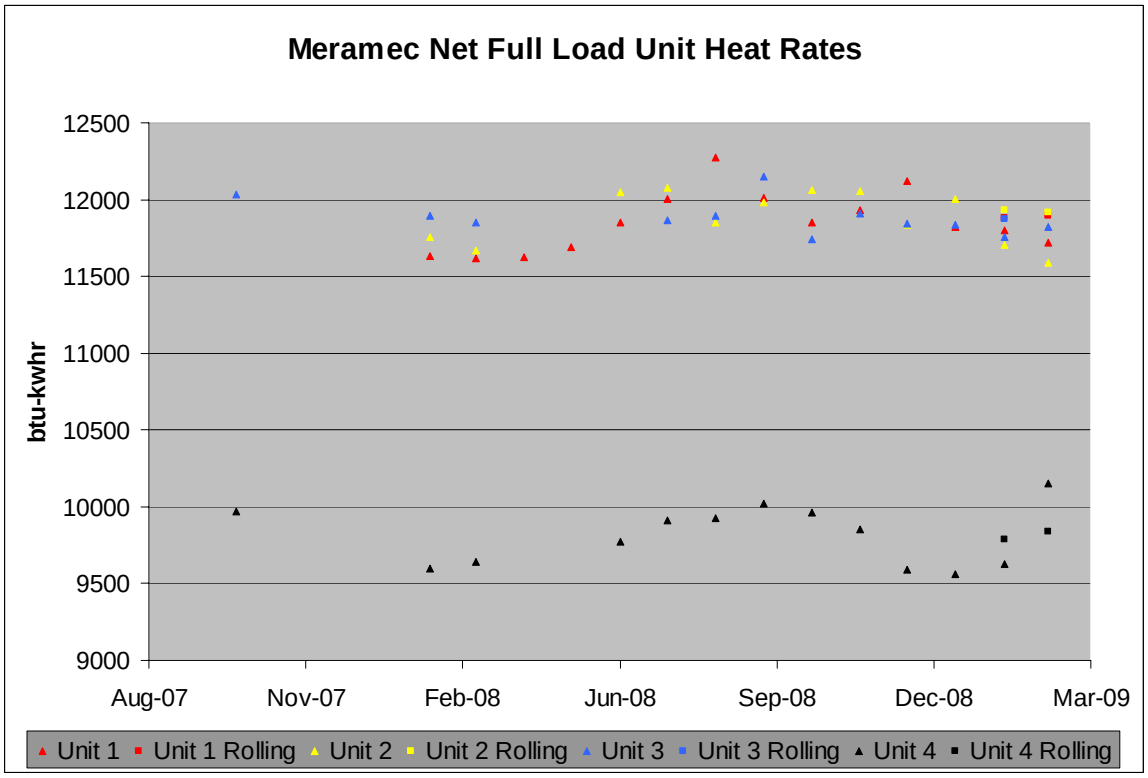
From: Joe Sind

CC: Bob Meiners, John Beck, Steve Schaeffer, Jim Vaughn, Tom Hart, Jeff Scott, Mike Moade, Chris Brown, Matt Wallace, Ken Stuckmeyer, Don Clayton, Jeff Colter, Scott McCormack, Chris Taylor, Jeff Shelton, Scott Hixson, Jim Barnett, Glenn Tiffin

Re: Meramec March 2009 Performance Report

The last report was on 3/26/2009 covering data through February.

Executive Summary



- Unit 1 showed improvement in corrected load and turbine efficiencies following the March SBO
- This and future reports will have trends of corrected load and HP and IP turbine efficiencies for units 1,2 and 4. This is impossible at this time for Unit 3 due to instrumentation requirements. These trends represent observations where the turbine control valves were completely open.
- The Unit 4 EtaPRO heat rate calculation was modified on 3/13 to use a different temperature compensation formula for feedwater flow. This caused an apparent

increase of about 6-7% in heat rate. On 3/21 there was noticeable drop in heat rate. Investigation indicates this was due to correcting cycle isolation (blowdown). Further discussion will be in the Unit 4 section.

Heat Rate KPI

A trend only heat rate KPI has been created for 2009 with the intent of having a pay heat rate KPI in 2010. Below is a table showing the actual performance of the plant through March.

Plant	2009 Actual	Threshold	Target	Stretch
Meramec	11179	11320	11114	10965

A separate e-mail was sent to the plant describing how the trend only KPI targets were derived for 2009. Performance engineering intends to do more work in this area and present the proposed methodology for the heat rate KPI at our quarterly heat rate meeting in the summer (to be scheduled).

Instrument Issues and Action Items

Since the last report was only two weeks ago all action items in that report are still valid.

- All four unit's heat rate calculations have been checked in EtaPRO and obvious errors have been corrected. Performance Engineering has action to check that tags used in EtaPRO for turbine efficiencies match other tags used for off line analyses. The reason for this is apparent in comparing tabular data and trends for each unit.
- The plant is being asked for any guidance concerning available Pi information which may be used to determine how much each unit may be blowing down or supplying building heat (aux) steam.
- The spreadsheet Instrument & other issues has been updated. Performance Engineering has action to get with plant personnel to prioritize and initiate JRs for these problems. I:\MERAMEC\Performance\Instrument & other issues.xls

Unit 1

Summary of Performance Report for:

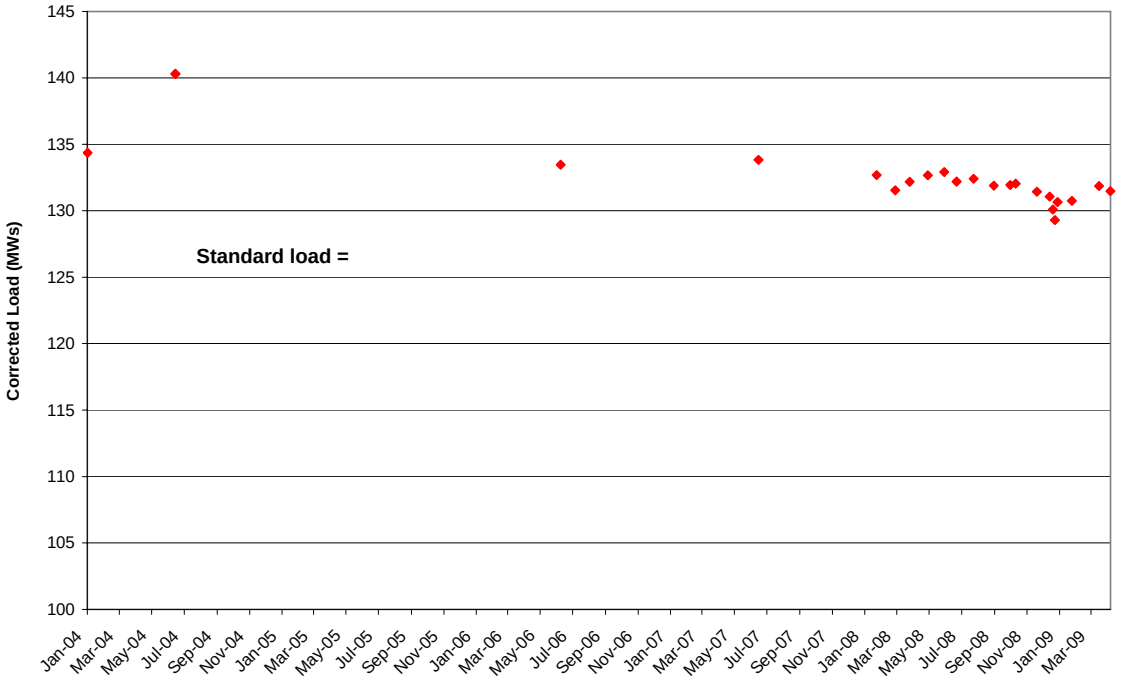
e19503:
many March hours deleted because of bad FFW temp. These 47 hours were after the SBO

Plant Meramec
Unit 1

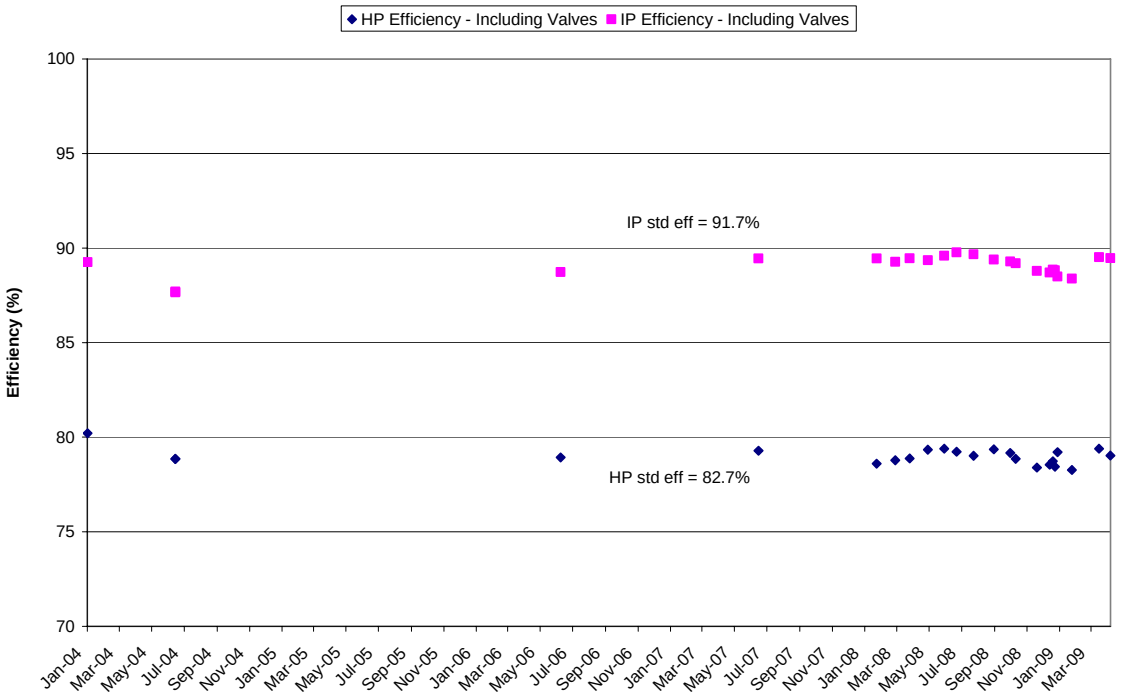
		Mar-08	Feb-09	Mar-09
Period				
Full Load Performance				
Hours of Data		243	376	47
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	137	123	134.3
AUX POWER	MW	8.8	9.2	9.6
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11620	11799	11723
Boiler Efficiency Actual	%	84.6	84.6	84.8
CONTROL VALVE POSITION LVDT	%	100.0	94.4	99.9
FEEDWATER TEMP TO ECON	degF	451.4	443.4	450.8
FEEDWATER TEMP TO HTR 1	degF	371.5	366.9	372.5
HP Turbine Efficiency Actual	%	80.0	78.5	80.2
IP Turbine Efficiency Corrected	%	85.1	84.1	85.1
Condenser Pressure HP	inHga	1.9	1.8	2.3
AIRHTR-A GAS OUTLET TEMP	degF	301	298	307.2
AMBIENT AIR TEMP	degF	43.9	38.3	52.4
CIRC WTR TEMP TO COND	degF	42.3	38.4	54.7
River Temperature	degF	42.3	38.4	54.7
FWH 1 Temperature Rise	degF	79.9	76.5	78.3
Net Load	MW	127.9	114.0	124.7
Average Cond Press	inHga	1.9	1.8	2.3
Average Exit Gas Temperature	degF	301	298	307.2
Aux Power	%	6.4	7.5	7.1
Gross Unit Heat Rate	BTU/KW-HR	10872	10915	10886
Gross Turbine Heat Rate	BTU/KW-HR	9197	9230	9228
12 Month Rolling Average Net Unut Heat Rate			11884	11892
feedwater flow for heat rate calc. has not been validated				

Unit 1 showed improvement in heat rate, corrected load and turbine efficiencies following the early March SBO (see following charts). The work package of the SBO is unknown but it is safe to assume no turbine cylinder work was performed. Therefore the increase in turbine efficiencies may be attributable to shedding some blade deposits while cooled and during start-up.

Meramec Unit 1 - Corrected Load



Meramec Unit 1 - HP and IP Efficiencies



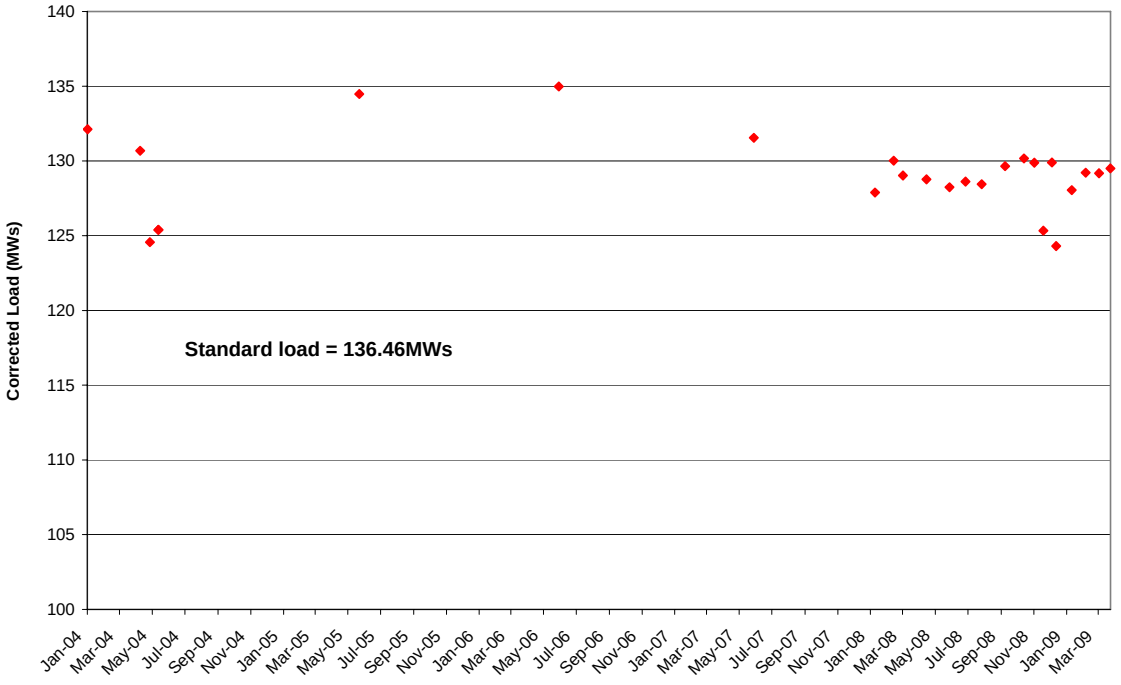
Unit 2

Summary of Performance Report for:

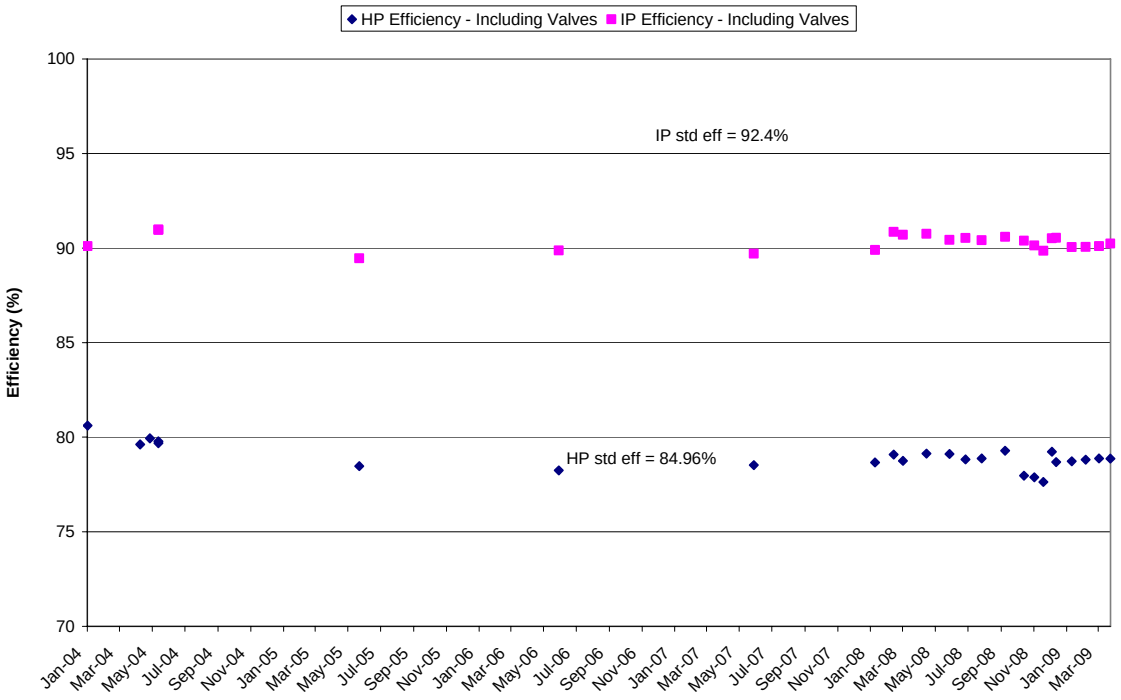
Plant	Meramec			
Unit	2			
Period		Mar-08	Feb-09	Mar-09
Full Load Performance				
Hours of Data		492	273	115
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	134.8	130.3	130.8
AUX POWER	MW	7.7	7.6	7.6
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11671.3	11703.8	11591.5
Boiler Efficiency Actual	%	84.9	84.5	84.8
CONTROL VALVE POSITION LVDT	%	-10.0	97.2	98.0
FEEDWATER TEMP TO ECON	degF	454.2	449.5	449.3
FEEDWATER TEMP TO HTR 1	degF	371.6	369.4	369.1
HP Turbine Efficiency Actual	%	80.3	80.2	80.2
IP Turbine Efficiency Corrected	%	94.9	94.4	94.4
Condenser Pressure HP	inHga	2.0	1.6	1.5
AIRHTR-A GAS OUTLET TEMP	degF	333.4	333.6	337.5
AMBIENT AIR TEMP	degF	46.9	38.2	53.9
CIRC WTR TEMP TO LP CONDB	degF	43.4	40.9	51.1
Minimum River Temperature	degF	43.4	40.9	51.1
FWH 1 Temperature Rise	degF	82.7	80.1	80.1
Net Load	MW	127.1	122.7	123.2
Average Cond Press	inHga	2.0	1.6	1.5
Average Exit Gas Temperature	degF	333.4	333.6	337.5
Aux Power	%	5.7	5.9	5.8
Gross Unit Heat Rate	BTU/KW-HR	11001.7	11017.2	10914.3
Gross Turbine Heat Rate	BTU/KW-HR	9344.5	9308.4	9252.2
12 Month Rolling Average Net Unut Heat Rate			11928.1	11920.1
feedwater flow for heat rate calc. has not been validated				

The losses in corrected load a few months back has not been investigated but are felt possibly attributable to control valves were not being completely open. This unit has indication issues with actual control valve position and relies on a tag called Turb Load Reference or Calculated CV position. This is somewhat corroborated by low HP efficiencies around the same time. Another possibility would be the unit supplying aux steam or some other cycle isolation issue.

Meramec Unit 2 - Corrected Load



Meramec Unit 2 - HP and IP Efficiencies



Unit 3

Summary of Performance Report for:

Plant		Meramec		
Unit		3		
Period		Mar-08	Feb-09	Mar-09
Full Load Performance				
Hours of Data		314	507	263
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	284.4	282.5	286.0
AUX POWER	MW	18.7	18.1	18.5
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11851.9	11756.3	11821.6
Boiler Efficiency Actual	%	82.5	82.2	82.4
CONTROL VALVE POSITION LVDT	%	79.5	77.8	84.5
FEEDWATER TEMP TO ECON	degF	475.2	475.4	476.8
FEEDWATER TEMP TO HTR 1	degF	394.8	392.3	390.8
HP Turbine Efficiency Actual	%	79.6	79.7	80.6
IP Turbine Efficiency Corrected	%	69.7	70.6	68.7
Condenser Pressure HP	inHga	2.1	2.4	2.4
AIRHTR-A GAS OUTLET TEMP	degF	408.6	394.0	398.1
AIRHTR-B GAS OUTLET TEMP	degF	362.6	360.3	368.3
AMBIENT AIR TEMP	degF	44.0	41.1	49.1
CIRC WTR TEMP TO COND	degF	47.5	44.7	50.3
Minimum River Temperature	degF	47.5	44.7	50.3
FWH 1 Temperature Rise	degF	80.3	83.1	86.0
Net Load	MW	265.8	264.4	267.4
Average Cond Press	inHga	2.1	2.4	2.4
Average Exit Gas Temperature	degF	385.6	377.2	383.2
Aux Power	%	6.6	6.4	6.5
Gross Unit Heat Rate	BTU/KW-HR	11074.7	11002.6	11055.1
Gross Turbine Heat Rate	BTU/KW-HR	9139.5	9041.8	9105.3
12 Month Rolling Average Net Unut Heat Rate			11871.9	

Control valves cannot go to 100% - full load taken as greater than 90% of capability
IP efficienc not valid, no good crossunder pressure
feedwater flow for heat rate calc. has not been validated

Trends of corrected load and turbine cylinder efficiencies are not available for this unit.

Unit 4

Summary of Performance Report for:

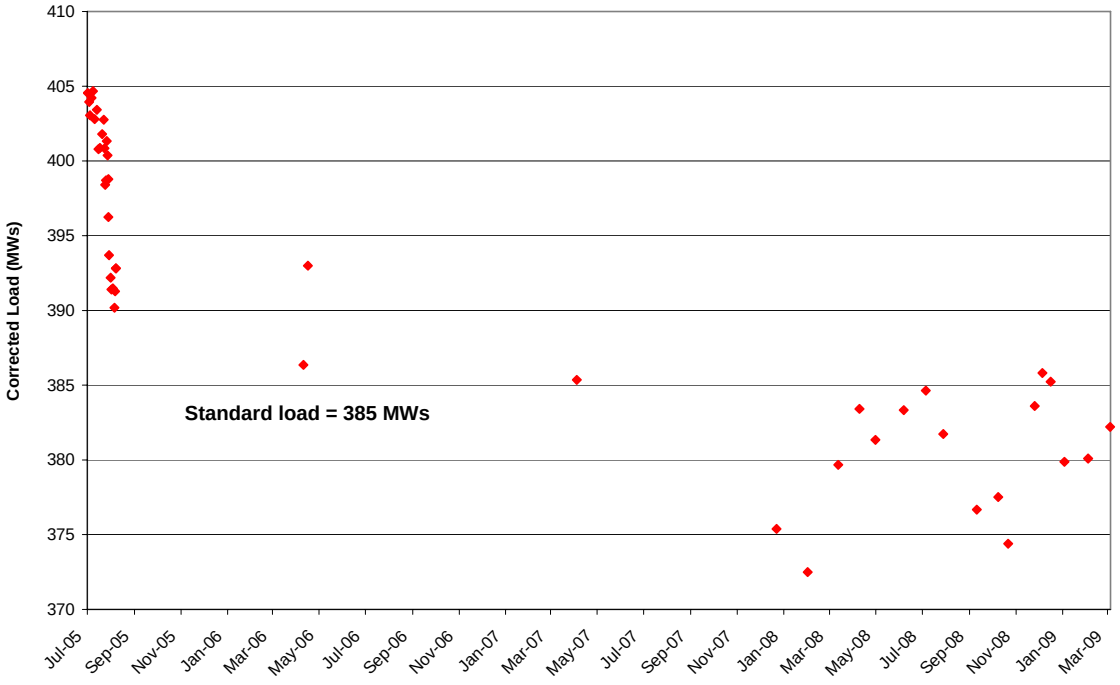
Plant	Meramec			
Unit	4			
Period		Mar-08	Feb-09	Mar-09
Full Load Performance = CVP>=98% and Load> 90% of capabilty table				
Hours of Data		191	499	376
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	364.8	359.6	359.5
AUX POWER	MW	20.3	21.3	20.7
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9642.1	9627.8	10149.5
Boiler Efficiency Actual	%	84.2	83.1	83.3
CONTROL VALVE POSITION LVDT	%	99.8	99.8	99.9
FEEDWATER TEMP TO ECON	degF	491.3	489.7	489.5
FEEDWATER TEMP TO HTR 1	degF	388.6	390.3	389.5
HP Turbine Efficiency Actual	%	85.1	84.5	84.9
IP Turbine Efficiency Corrected	%	88.2	88.8	88.0
Condenser Pressure HP	inHga	1.8	1.4	1.8
AIRHTR-A GAS OUTLET TEMP	degF	347.3	350.3	342.8
AIRHTR-B GAS OUTLET TEMP	degF	332.0	316.6	315.5
AMBIENT AIR TEMP	degF	50.7	40.6	49.7
CIRC WTR TEMP TO LP CONDB	degF	47.6	45.0	49.9
Minimum River Temperature	degF	47.6	45.0	49.9
FWH 1 Temperature Rise	degF	102.7	99.3	99.9
Net Load	MW	344.6	338.3	338.8
Average Cond Press	inHga	1.8	1.4	1.8
Average Exit Gas Temperature	degF	339.7	333.5	329.1
Aux Power	%	5.6	5.9	5.7
Gross Unit Heat Rate	BTU/KW-HR	9106.8	9058.2	9566.1
Gross Turbine Heat Rate	BTU/KW-HR	7668.6	7527.1	7971.4
12 Month Rolling Average Net Unut Heat Rate			9787.4	9838.1

feedwater flow for heat rate calc. has not been validated

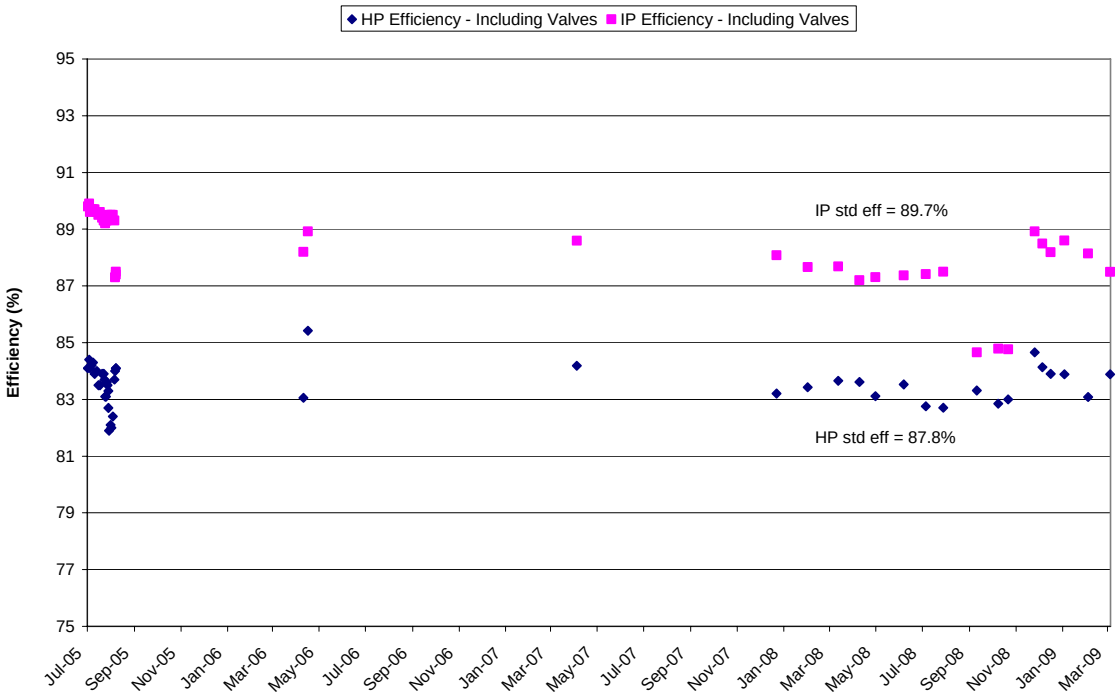
on 3/13/09 primary flow tags were changed to ones believed more realistic

The low IP efficiencies in the following trends are believed to be at a time when the unit had two IP turbine IVs failed,

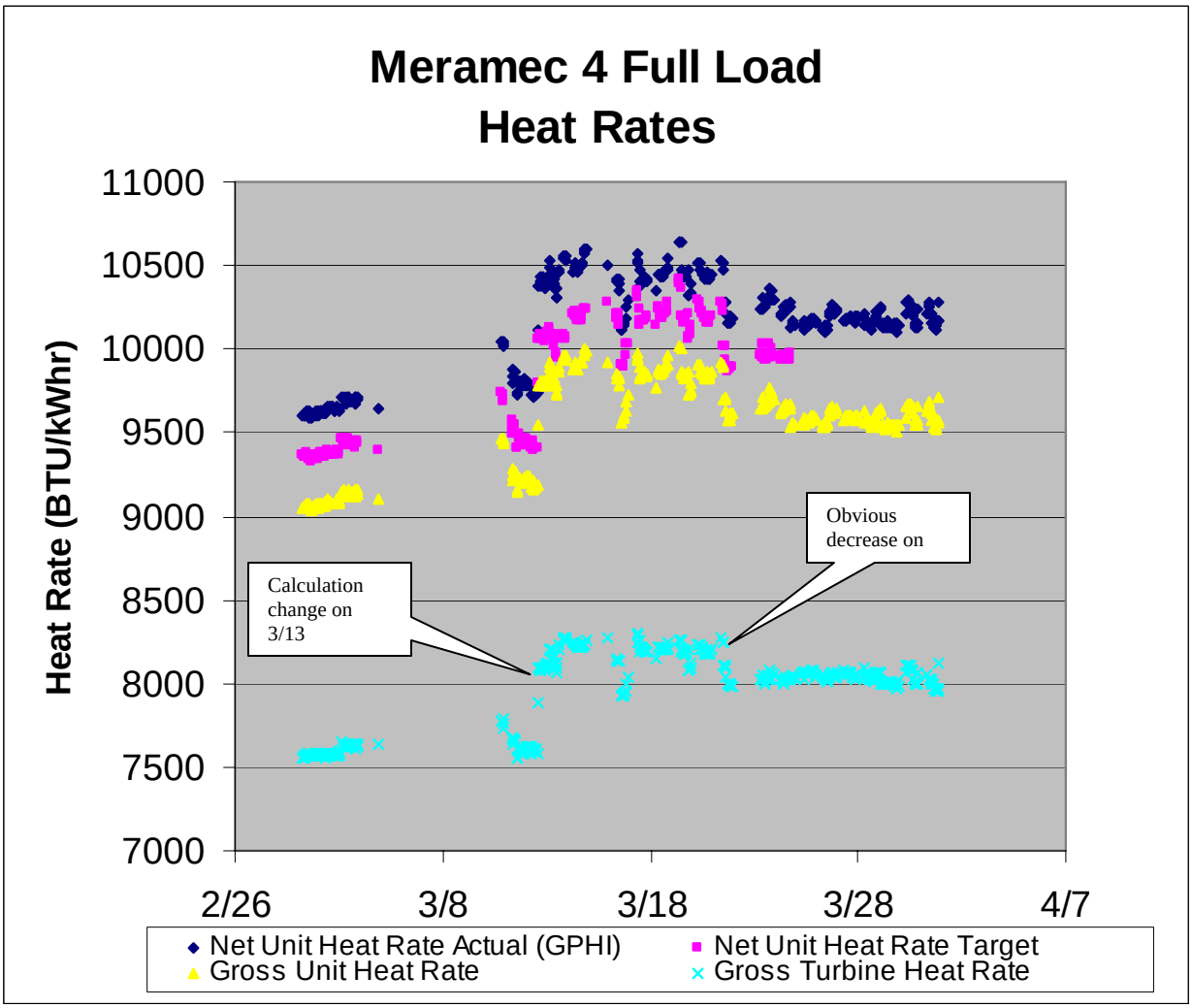
Meramec Unit 4 - Corrected Load



Meramec Unit 4 - HP and IP Efficiencies



The normal QA for preparation of these reports includes reviewing numerous trends for obvious changes. The graph below showed two distinct changes for Unit 4.



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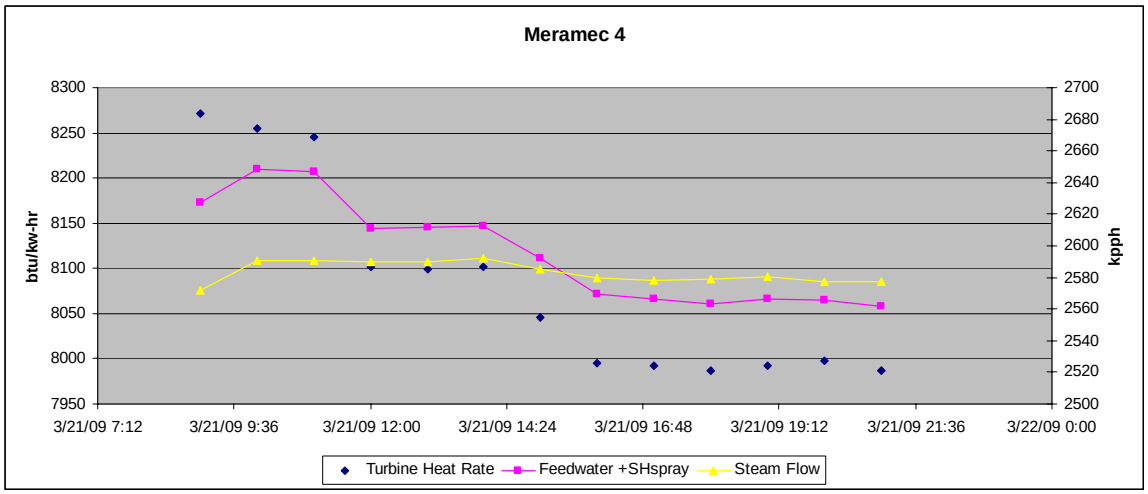
In order to explain the change on 3/21, further analyses were done concerning primary flows which are the main driver in the heat rate calculation. The following graph indicates that on this day feedwater flow was decreasing while steam flow basically stayed the same.



Elog review unveiled that the remote manual operated blowdown valve was closed near the beginning of this period. Evidently this valve had been opened to combat silica problems, which coincidently started around the time of the calculation change, but were being otherwise alleviated instead of blowing down. There were also changes being made with blowdown valve tag 4LY1609. The net change was on the order of 3 % to heat rate.

This is being presented to bring up two points for consideration.

- Loss of cycle isolation between the feedwater flow measurement and actual turbine admission has the biggest impact on the apparent turbine, and hence unit, heat rate. Changes in the calculated heat rate due to losses like this are exaggerated since the calculation assumes all feedwater is being returned back to the turbine. Actual heat rate changes are dependant on where the loss occurs, blowdown having a smaller effect than main steam drains for example.
- Losses out of the cycle that occur after admission to the turbine will not show up as feedwater/steam mismatch, but rather as a loss of load. Losses of this type should show up in the corrected load plots.

March 26, 2009

To: Tim Lafser

From: Joe Sind

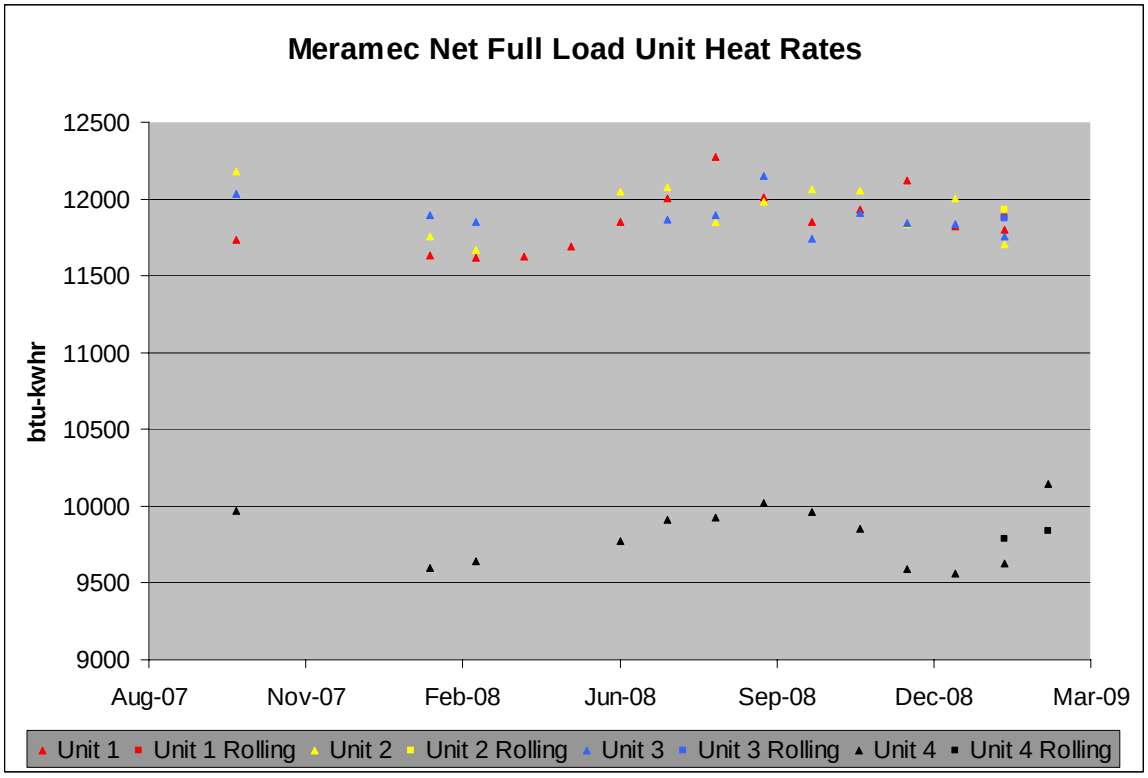
CC: Bob Meiners, John Beck, Steve Schaeffer, Jim Vaughn, Tom Hart, Jeff Scott, Mike Moade, Chris Brown, Matt Wallace, Ken Stuckmeyer, Don Clayton, Jeff Colter, Scott McCormack, Jeff Shelton, Scott Hixson, Jim Barnett, Glenn Tiffin

Re: Meramec February 2009 Performance Report

The last report issued was in November 2008 covering data through October 2008. Since that time Performance Engineering has added staff and there has been some additional automation put into the report generation process. Hopefully future reports will be timelier with a goal of monthly reports by the second week of the following month.

This report format is very similar to that for the other UE plants and is becoming somewhat standardized. However any improvement suggestions are welcome. The next report issue should also include some individual unit trends of turbine cylinder efficiencies and corrected loads.

Executive Summary



- For February, Unit 1 showed about a 1 % degradation in heat rate from the same period last year. All other units are essentially unchanged.
- Units 3 and 4 condenser pressures are about 0.5 inHg higher than in February of 2008. While the river is slightly higher in temperature than last year, cleanliness factors however indicate the pressure change is not solely due to higher inlet temps. This needs to be monitored closely with summer approaching.
- Units 1 and 2 condenser pressures are comparable to last year and show about a 0.5 in Hg improvement from January. Was this the result of some intentional corrective actions?
- Unit 2 ID fan vane positions and amps are somewhat higher than last year indicating a more fouled boiler with vanes going to 100% at times. Particularly on the B side.
- Unit 3 ID fan VIVs were limiting both last year and currently. The A, or superheat ID fan has noticeably higher amps than last year.
- Unit 4 appears to be in slightly better shape draft wise than the same time period last year.

Instrument Issues and Action Items

- A common I: drive was created to allow Performance Engineering and Meramec to share documentation and resources. On this drive is a spreadsheet which contains a list of instrument issues. The plant needs to assign some ownership of this list to initiate and record JRs for correction. I:\MERAMEC\Performance\Instrument & other issues.xls
- Work is complete in selecting a primary flow for the EtaPRO heat rate calculation on Unit 4. This change resulted in an approximate increase in indicated net heat rate of about 7%. A presentation on the rationale behind this change will be made separate from this report. Performance engineering will need to develop a method to back-fit these corrections to early 2009 data for KPI purposes.
- Progress has been made to select a primary flow for Unit 3 but the plant has some action to answer some instrumentation questions influencing potential choices. A presentation on the status of this pending change will be made separate from this report. Performance engineering will need to develop a method to back-fit these corrections to Early 2009 data for KPI purposes.
- Progress has been made in identifying the instrumentation available for turbine efficiency calculations on unit 3. The plant initiated JR091446 for locating and calibrating the instrumentation. Performance engineering assisted in locating the instruments and now the calibrations need to be scheduled.
- One of the data points needed for these calculations is a cross-under pressure. The plant needs to take action to initiate a job to install a permanent pressure transducer and wired into the DCS.
- Performance Engineering has begun an initiative to assist each plant with assessing cycle isolation issues. Targeted completion in late 2009 or first half 2010.

Unit 1

Summary of Performance Report for:

Plant	Meramec			
Unit	1			
Period		Feb-08	Jan-09	Feb-09
Full Load Performance				
Hours of Data		628	109	376
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	137	125	123
AUX POWER	MW	9.5	9.3	9.2
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11629	11824	11799
Boiler Efficiency Actual	%	84.5	84.5	84.6
CONTROL VALVE POSITION LVDT	%	100.0	99.2	94.4
FEEDWATER TEMP TO ECON	degF	451.5	445.3	443.4
FEEDWATER TEMP TO HTR 1	degF	372.2	367.3	366.9
HP Turbine Efficiency Actual	%	80.0	79.4	78.5
IP Turbine Efficiency Corrected	%	84.8	84.4	84.1
Condenser Pressure HP	inHga	1.8	2.3	1.8
AIRHTR-A GAS OUTLET TEMP	degF	297	298	298
AMBIENT AIR TEMP	degF	33.5	37.4	38.3
CIRC WTR TEMP TO COND	degF	35.0	34.4	38.4
River Temperature	degF	35.0	34.4	38.4
FWH 1 Temperature Rise	degF	79.3	78.0	76.5
Net Load	MW	127.5	115.4	114.0
Average Cond Press	inHga	1.8	2.3	1.8
Average Exit Gas Temperature	degF	297	298	298
Aux Power	%	6.9	7.5	7.5
Gross Unit Heat Rate	BTU/KW-HR	10826	10941	10915
Gross Turbine Heat Rate	BTU/KW-HR	9146	9246	9230
12 Month Rolling Average Net Unut Heat Rate				11884
feedwater flow for heat rate calc. has not been validated				

Unit heat rate is approximately 1 % higher than last year. Potential turbine efficiency and/or cycle isolation issues.
Backpressure improved about 0.5 inHg from January 2009.

Unit 2

Summary of Performance Report for:

Plant	Meramec			
Unit	2			
Period		Feb-08	Jan-09	Feb-09
Full Load Performance				
Hours of Data		491	196	273
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	133.2	130.5	130.3
AUX POWER	MW	7.6	7.7	7.6
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11755.4	12001.8	11703.8
Boiler Efficiency Actual	%	84.7	83.8	84.5
CONTROL VALVE POSITION LVDT	%	-10.0	98.2	97.2
FEEDWATER TEMP TO ECON	degF	453.1	451.4	449.5
FEEDWATER TEMP TO HTR 1	degF	370.3	369.9	369.4
HP Turbine Efficiency Actual	%	80.2	80.3	80.2
IP Turbine Efficiency Corrected	%	94.2	94.2	94.4
Condenser Pressure HP	inHga	1.8	2.1	1.6
AIRHTR-A GAS OUTLET TEMP	degF	324.3	328.3	333.6
AMBIENT AIR TEMP	degF	33.1	31.3	38.2
CIRC WTR TEMP TO LP CONDB	degF	35.3	33.4	40.9
Minimum River Temperature	degF	35.3	33.4	40.9
FWH 1 Temperature Rise	degF	82.8	81.5	80.1
Net Load	MW	125.6	122.9	122.7
Average Cond Press	inHga	1.8	2.1	1.6
Average Exit Gas Temperature	degF	324.3	328.3	333.6
Aux Power	%	5.7	5.9	5.9
Gross Unit Heat Rate	BTU/KW-HR	11086.0	11297.8	11017.2
Gross Turbine Heat Rate	BTU/KW-HR	9393.1	9470.1	9308.4
12 Month Rolling Average Net Unut Heat Rate				11928.1
feedwater flow for heat rate calc. has not been validated				

Backpressure improved about 0.5 inHg from January 2009.

Unit 3

Summary of Performance Report for:

Plant		Meramec		
Unit		3		
Period		Feb-08	Jan-09	Feb-09
Full Load Performance				
Hours of Data		320	334	507
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	277.4	285.1	282.5
AUX POWER	MW	18.1	18.7	18.1
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11892.5	11837.4	11756.3
Boiler Efficiency Actual	%	82.3	82.1	82.2
CONTROL VALVE POSITION LVDT	%	77.1	77.2	77.8
FEEDWATER TEMP TO ECON	degF	472.7	475.9	475.4
FEEDWATER TEMP TO HTR 1	degF	392.8	390.8	392.3
HP Turbine Efficiency Actual	%	79.7	79.8	79.7
IP Turbine Efficiency Corrected	%	69.6	70.0	70.6
Condenser Pressure HP	inHga	1.9	2.0	2.4
AIRHTR-A GAS OUTLET TEMP	degF	409.8	395.7	394.0
AIRHTR-B GAS OUTLET TEMP	degF	354.2	365.3	360.3
AMBIENT AIR TEMP	degF	35.7	34.6	41.1
CIRC WTR TEMP TO COND	degF	40.3	40.1	44.7
Minimum River Temperature	degF	40.3	40.1	44.7
FWH 1 Temperature Rise	degF	79.9	85.1	83.1
Net Load	MW	259.3	266.4	264.4
Average Cond Press	inHga	1.9	2.0	2.4
Average Exit Gas Temperature	degF	382.0	380.5	377.2
Aux Power	%	6.5	6.6	6.4
Gross Unit Heat Rate	BTU/KW-HR	11115.5	11061.5	11002.6
Gross Turbine Heat Rate	BTU/KW-HR	9150.7	9076.8	9041.8
12 Month Rolling Average Net Unut Heat Rate				11871.9

Control valves cannot go to 100% - full load taken as greater than 90% of capability
IP efficienc not valid, no good crossunder pressure
feedwater flow for heat rate calc. has not been validated

Currently the unit is capable of getting the turbine control valves much closer to fully open, which is an indicated cam position of 87%. On 3/17, C. Brown and D. Wetteroff noticed the valves were slightly lower (1 to 2 %) than this full open indication and manually intervened to get full open. Apparent HP turbine efficiency did not respond to this change so it is recommended not to make the effort to open the last few percent.

Unit 4

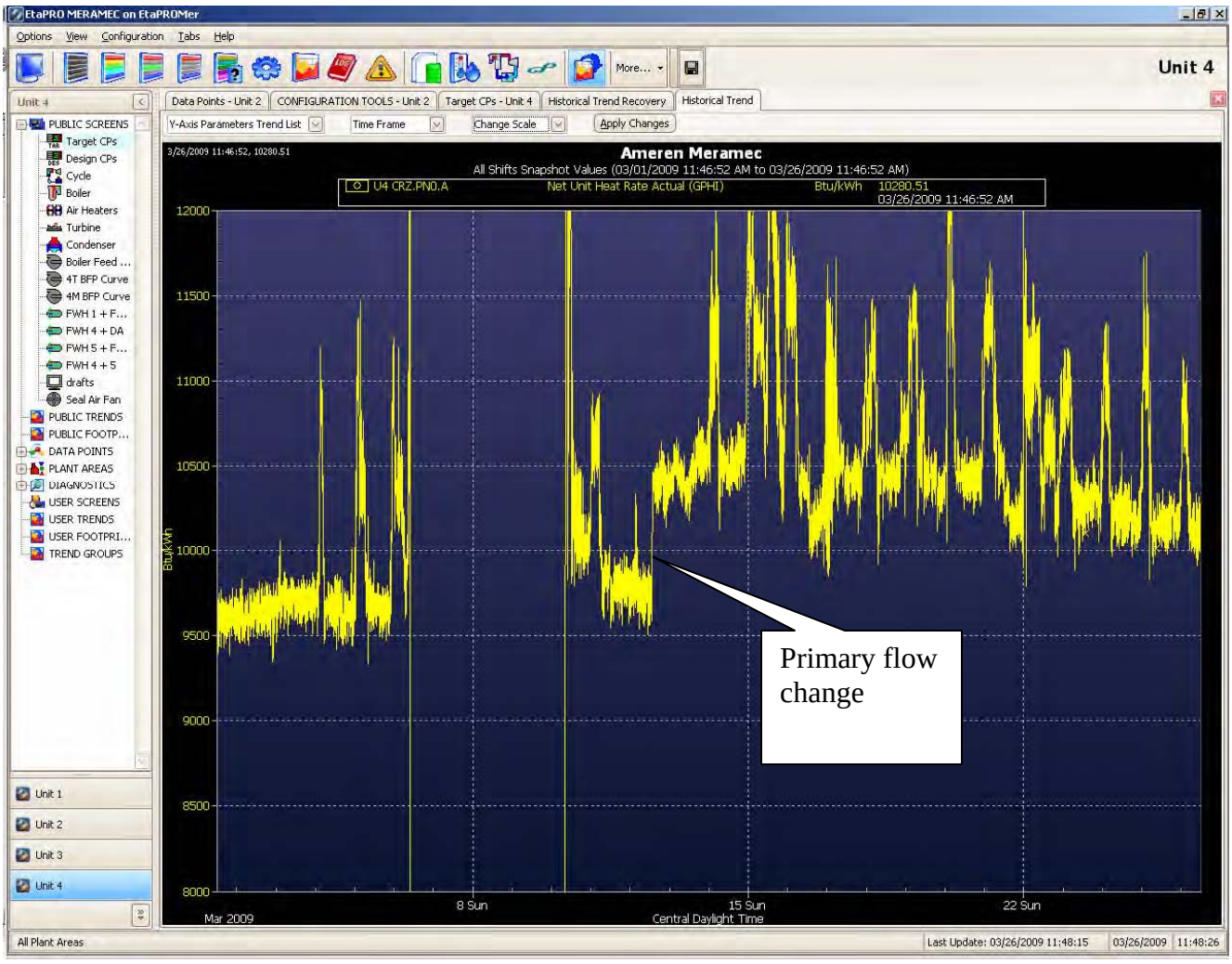
ummary of Performance Report for:

Plant	Meramec				
Unit	4				3/25/09
Period		Feb-08	Jan-09	Feb-09	Mar-09
Full Load Performance = CVP>=98% and Load> 90% of capabilty table					
Hours of Data		210	466	499	252
		Averages	**Averages**	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	363.9	371.4	359.6	356.8
AUX POWER	MW	21.4	21.6	21.3	20.4
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9599.5	9562.0	9627.8	10142.0
Boiler Efficiency Actual	%	83.7	83.0	83.1	83.1
CONTROL VALVE POSITION LVDT	%	99.8	99.9	99.8	99.8
FEEDWATER TEMP TO ECON	degF	490.4	490.9	489.7	489.1
FEEDWATER TEMP TO HTR 1	degF	391.1	389.1	390.3	389.0
HP Turbine Efficiency Actual	%	85.1	85.1	84.5	85.0
IP Turbine Efficiency Corrected	%	88.1	89.2	88.8	87.9
Condenser Pressure HP	inHga	1.2	1.3	1.4	1.7
AIRHTR-A GAS OUTLET TEMP	degF	320.9	340.2	350.3	346.1
AIRHTR-B GAS OUTLET TEMP	degF	308.5	321.9	316.6	311.4
AMBIENT AIR TEMP	degF	32.0	29.3	40.6	48.4
CIRC WTR TEMP TO LP CONDB	degF	38.7	39.2	45.0	47.6
Minimum River Temperature	degF	38.7	39.2	45.0	47.6
FWH 1 Temperature Rise	degF	99.3	101.8	99.3	100.1
Net Load	MW	342.6	349.8	338.3	336.4
Average Cond Press	inHga	1.2	1.3	1.4	1.7
Average Exit Gas Temperature	degF	314.7	331.1	333.5	328.8
Aux Power	%	5.9	5.8	5.9	5.7
Gross Unit Heat Rate	BTU/KW-HR	9036.0	9004.9	9058.2	9562.5
Gross Turbine Heat Rate	BTU/KW-HR	7563.8	7474.0	7527.1	7945.7
12 Month Rolling Average Net Unut Heat Rate				9787.4	9837.4

feedwater flow for heat rate calc. has not been validated

on 3/13/09 primary flow tags were changed to ones believed more realistic

Some March data was included to show some partial effect of the primary flow change on 3/13. The April report will include the effect for an entire reporting period but will obviously include other dynamic effects also.



Note the approx. 7% change in indicated heat rate with the change in selected primary flow. Also note the apparent decreasing trend in heat rate starting around 3/22. The cause is unknown but it should also be noted that during this time backpressure was increasing.

November 14, 2008

To: Tim Lafser
From: Joe Sind
CC: John Beck, Jeff Scott, Steve Schaeffer, Jim Vaughn, Tom Hart, Chris Brown, Mike Moade, Matt Wallace, Ken Stuckmeyer, Scott McCormack, Jeff Colter, Jeff Shelton

Subject: Meramec October 2008 Performance Report

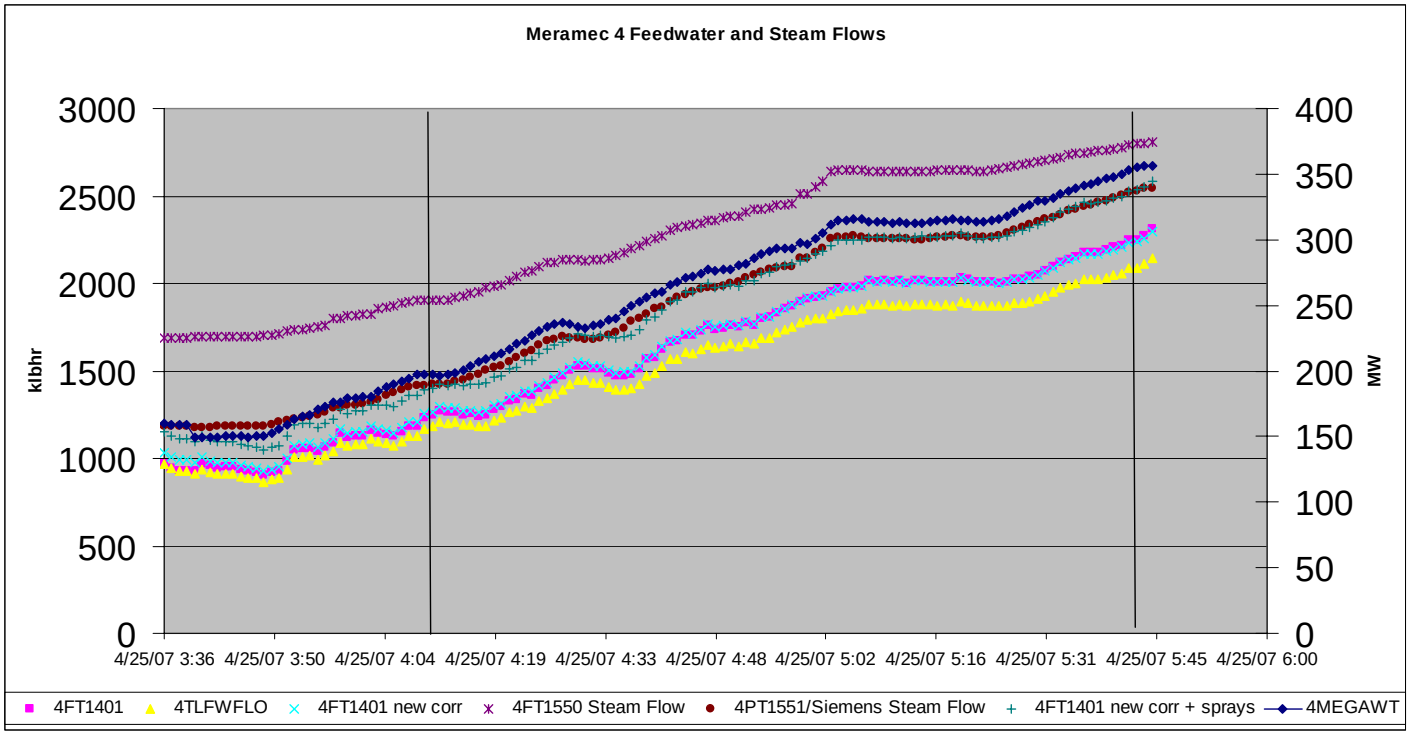
This is the first regular report following the initial demonstration in July's performance meeting. The report should not be considered in its final form for regular publication. Please advise on anything you think would be an improvement: presentation, content (additional content needed or content that is of little use), format, etc. Attempts will be made to improve the report until all recipients are satisfied.

Regular tabular data heat rate reports start on page 4. As is indicated there are several reasons why these reports should not necessarily be used as true indicators of the unit's absolute heat rate. That being said they should however indicate trends in heat rate. Although these kinds of reports are surely an expected outcome of a heat rate improvement and monitoring program there are several major initiatives that need to be undertaken before that will become a reliable reality. Suggestions are as follows.

A. Complete preparations for and execute a sound turbine efficiency test on unit 3. J. Sind and D. Wetteroff? have action for this. See P:\Meramec\Performance\Meramec 3 Turb Test Data.xls

B. Resolve what measurement is best to use for feedwater/steam flow in an effort reconcile EtaPRO heat rates to other benchmark heat rates

Unit 4 see: P:\Meramec\Performance\FlowCompare_rev3.xls



Did Flowserve take an independent measurement of flow comparable to 4FT1401?

Unit 3 see: RE Meramec Unit 3.msg

Units 1 and 2: similar preliminary assessment needs to be done

C. Increase plant heat rate awareness

Attend Heat Rate Awareness class by GP/PSC

SSIIs, COE, engineers,?

Increase attention of EtaPRO

Review daily EPReporter email controllable loss reports

Plant performance engineer(s) attend EtaPRO admin. training and actively participate in EtaPRO management.

D. <u>Per Tim's request for suggestions</u>

Capital projects for consideration:

1. Adjustable speed drives on all main boiler feedpumps Units 1-3?
2. Main Turbine Upgrades (Units 1,2,3)?
3. HOGEN – plant hydrogen production and purity improvement?

From July meeting:

2. Update controllable loss targets in EtaPRO per meeting discussions – Jeff Shelton/Joe Sind –Status: Delay to 2009 to stay on annual schedule of review, incorporate GP check on carbon monoxide loss calculation and NueCo advice on O2 levels.
3. Contact Jeff Colter to determine if there are turbine steam temperature restrictions for Unit 3 at lower loads – Joe Sind – Status: Complete, per Jeff "Joe, The turbine is designed for 1000 degF main and reheat throughout the operating range with normal metal temperatures."
4. Review recent Unit 3/4 operation for some targets to ensure that the 2007 data is representative of current operation – Jeff Shelton/Joe Sind Status: see item 1
5. Determine if Smart Signal registered anything during Unit 1 FWH 1 event in June – Jeff Shelton - Status: Yes, this did come up but the PMC found out a JR was already written so an additional notification was not made to the plant.
6. Investigate No 1 FWH drain/temperature issue on Unit 1 – Jeff Scott Status: See attached spreadsheet Instrument and other issues. Xls P:\Meramec\Performance\Instrument & other issues.xls
7. Provide EtaPRO Introduction to Jeff Scott – Joe Sind/Jeff Shelton Status: Done

New or ongoing heat rate improvement action items or other issues:

1. Return 2-1 FWH heater to service
2. Operate Unit 3 at turbine VWO if possible
3. Determine cause of low extraction pressure to 4-2 FWH and correct if possible.

Summary of Performance Report for:

Plant Meramec
Unit 1

		Oct-07	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08
Period							
Full Load Performance							
Hours of Data		253	465	362	498	244	145
		Averages	**Averages**	**Averages**	**Averages**	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	135.8	130.9	128.9	128.8	129.4	132.4
AUX POWER	MW	9.1	8.9	8.9	10.9	9.2	9.3
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11735.5	11854.3	12004.6	12275.9	12008.8	11853.1
Boiler Efficiency Actual	%	85.2	85.2	85.2	85.2	85.0	85.0
CONTROL VALVE POSITION LVDT	%	100.0	100.0	99.9	99.9	99.9	100.0
FEEDWATER TEMP TO ECON	degF	454.5	450.3	449.8	449.8	449.7	451.1
FEEDWATER TEMP TO HTR 1	degF	369.7	371.5	370.7	370.8	370.7	371.9
HP Turbine Efficiency Actual	%	79.7	80.4	80.0	80.0	80.1	80.0
IP Turbine Efficiency Corrected	%	85.1	86.1	86.1	85.9	85.8	85.7
Condenser Pressure HP	inHga	2.6	2.8	3.1	3.0	2.9	2.7
AIRHTR-A GAS OUTLET TEMP	degF	305.5	317.5	320.7	319.1	317.3	313.7
AMBIENT AIR TEMP	degF	72.8	82.0	83.1	80.6	74.4	66.5
CIRC WTR TEMP TO COND	degF	70.2	75.5	82.0	80.9	73.9	68.7
River Temperature	degF	70.2	75.5	82.0	80.9	73.9	68.7
FWH 1 Temperature Rise	degF	84.8	78.8	79.1	79.0	79.0	79.3
Net Load	MW	126.7	122.1	120.0	117.9	120.2	123.2
Average Cond Press	inHga	2.6	2.8	3.1	3.0	2.9	2.7
Average Exit Gas Temperature	degF	305.5	317.5	320.7	319.1	317.3	313.7
Aux Power	%	6.7	6.8	6.9	8.4	7.1	7.0
Gross Unit Heat Rate	BTU/KW-HR	10948.6	11050.7	11176.0	11239.0	11153.7	11024.9
Gross Turbine Heat Rate	BTU/KW-HR	9330.0	9412.7	9519.1	9574.2	9484.5	9368.1

feedwater flow for heat rate calc. has not been validated

Decreasing net heat rate corresponds to dropping condenser pressure and reduced aux power

Summary of Performance Report for:

Plant		Meramec					
Unit		2					
Period		Oct-07	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08
Full Load Performance							
Hours of Data		115	481	482	44	255	243
		Averages	**Averages**	**Averages**	**Averages**	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	131.6	129.6	128.4	128.6	127.1	128.4
AUX POWER	MW	7.7	7.7	7.7	3.8	7.6	7.7
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	12178.8	12049.5	12075.1	11847.9	11978.9	12063.3
Boiler Efficiency Actual	%	85.2	84.4	84.3	84.1	84.3	84.4
CONTROL VALVE POSITION LVDT	%	-10.0	-10.0	97.9	98.4	-10.0	93.1
FEEDWATER TEMP TO ECON	degF	357.5	452.8	452.3	433.6	#DIV/0!	373.4
FEEDWATER TEMP TO HTR 1	degF	222.7	370.4	370.3	298.3	340.0	281.7
HP Turbine Efficiency Actual	%	79.2	80.3	80.1	80.5	80.4	79.3
IP Turbine Efficiency Corrected	%	94.3	94.6	94.6	94.8	94.8	94.6
Condenser Pressure HP	inHga	2.7	2.7	2.9	2.8	2.8	2.4
AIRHTR-A GAS OUTLET TEMP	degF	321.3	344.9	348.1	343.6	339.3	316.7
AMBIENT AIR TEMP	degF	77.7	82.3	83.8	79.2	75.8	58.3
CIRC WTR TEMP TO LP CONDB	degF	72.8	75.8	82.1	80.5	74.0	61.6
Minimum River Temperature	degF	72.8	75.8	82.1	80.5	74.0	61.6
FWH 1 Temperature Rise	degF	134.8	82.4	82.0	135.3	#DIV/0!	91.7
Net Load	MW	123.9	121.9	120.7	124.8	119.5	120.8
Average Cond Press	inHga	2.7	2.7	2.9	2.8	2.8	2.4
Average Exit Gas Temperature	degF	321.3	344.9	348.1	343.6	339.3	316.7
Aux Power	%	5.9	5.9	6.0	3.0	6.0	6.0
Gross Unit Heat Rate	BTU/KW-HR	11462.3	11338.0	11353.8	11497.5	11263.0	11343.9
Gross Turbine Heat Rate	BTU/KW-HR	9761.1	9568.2	9575.2	9673.1	9499.4	9578.8

2-1 FWH C 2-1 FWH C 2-1 FWH C

feedwater heater OOS and FW temp instrumentation issues
feedwater flow for heat rate calc. has not been validated

No consistent explanation for heat rate changes
EtaPRO uses steam flow as primary flow measurement

Summary of Performance Report for:

Plant	Meramec					
Unit	3					
Period		Oct-07	July-08	Aug-08	Sep-08	Oct-08
Full Load Performance						
Hours of Data		245	59	333	307	427
		Averages	**Averages**	**Averages**	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	278.1	290.9	282.2	269.7	277.0
AUX POWER	MW	18.7	18.9	19.2	18.6	18.0
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	12033.6	11869.1	11896.6	12146.5	11738.3
Boiler Efficiency Actual	%	82.5	82.7	82.8	82.7	82.6
CONTROL VALVE POSITION LVDT	%	81.8	82.4	80.9	75.2	74.6
FEEDWATER TEMP TO ECON	degF	474.3	478.1	476.0	469.4	473.5
FEEDWATER TEMP TO HTR 1	degF	389.4	395.3	393.0	377.1	390.2
HP Turbine Efficiency Actual	%	80.3	80.0	79.3	78.9	79.2
IP Turbine Efficiency Corrected	%	70.2	71.0	70.8	70.4	70.9
Condenser Pressure HP	inHga	3.3	3.3	3.3	3.2	2.7
AIRHTR-A GAS OUTLET TEMP	degF	433.3	421.3	423.2	415.5	405.1
AIRHTR-B GAS OUTLET TEMP	degF	370.0	393.1	384.8	379.5	375.4
AMBIENT AIR TEMP	degF	72.2	82.1	80.5	73.7	62.9
CIRC WTR TEMP TO COND	degF	73.4	82.3	84.0	77.6	68.6
Minimum River Temperature	degF	73.4	82.3	84.0	77.6	68.6
FWH 1 Temperature Rise	degF	84.9	82.8	83.0	92.3	83.2
Net Load	MW	259.4	272.1	263.0	251.1	259.1
Average Cond Press	inHga	3.3	3.3	3.3	3.2	2.7
Average Exit Gas Temperature	degF	401.6	407.2	404.0	397.5	390.2
Aux Power	%	6.7	6.5	6.8	6.9	6.5
Gross Unit Heat Rate	BTU/KW-HR	11223.4	11099.7	11087.1	11311.0	10976.4
Gross Turbine Heat Rate	BTU/KW-HR	9256.2	9178.5	9180.2	9358.1	9071.3

Control valves cannot go to 100%
IP efficienc not valid, no good crossunder pressure
feedwater flow for heat rate calc. has not been validated

Instrumentation for turbine efficiencies needs to be walked down and calibrated.
79 % for HP is low but plausible
IP efficiency with manual reading of crossover was 76% very low.

Summary of Performance Report for:

Plant	Meramec						
Unit	4						
Period		Oct-07	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08
Full Load Performance							
Hours of Data		675	331	497	219	226	644
		Averages	**Averages**	**Averages**	**Averages**	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	318.2	358.3	355.4	353.9	334.6	317.3
AUX POWER	MW	19.4	20.6	21.2	21.2	18.9	19.3
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9969.8	9775.8	9915.0	9924.3	10020.4	9965.6
Boiler Efficiency Actual	%	84.0	83.5	83.6	83.5	84.0	84.0
CONTROL VALVE POSITION LVDT	%	99.8	99.7	99.7	99.7	#DIV/0!	97.8
FEEDWATER TEMP TO ECON	degF	480.4	492.8	492.7	492.0	494.0	486.0
FEEDWATER TEMP TO HTR 1	degF	381.1	390.9	390.8	390.7	388.0	378.7
HP Turbine Efficiency Actual	%	85.4	84.7	84.3	84.2	85.1	84.3
IP Turbine Efficiency Corrected	%	89.0	87.9	87.9	87.9	85.1	85.5
Condenser Pressure HP	inHga	2.5	3.6	3.6	3.5	3.0	2.2
AIRHTR-A GAS OUTLET TEMP	degF	307.3	341.1	336.1	333.7	333.7	311.0
AIRHTR-B GAS OUTLET TEMP	degF	305.9	329.9	340.7	337.9	311.5	313.2
AMBIENT AIR TEMP	degF	65.3	81.0	83.8	81.3	73.8	59.4
CIRC WTR TEMP TO LP CONDB	degF	69.1	77.0	82.9	83.7	74.4	65.8
Minimum River Temperature	degF	69.1	77.0	82.9	83.7	74.4	65.8
FWH 1 Temperature Rise	degF	99.3	101.9	101.9	101.3	106.0	107.3
Net Load	MW	298.9	337.7	334.2	332.7	315.6	298.0
Average Cond Press	inHga	2.5	3.6	3.6	3.5	3.0	2.2
Average Exit Gas Temperature	degF	306.6	335.5	338.4	335.8	322.6	312.1
Aux Power	%	6.1	5.7	6.0	6.0	5.7	6.1
Gross Unit Heat Rate	BTU/KW-HR	9363.1	9214.1	9323.6	9330.8	9453.0	9360.4
Gross Turbine Heat Rate	BTU/KW-HR	7866.4	7695.7	7796.8	7793.1	7944.5	7861.8

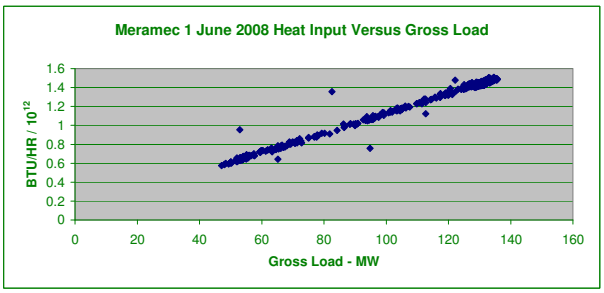
feedwater flow for heat rate calc. has not been validated

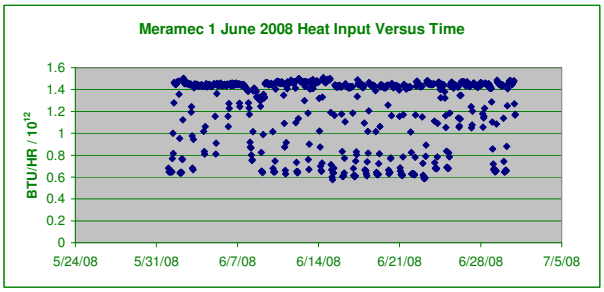
Summary of Performance Report for:

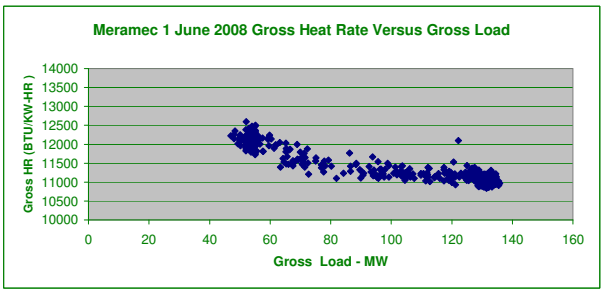
Plant Meramec
Unit 1
Period 6/1/08 to 7/1/08

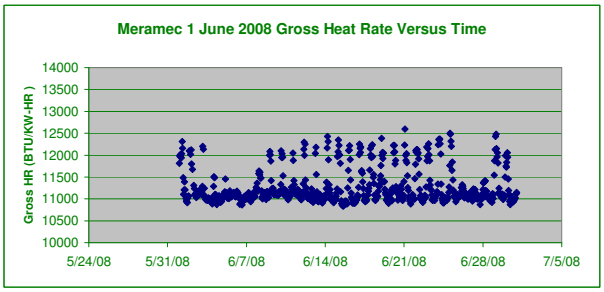
Full Load Performance
Hours of Data 465

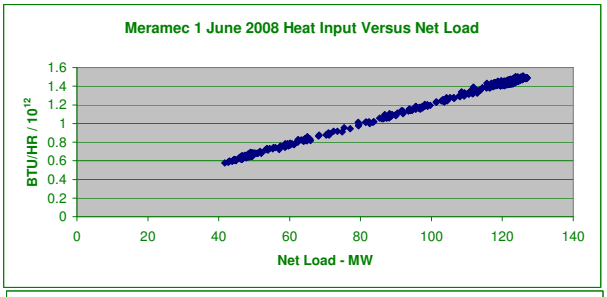
	Averages	
GENERATOR MEGAWATTS	130.9	MW
AUX POWER	8.9	MW
Net Unit Heat Rate Actual (GPHI)	11854.3	BTU/KW-HR
Boiler Efficiency Actual	85.2	%
CONTROL VALVE POSITION LVDT	100.0	%
FEEDWATER TEMP TO ECON	450.3	degF
FEEDWATER TEMP TO HTR 1	371.5	degF
HP Turbine Efficiency Actual	80.4	%
IP Turbine Efficiency Corrected	86.1	%
Condenser Pressure HP	2.8	inHga
AIRHTR-A GAS OUTLET TEMP	317.5	degF
AMBIENT AIR TEMP	82.0	degF
CIRC WTR TEMP TO LP CONDB	75.5	degF
Minimum River Temperature	75.5	degF
FWH 1 Temperature Rise	78.8	degF
Net Load	122.1	MW
Average Cond Press	2.8	inHga
Average Exit Gas Temperature	317.5	degF
Aux Power	6.8	%
Gross Unit Heat Rate	11050.7	BTU/KW-HR
Gross Turbine Heat Rate	9412.7	BTU/KW-HR

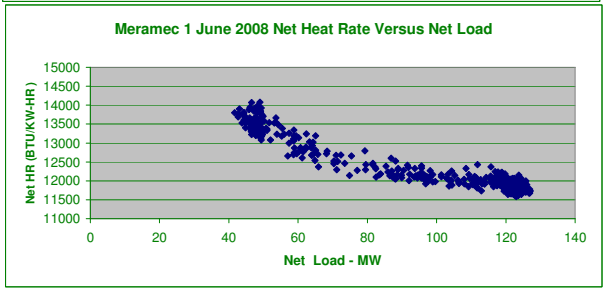


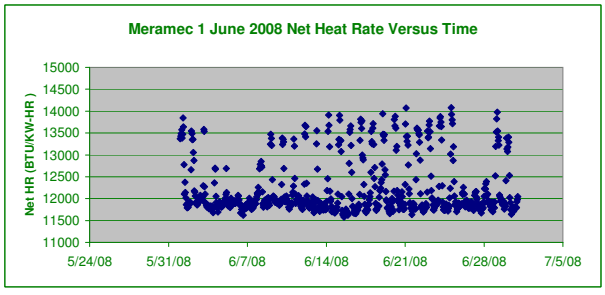












Meramec Unit 1 Rollup, June 2008

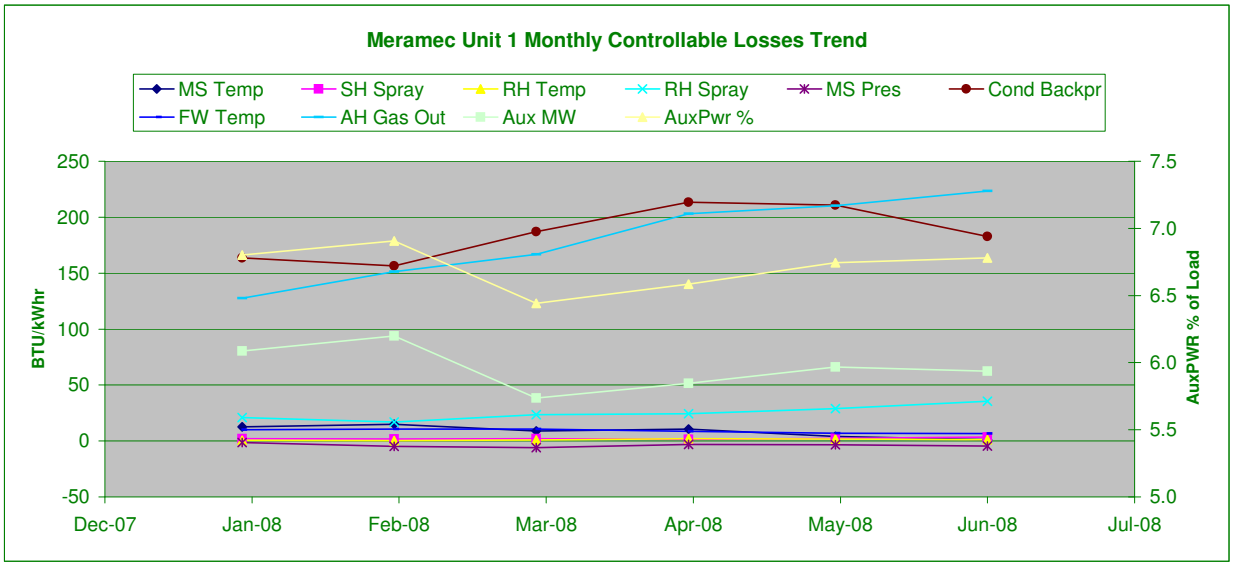
Notable Deviations in Plant Performance Data / Discussion Topics, etc.

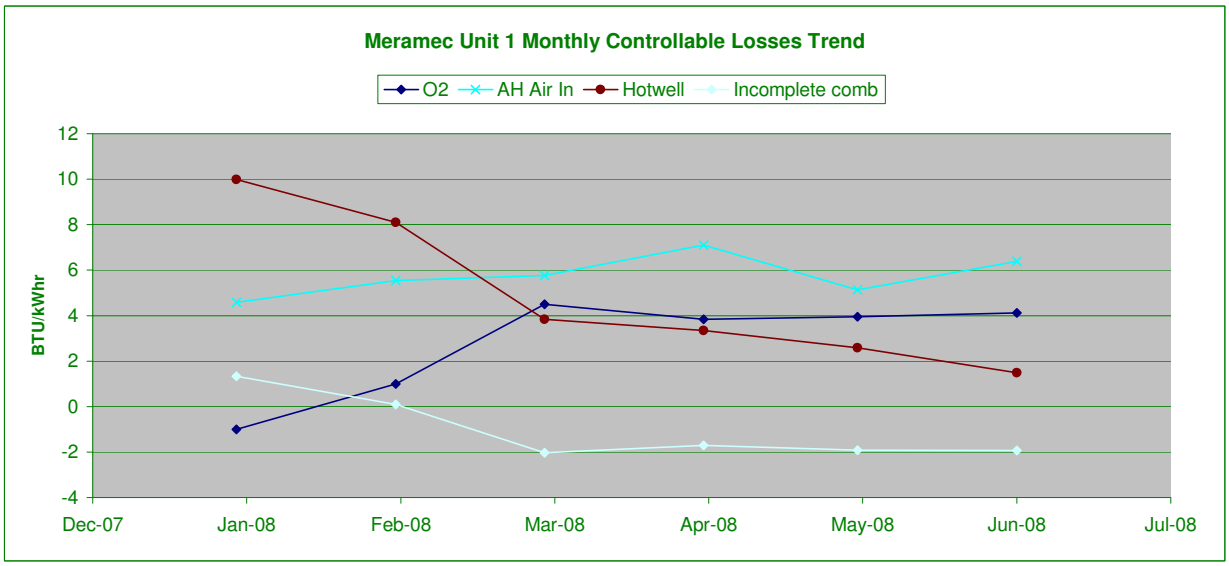
1. The controllable loss parameter target values need to updated to reflect current plant operation. The target values for all controllable loss parameters have been reviewed using actual 2007 unit data.

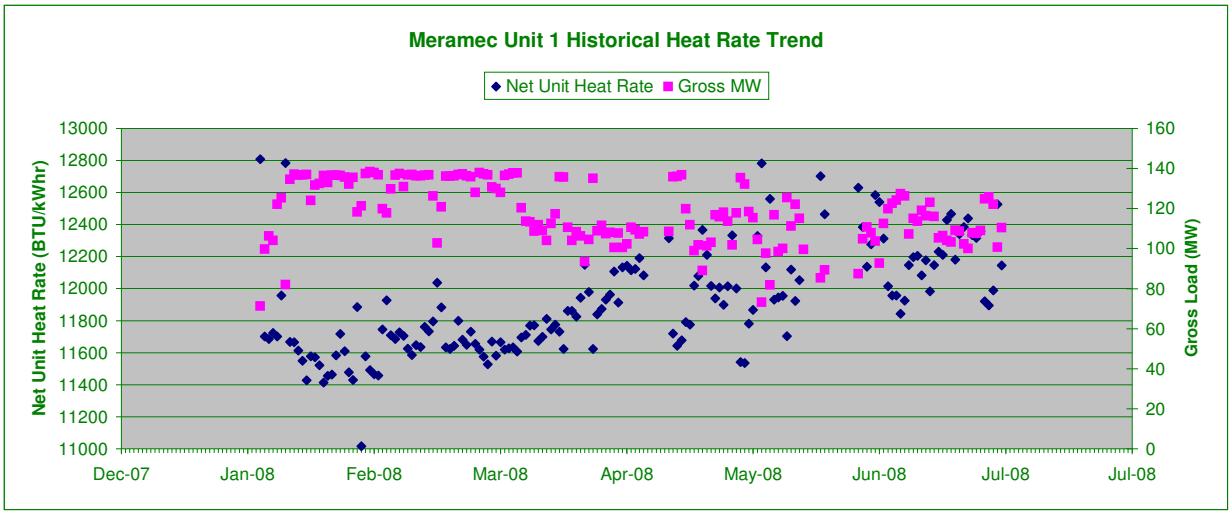
Top Priority Engineering Action Items	JR#	Priority	Resp Pty

Top Instrumentation Deficiencies	Point ID	Actual	Expected	JR#	Priority	Resp Pty

Top Priority OPM/EtaPro Action Items	Priority	Resp Pty
Update target values with agreed upon target values/curves	1	JDS


Meramec Unit 1 Monthly Controllable Losses Trend
MS Temp
SH Spray
RH Temp
RH Spray
MS Pres
Cond Backpr
FW Temp
AH Gas Out
Aux MW
AuxPwr %
BTU/kWhr
AuxPWR % of Load
250
200
150
100
50
0
-50
7.5
7.0
6.5
6.0
5.5
5.0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Meramec Unit 1 Monthly Controllable Losses Trend
O2
AH Air In
Hotwell
Incomplete comb
BTU/kWhr
12
10
8
6
4
2
0
-2
-4
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Meramec Unit 1 Historical Heat Rate Trend
Net Unit Heat Rate
Gross MW
Net Unit Heat Rate (BTU/kWhr)
Gross Load (MW)
13000
12800
12600
12400
12200
12000
11800
11600
11400
11200
11000
160
140
120
100
80
60
40
20
0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Jul-08

Meramec Unit 1 Rollup, June 2008

June-08

Overall Heat Rate & Losses Summary

1. The controllable loss parameter target values need to updated to reflect current plant operation.

Steam Generator Performance Summary:

No items noted

Steam Turbine Performance Summary:

No items noted

Condenser Performance Summary:

1. Condenser pressure had some large daily pressure rises in the middle of the month but they seemed to have gone away. Circ. water temperature rise also increased signifcantly those days. Was a circ pump taken off in mid-June?

Feedwater Heater Performance Summary:

1. Drainer Position on No. 1 heater went from 60% to 90% open in June and has stayed there.

Recommended Actions:

Instrumentation or calculation related issues:

The EtaPro target values need to be updated to reflect current plant operation.

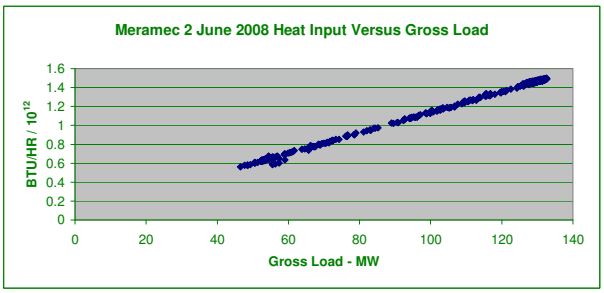
Changes made to the system that affects this month's report:

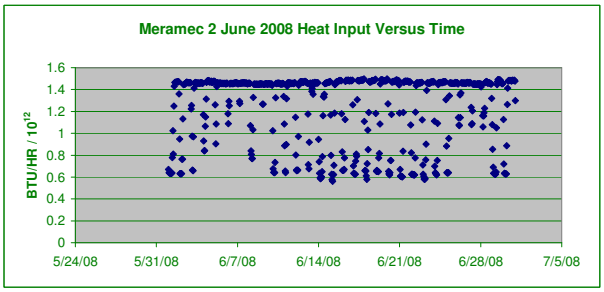
Summary of Performance Report for:

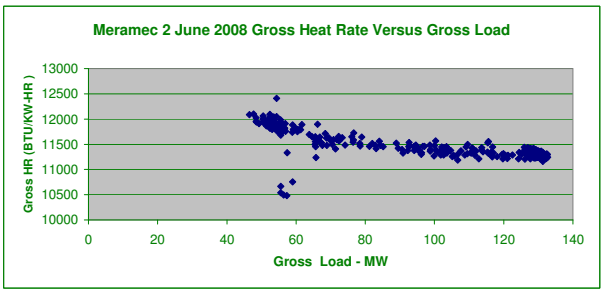
Plant Meramec
Unit 2
Period 6/1/08 to 7/1/08

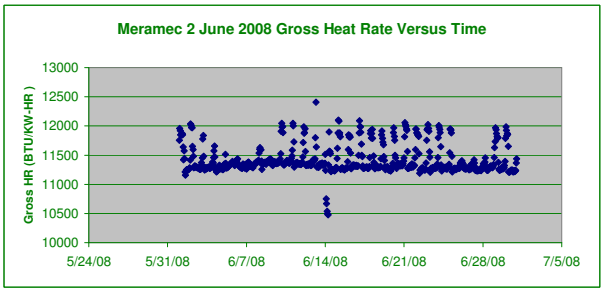
Full Load Performance
Hours of Data 481

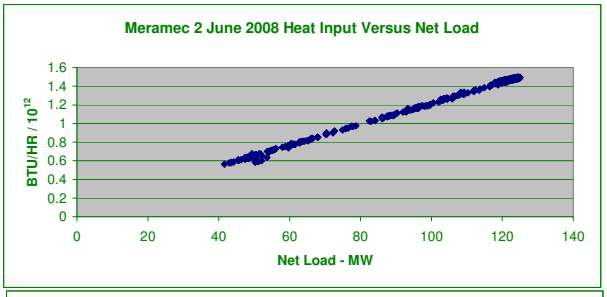
	Averages	
GENERATOR MEGAWATTS	129.6	MW
AUX POWER	7.7	MW
Net Unit Heat Rate Actual (GPHI)	12049.5	BTU/KW-HR
Boiler Efficiency Actual	84.4	%
CONTROL VALVE POSITION LVDT	-10.0	%
FEEDWATER TEMP TO ECON	452.8	degF
FEEDWATER TEMP TO HTR 1	370.4	degF
HP Turbine Efficiency Actual	80.3	%
IP Turbine Efficiency Corrected	94.6	%
Condenser Pressure HP	2.7	inHga
AIRHTR-A GAS OUTLET TEMP	344.9	degF
AMBIENT AIR TEMP	82.3	degF
CIRC WTR TEMP TO LP CONDB	75.8	degF
Minimum River Temperature	75.8	degF
FWH 1 Temperature Rise	82.4	degF
Net Load	121.9	MW
Average Cond Press	2.7	inHga
Average Exit Gas Temperature	344.9	degF
Aux Power	5.9	%
Gross Unit Heat Rate	11338.0	BTU/KW-HR
Gross Turbine Heat Rate	9568.2	BTU/KW-HR

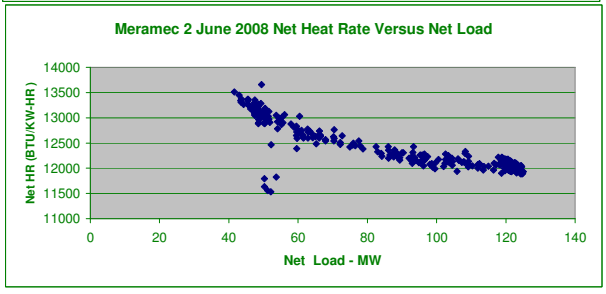


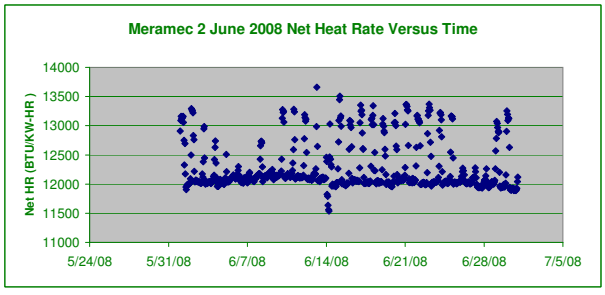












Meramec Unit 2 Rollup, June 2008

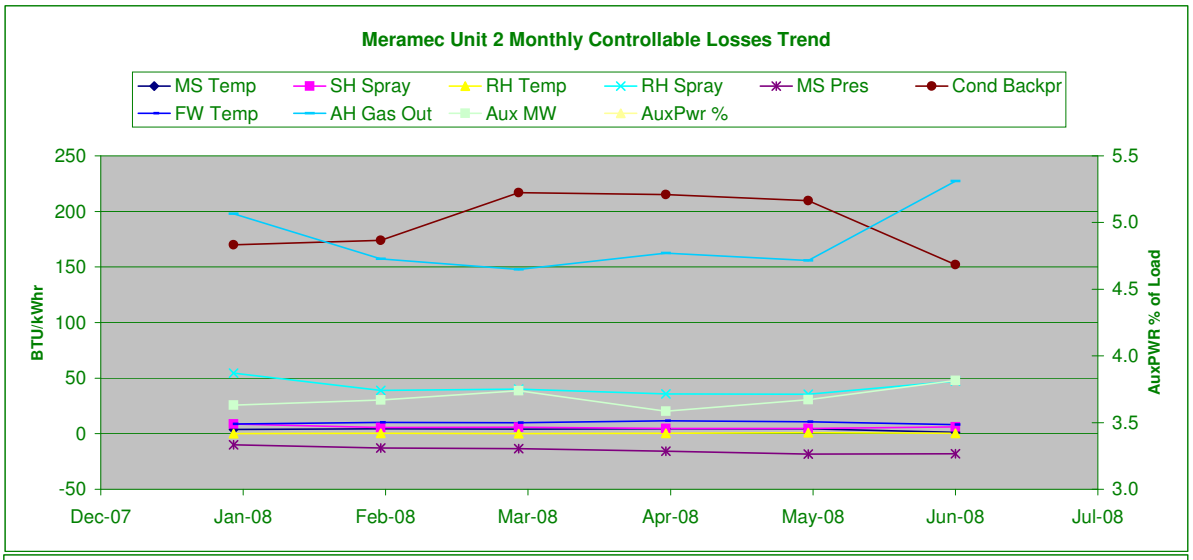
Notable Deviations in Plant Performance Data / Discussion Topics, etc.

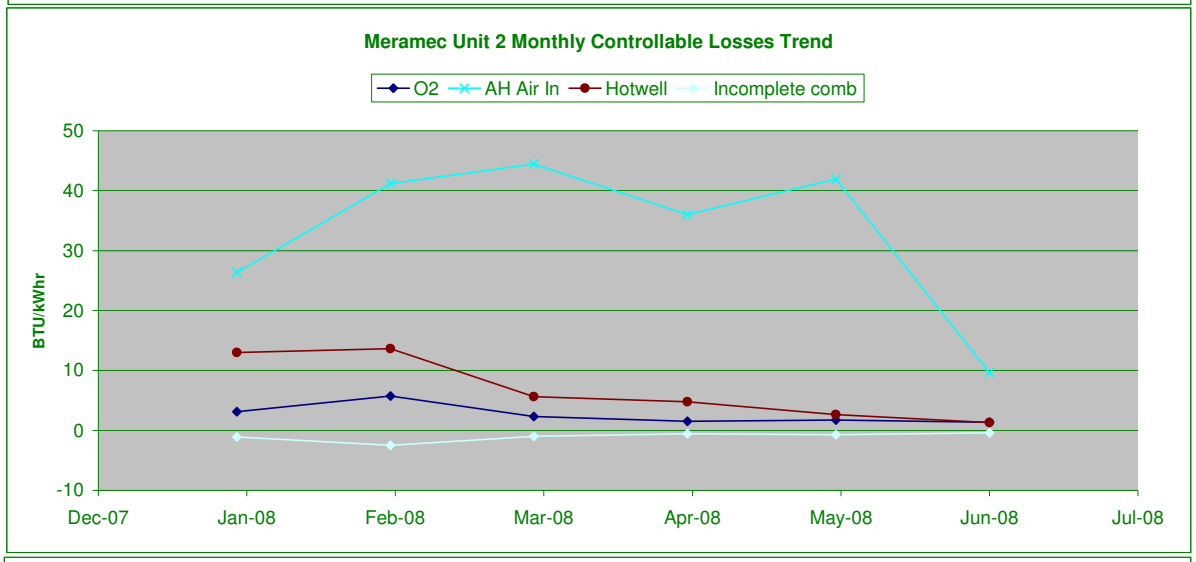
1. The controllable loss parameter target values need to updated to reflect current plant operation. The target values for all controllable loss parameters have been reviewed using actual 2007 unit data.

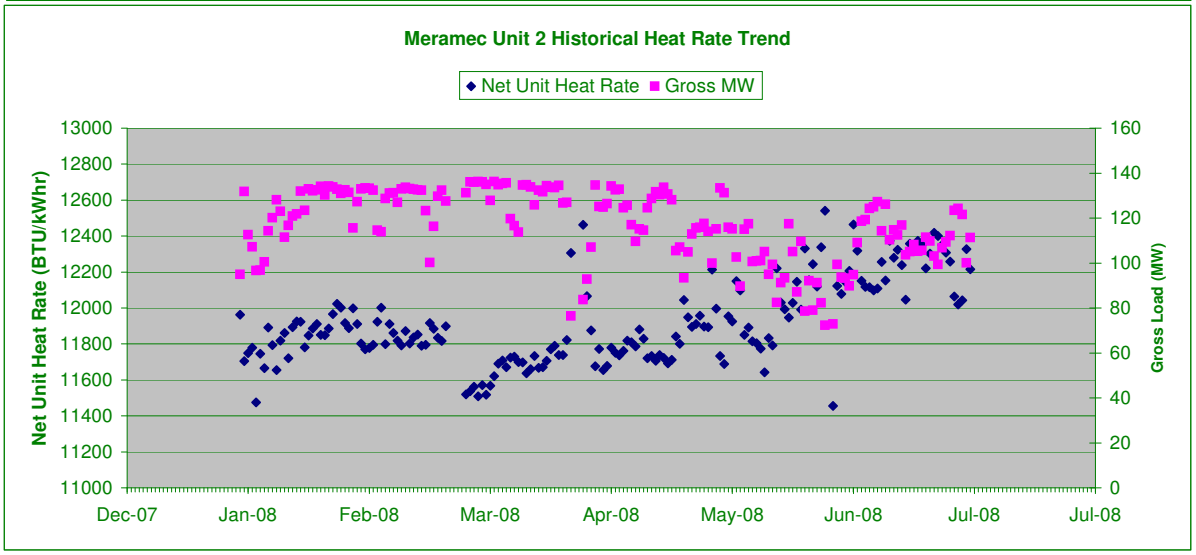
Top Priority Engineering Action Items	JR#	Priority	Resp Pty

Top Instrumentation Deficiencies	Point ID	Actual	Expected	JR#	Priority	Resp Pty
CV Position reading -10%	MR2TRB-TURBGOVVLV-1591-ZI					

Top Priority OPM/EtaPro Action Items	Priority	Resp Pty
Update target values with agreed upon target values/curves	1	JDS


Meramec Unit 2 Monthly Controllable Losses Trend
MS Temp
SH Spray
RH Temp
RH Spray
MS Pres
Cond Backpr
FW Temp
AH Gas Out
Aux MW
AuxPwr %
BTU/kWhr
AuxPWR % of Load
250
200
150
100
50
0
-50
5.5
5.0
4.5
4.0
3.5
3.0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Meramec Unit 2 Monthly Controllable Losses Trend
O2
AH Air In
Hotwell
Incomplete comb
BTU/kWhr
50
40
30
20
10
0
-10
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Meramec Unit 2 Historical Heat Rate Trend
Net Unit Heat Rate
Gross MW
Net Unit Heat Rate (BTU/kWhr)
Gross Load (MW)
13000
12800
12600
12400
12200
12000
11800
11600
11400
11200
11000
160
140
120
100
80
60
40
20
0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Jul-08

Meramec Unit 2 Rollup, June 2008

June-08

Overall Heat Rate & Losses Summary

1. The controllable loss parameter target values need to updated to reflect current plant operation.

Steam Generator Performance Summary:

Steam Turbine Performance Summary:

Condenser Performance Summary:

Feedwater Heater Performance Summary:

Recommended Actions:

Instrumentation or calculation related issues:

The EtaPro target values need to be updated to reflect current plant operation.

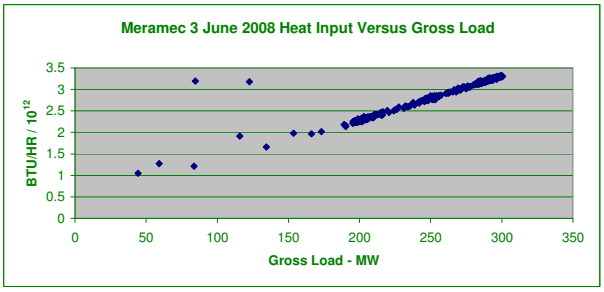
Changes made to the system that affects this month's report:

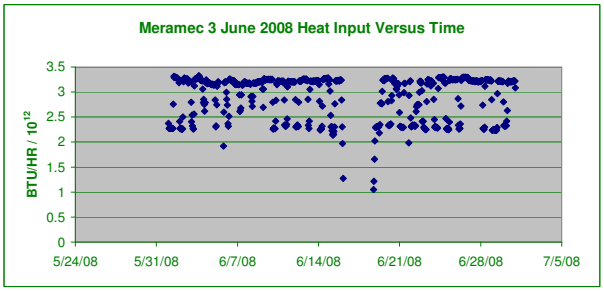
Summary of Performance Report for:

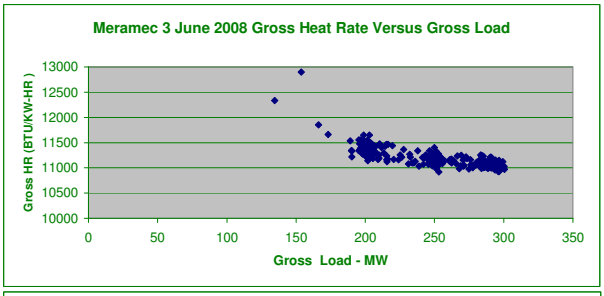
Plant Meramec
Unit 3
Period 6/1/08 to 7/1/08

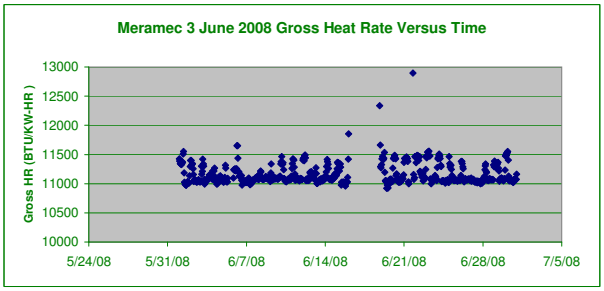
Full Load Performance
Hours of Data 422

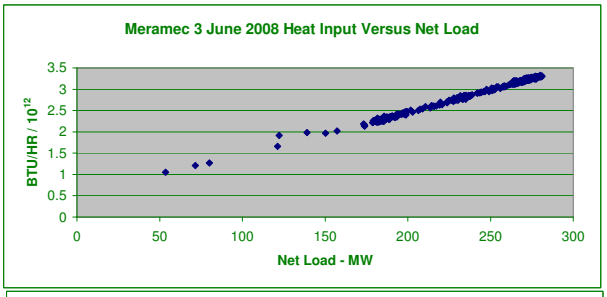
	Averages	
GENERATOR MEGAWATTS	290.6	MW
AUX POWER	19.2	MW
Net Unit Heat Rate Actual (GPHI)	11853.1	BTU/KW-HR
Boiler Efficiency Actual	82.9	%
CONTROL VALVE POSITION LVDT	81.0	%
FEEDWATER TEMP TO ECON	477.3	degF
FEEDWATER TEMP TO HTR 1	393.8	degF
HP Turbine Efficiency Actual	79.9	%
IP Turbine Efficiency Corrected	71.2	%
Condenser Pressure HP	3.1	inHga
AIRHTR-A GAS OUTLET TEMP	417.3	degF
AIRHTR-B GAS OUTLET TEMP	389.2	degF
AMBIENT AIR TEMP	82.3	degF
CIRC WTR TEMP TO LP CONDB	78.6	degF
Minimum River Temperature	78.6	degF
FWH 1 Temperature Rise	83.4	degF
Net Load	271.3	MW
Average Cond Press	3.1	inHga
Average Exit Gas Temperature	403.3	degF
Aux Power	6.6	%
Gross Unit Heat Rate	11069.5	BTU/KW-HR
Gross Turbine Heat Rate	9175.9	BTU/KW-HR

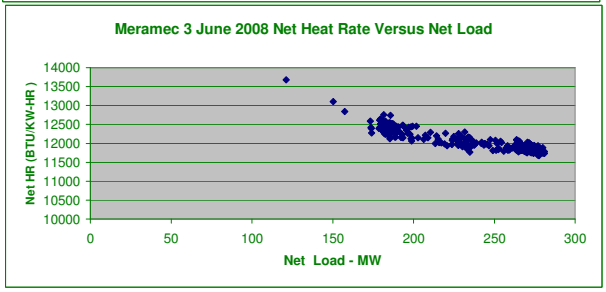


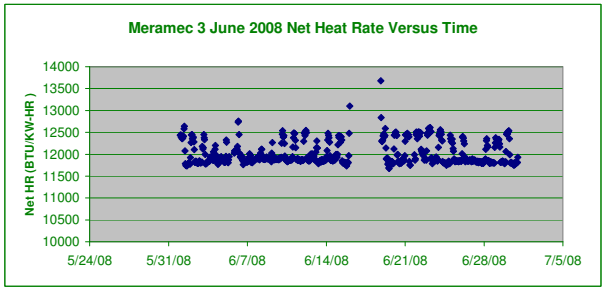












Meramec Unit 3 Rollup, June 2008

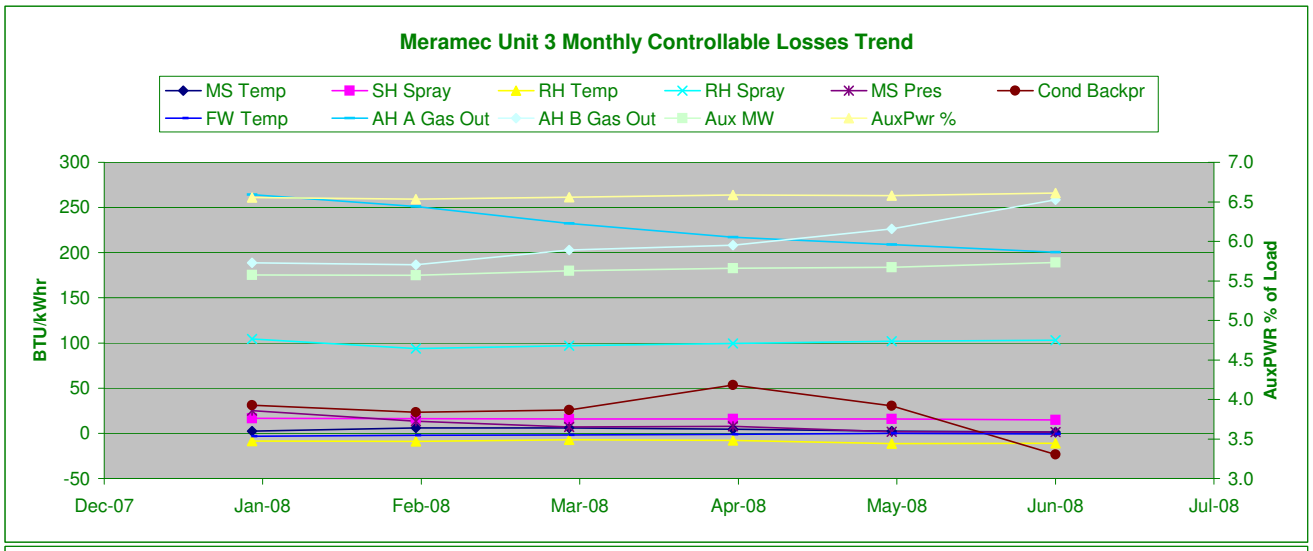
Notable Deviations in Plant Performance Data / Discussion Topics, etc.

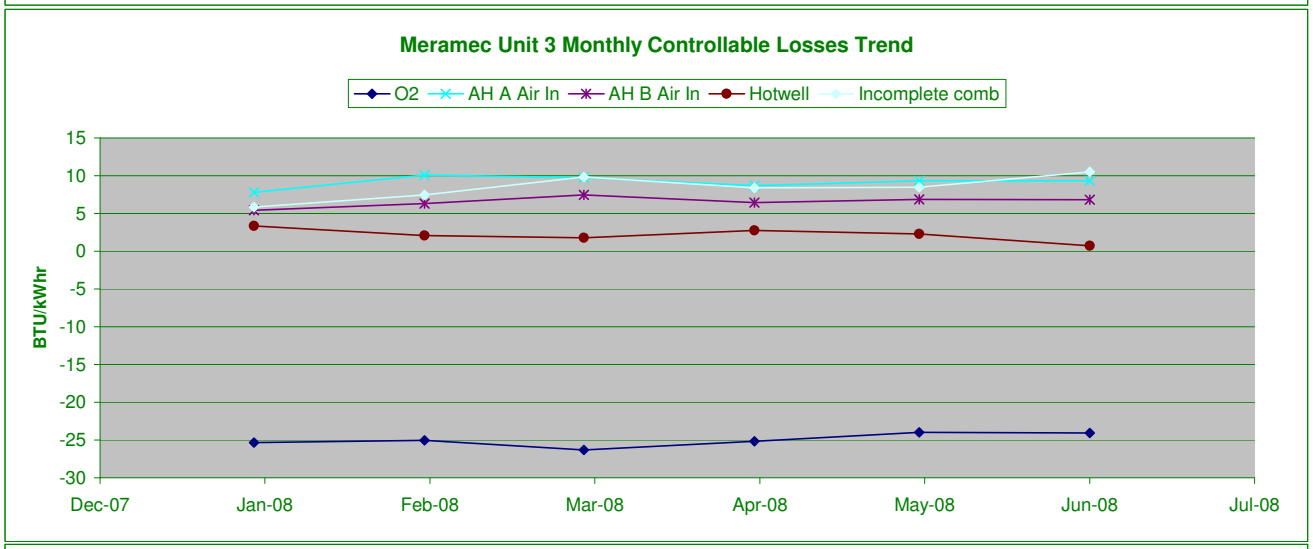
1. The controllable loss parameter target values need to updated to reflect current plant operation. The target values for all controllable loss parameters have been reviewed using actual 2007 unit data.

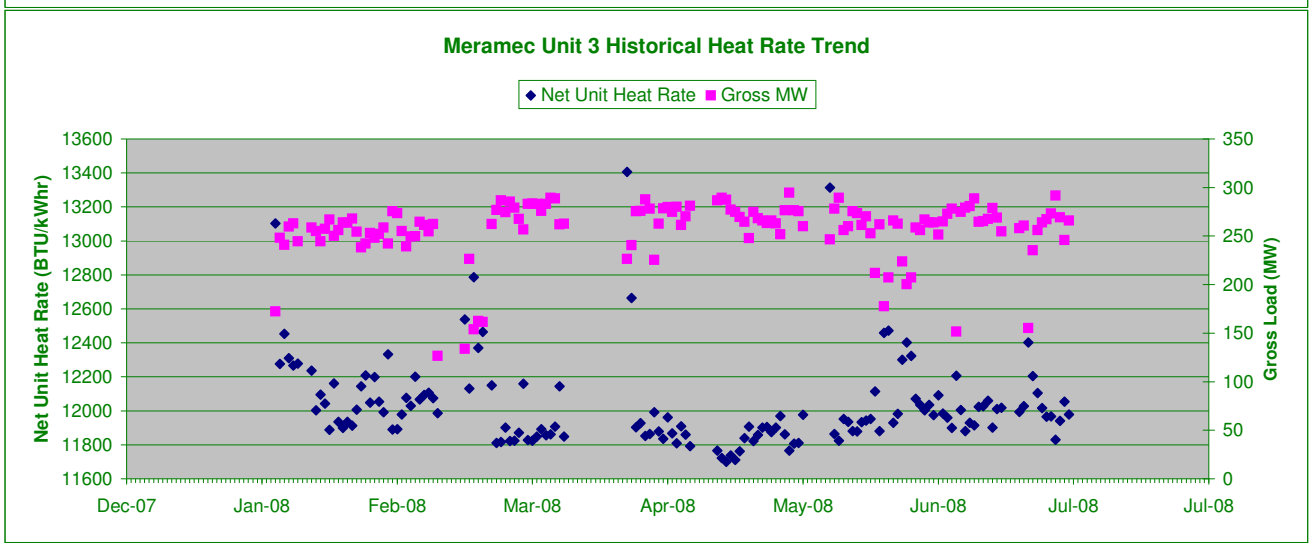
Top Priority Engineering Action Items	JR#	Priority	Resp Pty

Top Instrumentation Deficiencies	Point ID	Actual	Expected	JR#	Priority	Resp Pty

Top Priority OPM/EtaPro Action Items	Priority	Resp Pty
Update target values with agreed upon target values/curves	1	JDS


Meramec Unit 3 Monthly Controllable Losses Trend
MS Temp
SH Spray
RH Temp
RH Spray
MS Pres
Cond Backpr
FW Temp
AH A Gas Out
AH B Gas Out
Aux MW
AuxPwr %
BTU/kWhr
AuxPWR % of Load
300
250
200
150
100
50
0
-50
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Meramec Unit 3 Monthly Controllable Losses Trend
O2
AH A Air In
AH B Air In
Hotwell
Incomplete comb
BTU/kWhr
15
10
5
0
-5
-10
-15
-20
-25
-30
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Meramec Unit 3 Historical Heat Rate Trend
Net Unit Heat Rate
Gross MW
Net Unit Heat Rate (BTU/kWhr)
Gross Load (MW)
13600
13400
13200
13000
12800
12600
12400
12200
12000
11800
11600
350
300
250
200
150
100
50
0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Jul-08

Meramec Unit 3 Rollup, June 2008

June-08

Overall Heat Rate & Losses Summary

1. The controllable loss parameter target values need to updated to reflect current plant operation.

Steam Generator Performance Summary:

Steam Turbine Performance Summary:

Condenser Performance Summary:

Feedwater Heater Performance Summary:

Recommended Actions:

Instrumentation or calculation related issues:

The EtaPro target values need to be updated to reflect current plant operation.

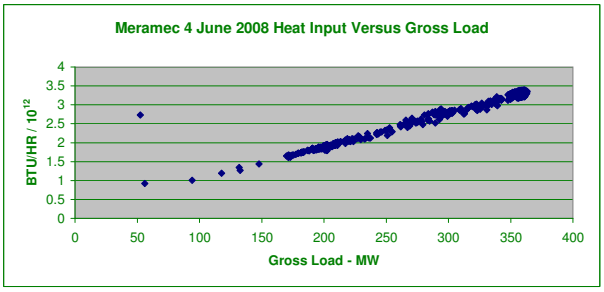
Changes made to the system that affects this month's report:

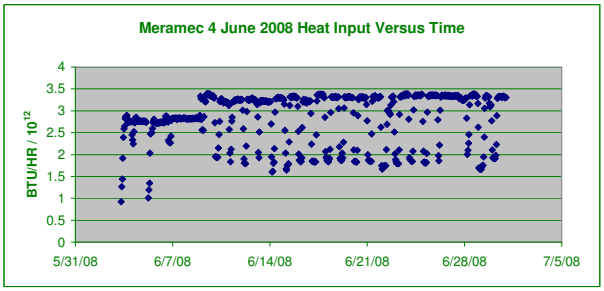
Summary of Performance Report for:

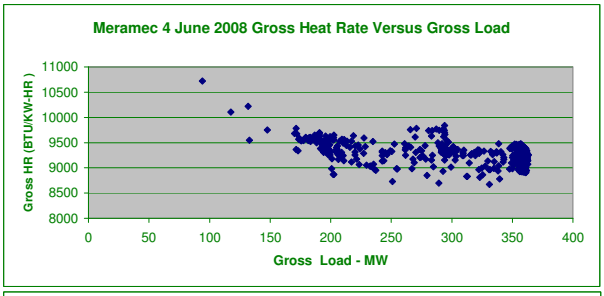
Plant Meramec
Unit 4
Period 6/1/08 to 7/1/08

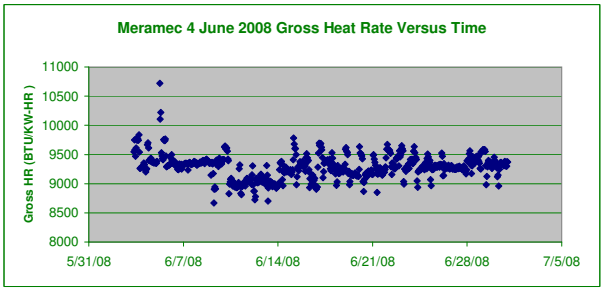
Full Load Performance
Hours of Data 331

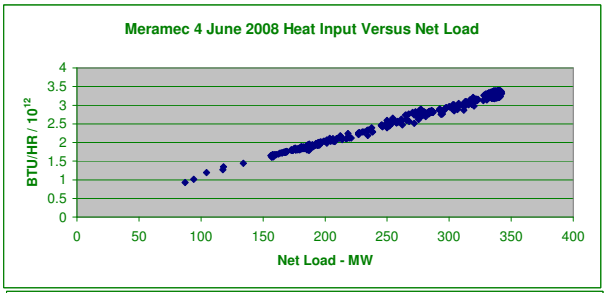
	Averages	
GENERATOR MEGAWATTS	358.3	MW
AUX POWER	20.6	MW
Net Unit Heat Rate Actual (GPHI)	9775.8	BTU/KW-HR
Boiler Efficiency Actual	83.5	%
CONTROL VALVE POSITION LVDT	99.7	%
FEEDWATER TEMP TO ECON	492.8	degF
FEEDWATER TEMP TO HTR 1	390.9	degF
HP Turbine Efficiency Actual	84.7	%
IP Turbine Efficiency Corrected	87.9	%
Condenser Pressure HP	3.6	inHga
AIRHTR-A GAS OUTLET TEMP	341.1	degF
AIRHTR-B GAS OUTLET TEMP	329.9	degF
AMBIENT AIR TEMP	81.0	degF
CIRC WTR TEMP TO LP CONDB	77.0	degF
Minimum River Temperature	77.0	degF
FWH 1 Temperature Rise	101.9	degF
Net Load	337.7	MW
Average Cond Press	3.6	inHga
Average Exit Gas Temperature	335.5	degF
Aux Power	5.7	%
Gross Unit Heat Rate	9214.1	BTU/KW-HR
Gross Turbine Heat Rate	7695.7	BTU/KW-HR

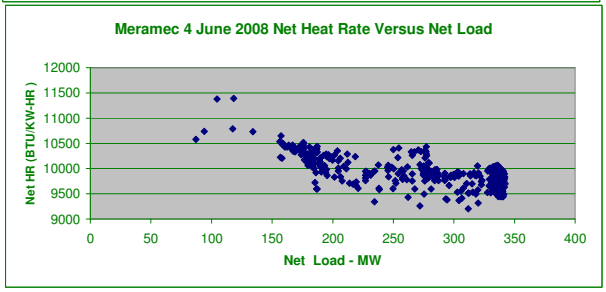


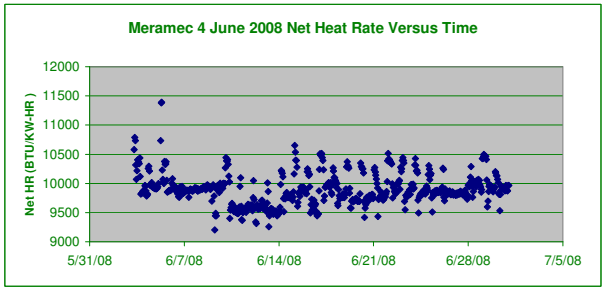












Meramec Unit 4 Rollup, June 2008

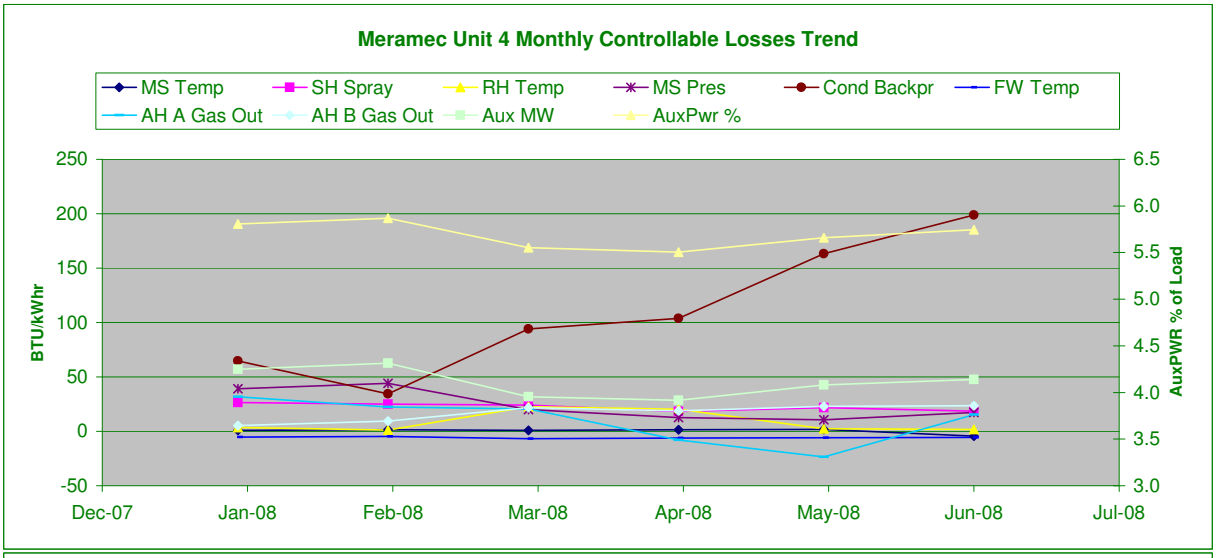
Notable Deviations in Plant Performance Data / Discussion Topics, etc.

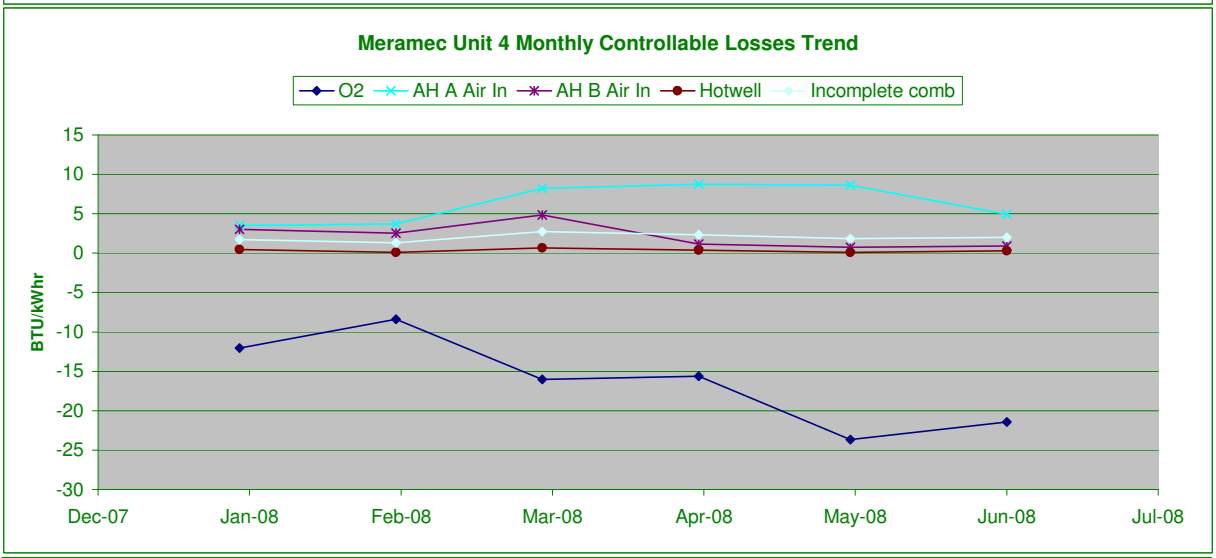
1. The controllable loss parameter target values need to updated to reflect current plant operation. The target values for all controllable loss parameters have been reviewed using actual 2007 unit data.

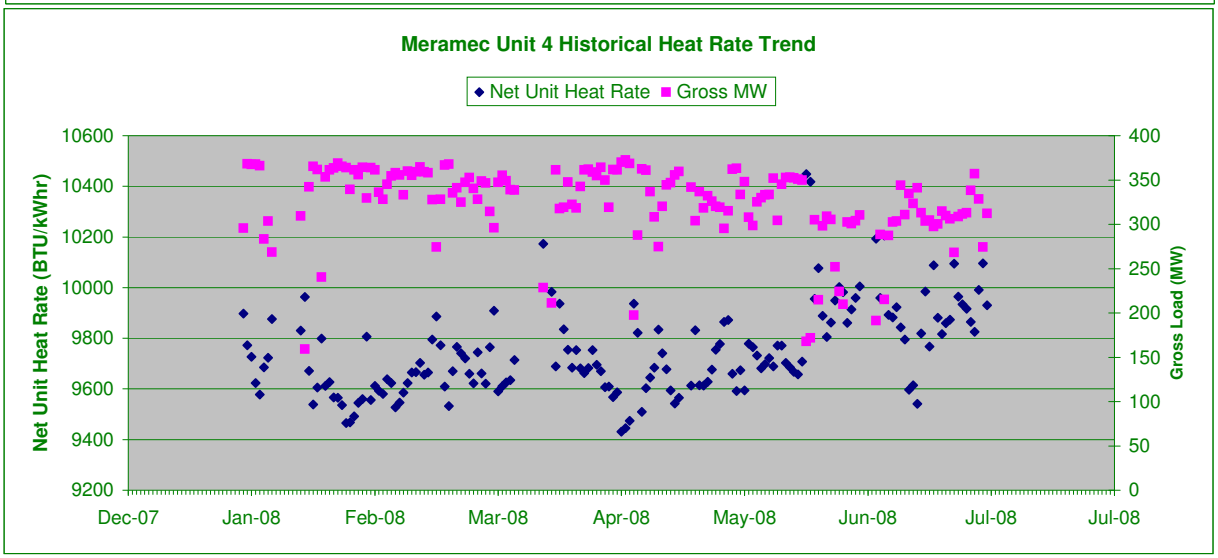
Top Priority Engineering Action Items	JR#	Priority	Resp Pty

Top Instrumentation Deficiencies	Point ID	Actual	Expected	JR#	Priority	Resp Pty

Top Priority OPM/EtaPro Action Items	Priority	Resp Pty
Update target values with agreed upon target values/curves	1	JDS


Meramec Unit 4 Monthly Controllable Losses Trend
MS Temp
SH Spray
RH Temp
MS Pres
Cond Backpr
FW Temp
AH A Gas Out
AH B Gas Out
Aux MW
AuxPwr %
BTU/kWhr
AuxPWR % of Load
250
200
150
100
50
0
-50
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Meramec Unit 4 Monthly Controllable Losses Trend
O2
AH A Air In
AH B Air In
Hotwell
Incomplete comb
BTU/kWhr
15
10
5
0
-5
-10
-15
-20
-25
-30
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Meramec Unit 4 Historical Heat Rate Trend
Net Unit Heat Rate
Gross MW
Net Unit Heat Rate (BTU/kWhr)
Gross Load (MW)
10600
10400
10200
10000
9800
9600
9400
9200
400
350
300
250
200
150
100
50
0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Jul-08

Meramec Unit 4 Rollup, June 2008

June-08

Overall Heat Rate & Losses Summary

1. The controllable loss parameter target values need to updated to reflect current plant operation.

Steam Generator Performance Summary:

Steam Turbine Performance Summary:

Condenser Performance Summary:

Feedwater Heater Performance Summary:

Recommended Actions:

Instrumentation or calculation related issues:

The EtaPro target values need to be updated to reflect current plant operation.

Changes made to the system that affects this month's report:

Rush Island

Heat Rate Performance Reports

Attachment D

7/22/2009

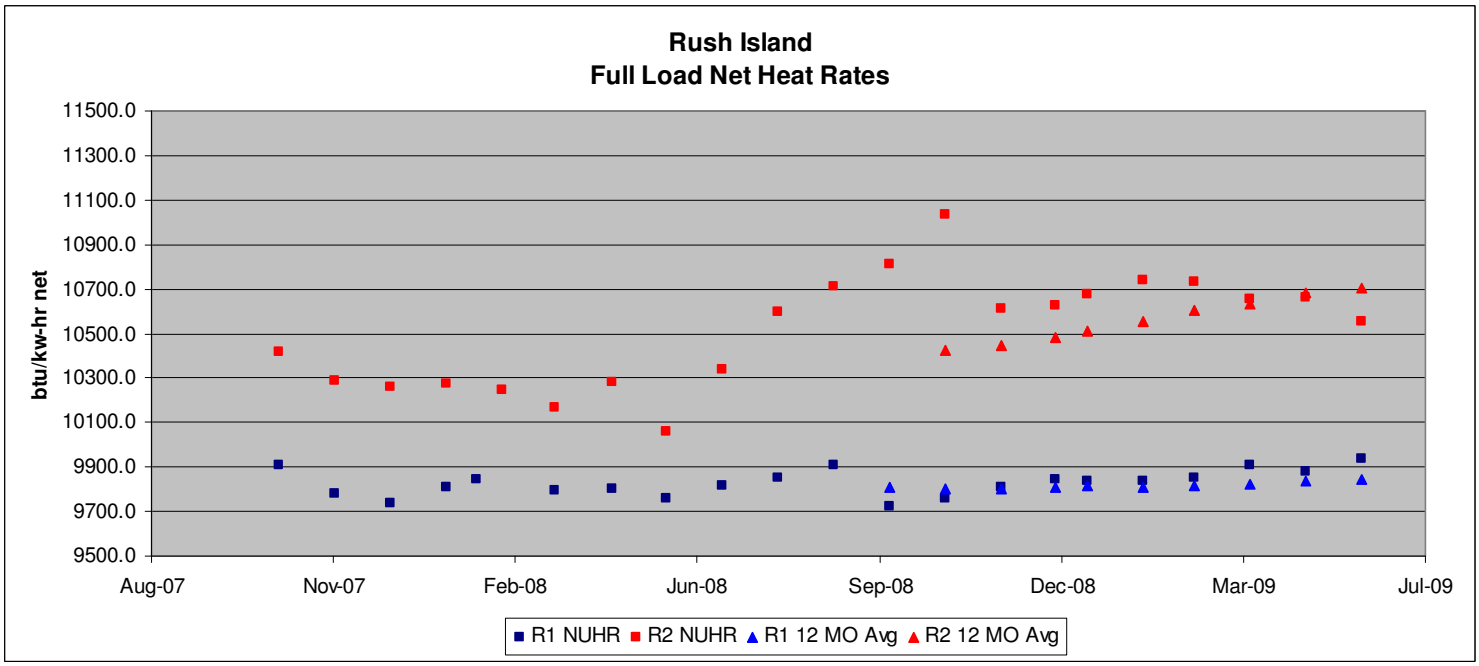
Mr. David Strubberg

From: Jim Barnett

Cc: Bob Meiners, Andy Williamson, Paul Starks, Greg Vasel, Gary Blessing, Mike Clonts, Matt Wallace, Ken Stuckmeyer, Don Clayton, Jeff Shelton, Joe Sind, Jim Barnett, Scott Hixson, Glenn Tiffin, Fred Kutilek, Tom Ziegler, Jeff Colter, Tim Finnell, Scott McCormack, Mike Kobel

Re: Rush Island June 2009 Performance Report

The last report was on June 19, 2009 and covered operation through May 2009. The information provided within this report covers unit operation from the last report through June 2009.



The heat rate KPI data through June is summarized in the table below.

Plant	2009 Actual	Threshold	Target	Stretch
Rush Island	10264	10186	10066	9996

Executive Summary

- Unit 1/Unit 2 Heat Rates remain consistent with what was seen in last month's report.
- As Unit 1 backpressure continues to increase, due to rising river temperatures and condenser cleanliness degradation Gross Load at VWO also continues to decrease because of the cross over pressure limitation.
- Unit 1 Boiler Draft is being operated at -0.75 in H2O instead of -0.5 in H2O which is typical for balanced draft units. Does not impact the Auxiliary power to any noticeable degree.
- The Main Steam Flow Curve on Unit 1 has not been updated in DCS since changing the first stage nozzle block in Fall of 2007, the increased flow area of 3% may explain some of the 4% difference in Feedwater to main steam flow ratio.
- At a first look the 1-3 feedwater heater may appear to have a leak, but after further investigation the DCA is also on the rise which may indicate a level issue.
- Unit 2 Corrected Load appears to be trending downward starting around the June 25th.
- 2-3 Feedwater heater higher than expected DCA, suspect level issue.
- Unit 2 Main Steam Drain valve 2HV-905A is leaking thru. Discussions with other plants indicate typical operation with root valves closed on leaking high energy drains with similar functionality as Rush Island's 1(2)HV-905A/B's.

Action Items

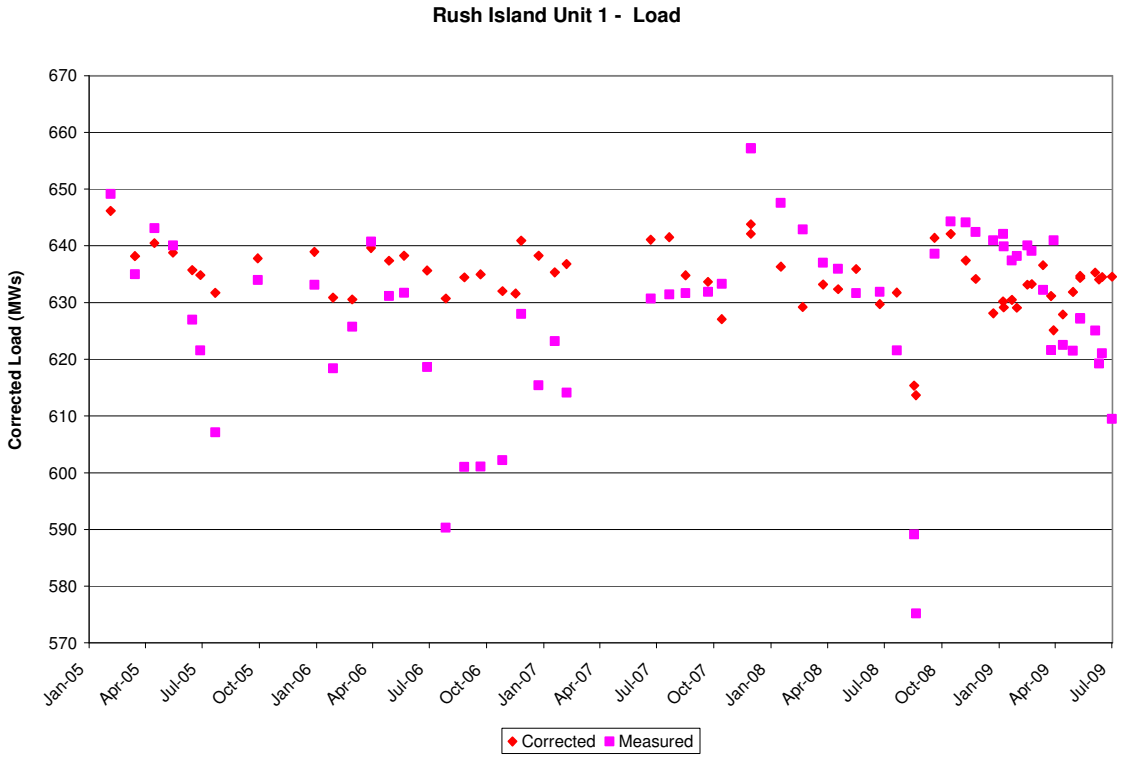
- Performance engineering to analyze operating data, fuel deliveries, and fuel lab analysis and provide a report on the 8800/8400 test burn.
- Performance engineering to work with the plant on JR'ing the correct instrumentation to be calibrated so the U2 FW flow indication can be validated.
- The Instrument & other issue spreadsheet has been updated and JRs initiated for instruments that are not functional. Could the plant please review and comment on if the JRs initiated are OK, or what should be done I:\RUSH\Performance\Instrument & other issues.xls
- Performance engineering would like to be copied on notes from morning meetings.
- Performance engineering working with plant on trouble shooting #5 heater level and high DCA's.
- Performance engineering working with Plant Controls engineer to correct Steam Flow Curve in DCS after the First Stage Nozzle block change out.

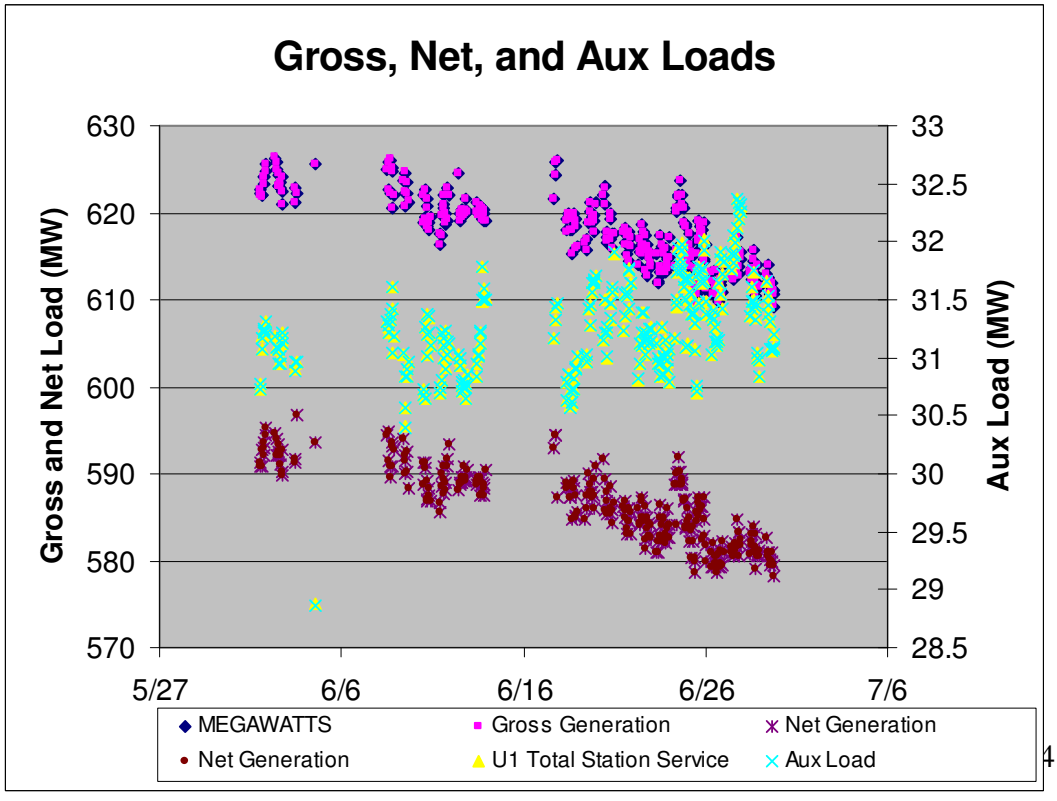
Summary of Performance Report for:

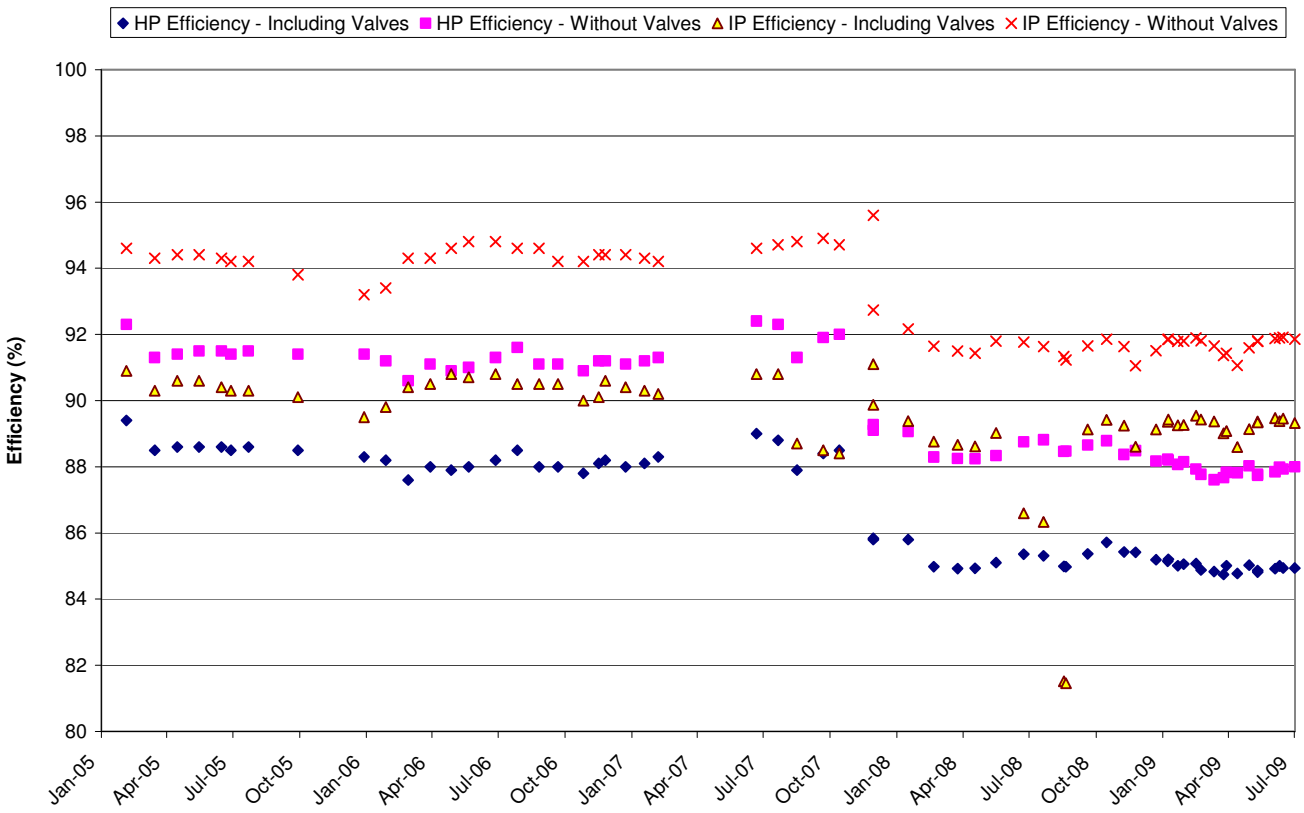
Plant	Rush Island				
Unit	1				
Period	6/1/09	to	7/1/09		
			Jun-09	May-09	Jun-08
Full Load Performance					
Hours of Data			273	193	329
			Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW		617.6	618.5	632.9
AUX POWER	MW		31.3	30.6	30.7
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9934.1	9878.0	9814.4
Boiler Efficiency Actual	%		86.3	86.2	86.5
CONTROL VALVE POSITION LVDT	%		100.6	100.4	99.9
FEEDWATER TEMP TO ECON	degF		493.8	493.4	496.8
FEEDWATER TEMP TO HTR 1	degF		445.1	444.5	446.8
HP Turbine Efficiency Actual	%		85.0	84.9	85.4
IP Turbine Efficiency Corrected	%		89.2	89.3	91.5
Condenser Pressure	inHga		3.2	2.6	2.8
AIRHTR-A GAS OUTLET TEMP	degF		312.2	300.0	300.1
AIRHTR-B GAS OUTLET TEMP	degF		315.2	309.1	304.8
AMBIENT AIR TEMP	degF		84.0	71.8	80.0
CIRC WTR TEMP TO LP CONDB	degF		77.6	66.6	75.3
CIRC WTR TEMP TO LP CONDB	degF		75.9	64.9	73.7
Minimum River Temperature	degF		75.9	64.9	73.7
FWH 1 Temperature Rise	degF		48.8	49.0	50.0
Net Load	MW		586.3	587.9	602.2
Average Exit Gas Temperature	degF		313.7	304.5	302.5
Aux Power	%		5.1	4.9	4.9
Gross Unit Heat Rate	BTU/KW-HR		9431.2	9389.2	9337.9
Gross Turbine Heat Rate	BTU/KW-HR		8142.7	8094.9	8075.6
Measured Feedwater Flow	KPPH		4200.2	4156.2	4339.1
Calc Steam Evaporated	KPPH		4188.4	4150.4	4334.1
Steam Flow From First Stage	KPPH		4042.6	3995.2	4126.2
FW/Steam			1.04	1.04	1.05
Steam/Load			6.55	6.46	6.52
FW/Load			6.80	6.72	6.86

Unit 1 Observations

The following two chart(s) show the continued degradation of the Gross and Net load on Unit 1 due to the cross over limitation and the increase in condenser backpressure. As can be seen below there is basically no significant change in the corrected load, but the gross and net continue to decrease because the decrease in throttle pressure/flow due to the crossover limitation.

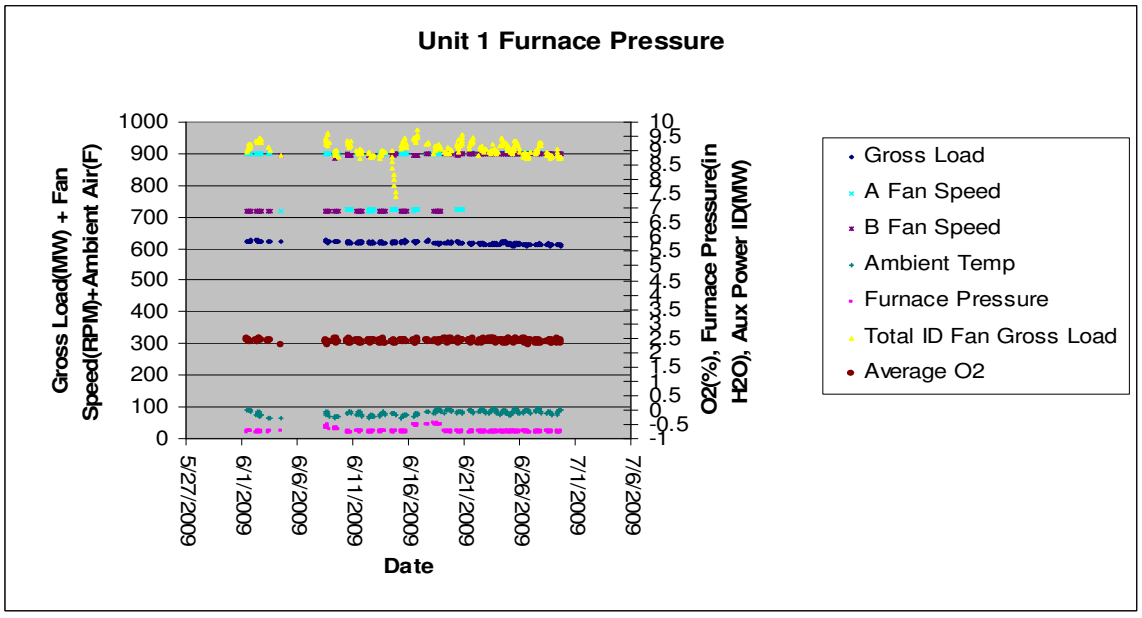




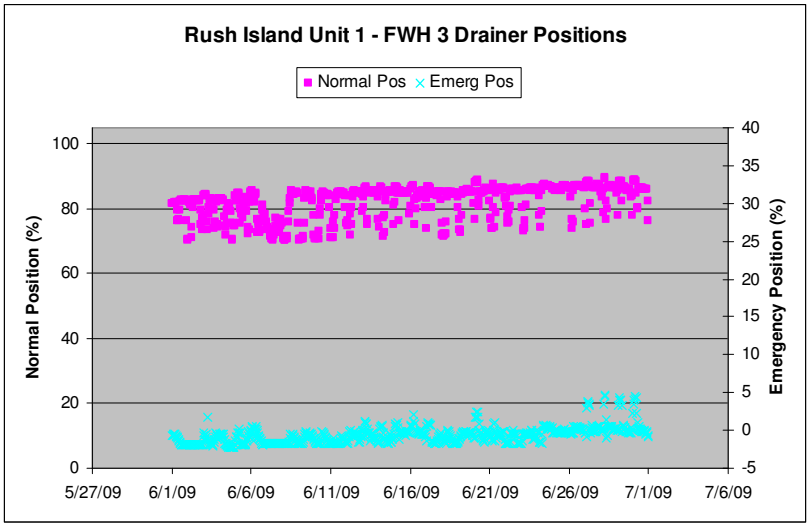


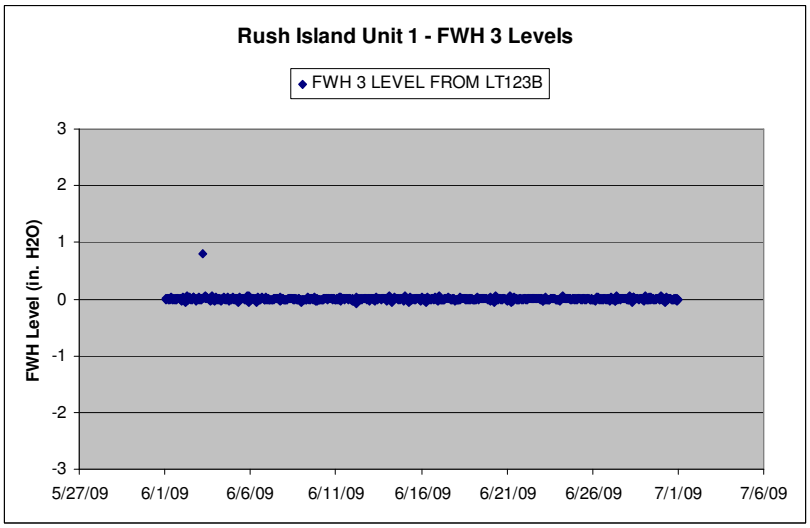
Turbine efficiencies do not seem to be dropping to any significant degree.

The unit 1 boiler furnace draft set-point is being operated at -0.75 in H2O, instead of what is typically seen on balanced draft units -0.5 in H2O. After looking at the auxiliary power for the A/B ID's there is no noticeable change observed depending on whether you are operating at -0.5 in H2O or -0.75 in H2O. After discussion with plant personnel, the plant is operating in this manner for additional personal protection, while working around boiler and maintaining sootblowers.

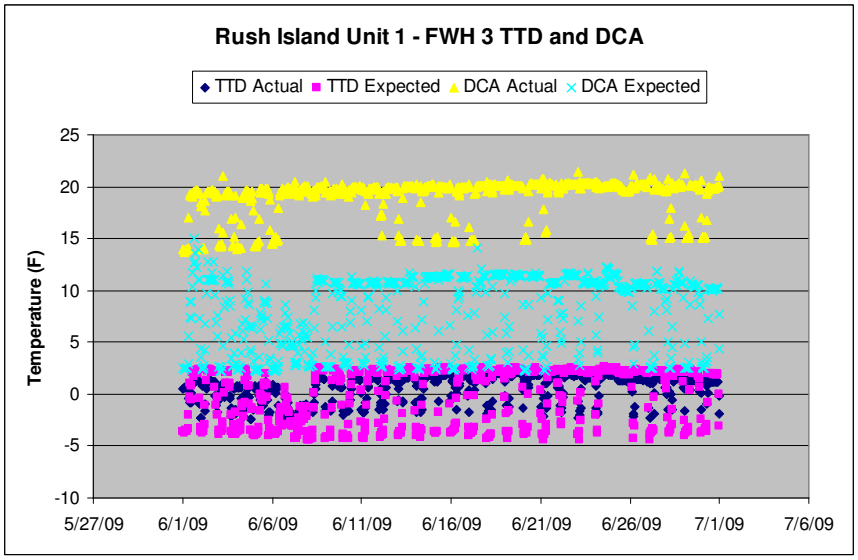


The 1-3 feedwater heater appeared to have a leak, based on the drainer valve position required to maintain the same heater level over the month of June.





In addition to looking at the normal drainer position, if the DCA on 1-3 heater is trended for the month you can see that the DCA is also on the rise which more than likely indicates a drift in the level instrumentation.

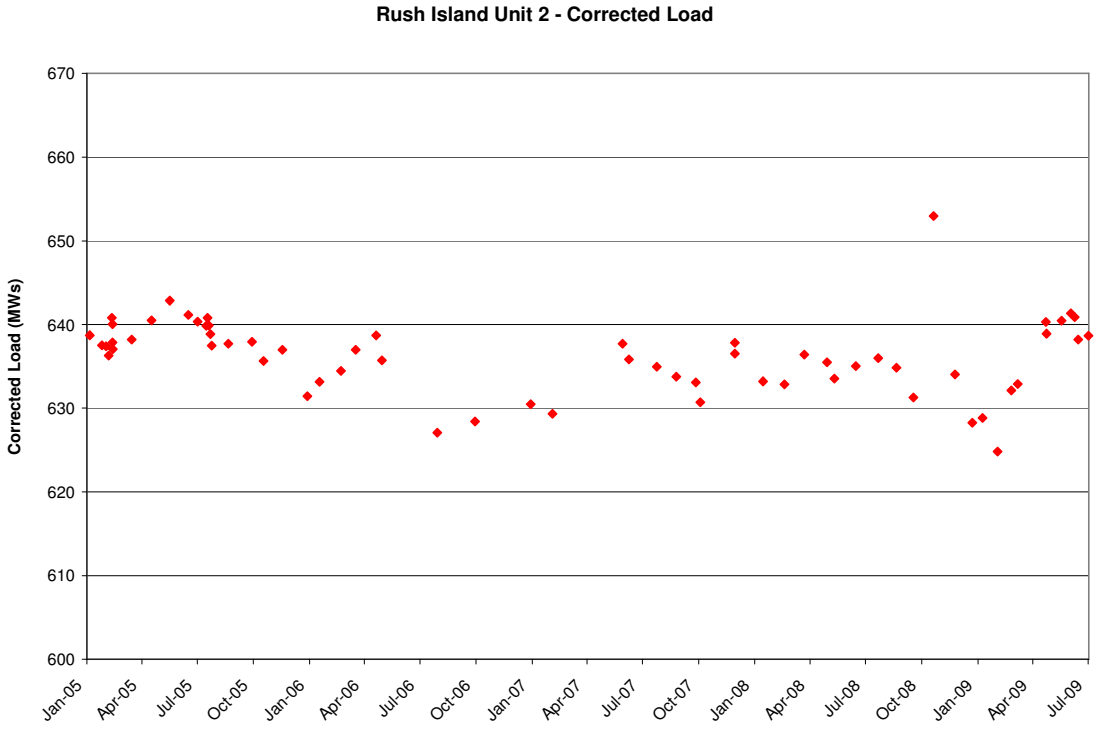


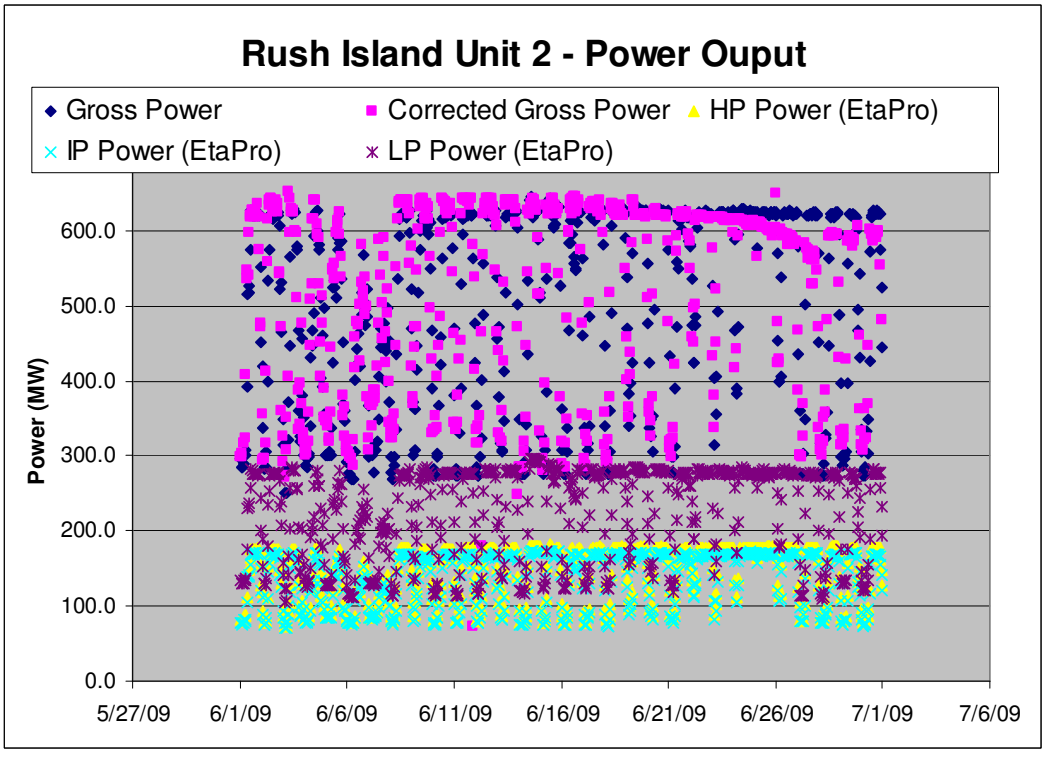
Summary of Performance Report for:

Plant	Rush Island				
Unit	2				
Period	6/1/09	to	7/1/09		
			Jun-09	May-09	Jun-08
Full Load Performance					
Hours of Data			284	178	224
			Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW		622.9	612.9	616.0
AUX POWER	MW		36.2	35.8	35.9
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		10554.5	10663.6	10339
Boiler Efficiency Actual	%		86.1	85.9	85.6
CONTROL VALVE POSITION LVDT	%		99.8	99.8	100.2
FEEDWATER TEMP TO ECON	degF		488.1	485.9	490
FEEDWATER TEMP TO HTR 1	degF		443.9	441.7	442
HP Turbine Efficiency Actual	%		87.7	88.0	89.9
IP Turbine Efficiency Corrected	%		92.2	92.5	91.4
Condenser Pressure HP	inHga		2.6	2.0	2.4
AIRHTR-A GAS OUTLET TEMP	degF		312.3	311.4	317
AIRHTR-B GAS OUTLET TEMP	degF		334.6	322.1	329
AMBIENT AIR TEMP	degF		85.5	72.6	80.8
CIRC WTR TEMP TO LP CONDB	degF		77.7	65.3	75.1
CIRC WTR TEMP TO LP CONDB	degF		77.6	65.2	75.1
Minimum River Temperature	degF		77.6	65.2	75.1
FWH 1 Temperature Rise	degF		44.2	44.2	48.2
Net Load	MW		586.6	577.2	580.2
Average Exit Gas Temperature	degF		323.4	316.8	323.0
Aux Power	%		5.8	5.8	5.8
Gross Unit Heat Rate	BTU/KW-HR		9940.5	10041.3	9737
Gross Turbine Heat Rate	BTU/KW-HR		8557.4	8628.0	8333
Measured Feedwater Flow	KPPH		4399.0	4333.3	4239
Calc Steam Evaporated	KPPH		4470.3	4394.9	4294
Steam Flow From First Stage	KPPH		4043.7	3934.5	3982
FW/Steam			1.09	1.10	1.06
Steam/Load			6.49	6.42	6.46
FW/Load			7.06	7.07	6.88

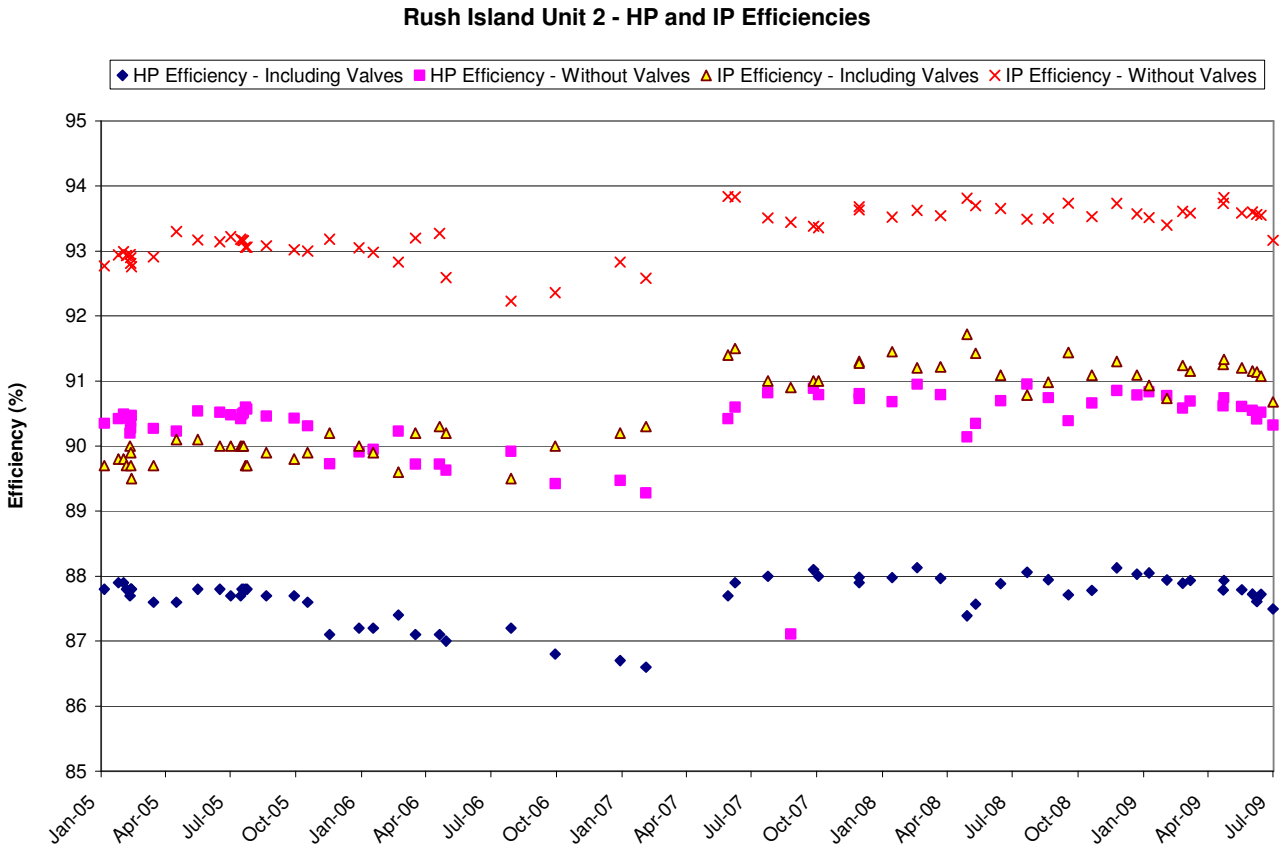
Unit 2 Observations

Corrected load appears to have taken approximate 2 MW drop from when data was obtained last month. Performance engineering has just started to investigate the reason behind this and plans to have more details with in the next couple of reports. The corrected load appears to have started to drop off around the 25th of June. Note that the corrected loads listed below does not make corrections for turbine efficiency degradation so, the degradation of the efficiencies might be the major contributor to the drop in corrected load, but additional analysis is required for validation.

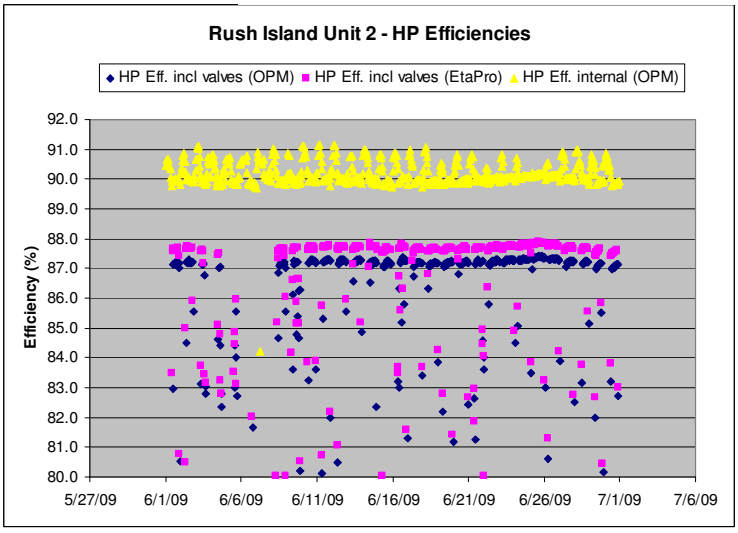


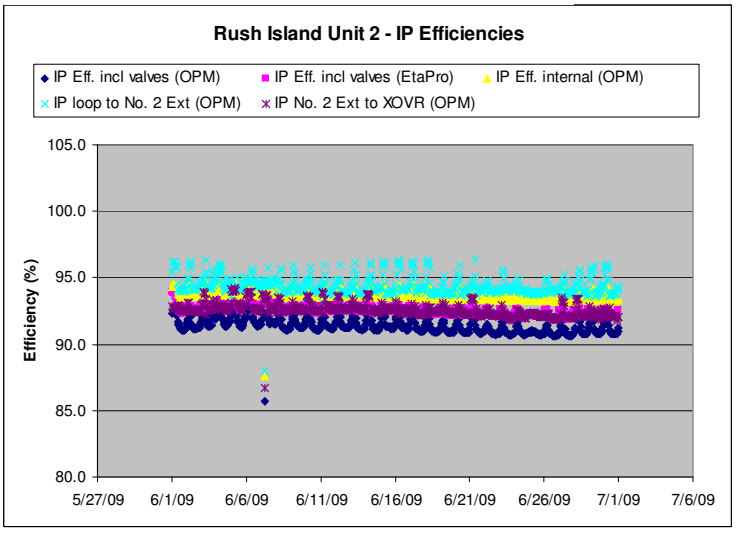


The HP/IP efficiencies seem to continue to drop off. The HP's seem to have held fairly constant until around the 06/26/09, vs. the IP efficiencies continued a slow degradation the entire month.



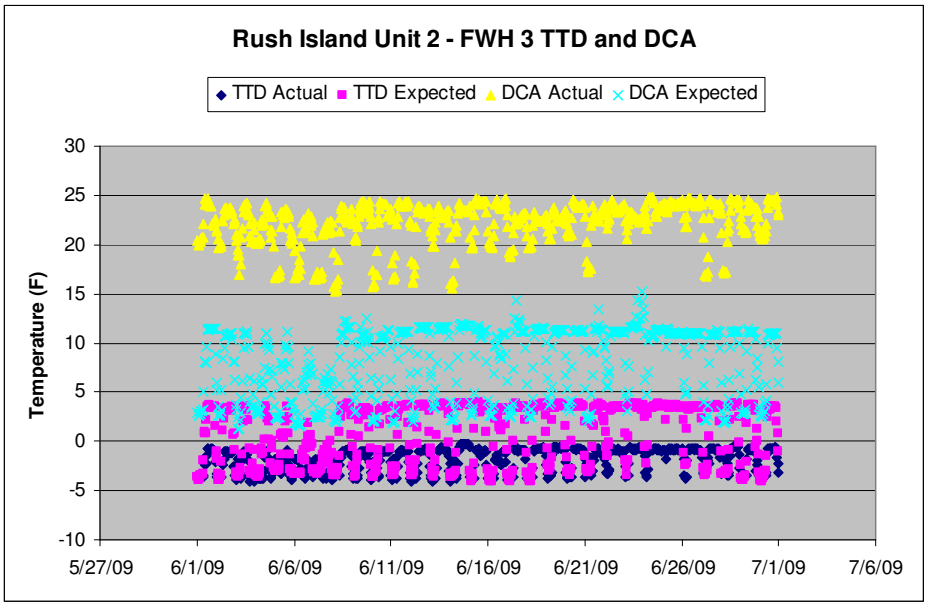
The above chart is a snap shot that is collected on a monthly basis with the turbine at VWO and approximately full load/2400 psig throttle pressure which gives a broader look at the turbine efficiencies.



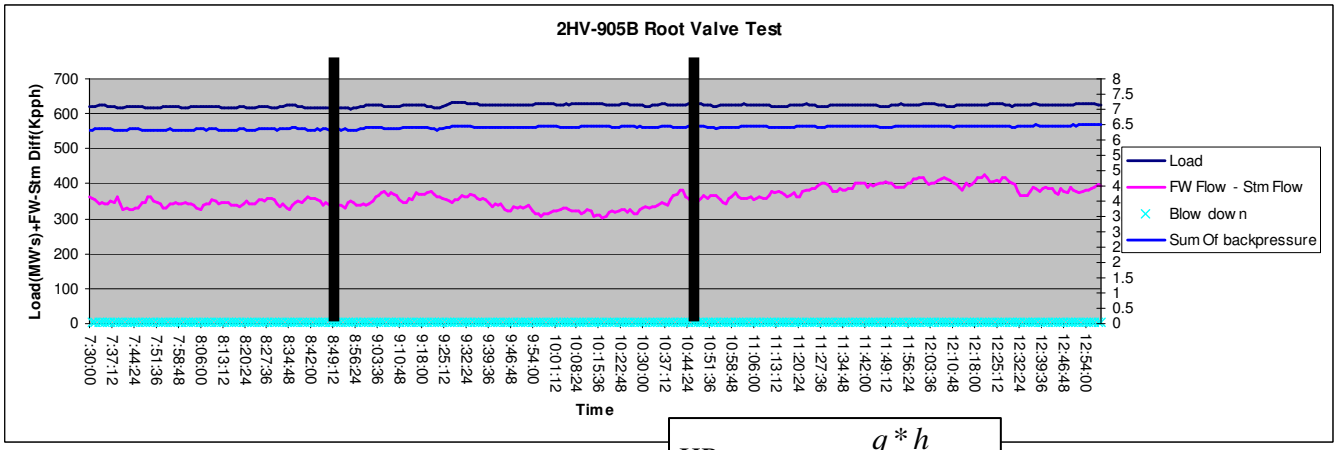


The above two charts include the entire month of June's efficiencies, at all loads, as you can see the HP drops around the 25th of the month and the IP has a more gradual drop thru out the entire month.

The DCA for the 2-3 Feedwater heater is running approximately 10 degrees higher than the expected temperature, which may indicate a level problem. In addition the TTD is running lower than expected which would also indicate a level problem.



Based on testing that was completed on 06/24/09 and 06/25/09 on 2HV-905B/Mainsteam drain valve there appears to be an approximate 42kpph of leakage thru this valve. The high energy drain is estimated at having an enthalpy of 1468 btu/#, so if this valve is leaking to this degree performance engineering would expect an 100.5 btu/kw-hr heat rate impact. Based on recent conversations with other plants that have similar start-up and drain systems on their main steam leads typical operation is to close the root valves when the a motor operated drain valve is found leaking until repairs can be completed on valves with the same functionality as the RI 1(2)HV-905A/B's.



$$HR_{impact} = \frac{q * h}{GrossLoad_{Unit}}$$

	Feedwater to steam mismatch	Gross Load			
During Test	340.5056505	619.05171			
After Test	382.8547258	619.07369	q(#/hr) =	Flow Rate	
			h(BTU/#) =	Enthalpy	
difference	42.34907525	kpph			
Estimated Enthalpy	1468.293819	Btu/lbm	Gross Load(Kw) =		619051.7
Heat Rate Impact	100.4537729	btu/kw-hr			

6/23/2009

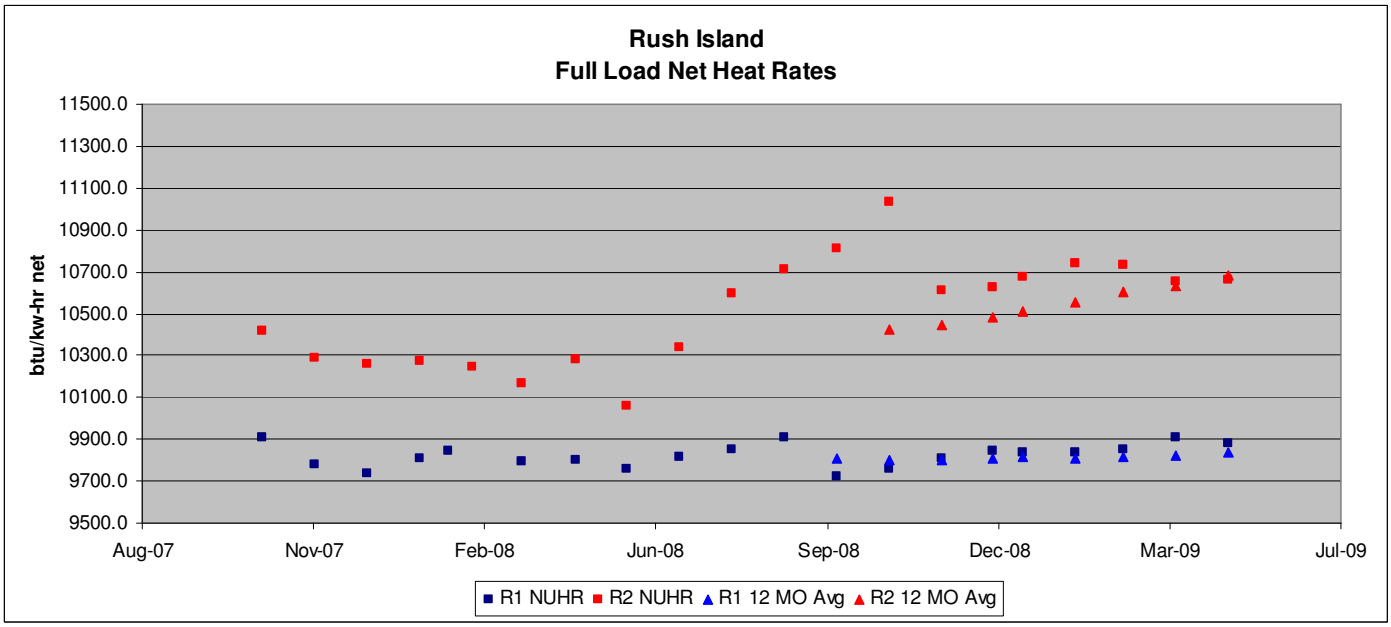
Mr. David Strubberg

From: Jim Barnett

Cc: Bob Meiners, Andy Williamson, Paul Starks, Greg Vasel, Gary Blessing, Mike Clonts, Matt Wallace, Ken Stuckmeyer, Don Clayton, Jeff Shelton, Joe Sind, Jim Barnett, Scott Hixson, Glenn Tiffin, Fred Kutilek, Tom Ziegler, Jeff Colter, Tim Finnell, Scott McCormack, Mike Kobel

Re: Rush Island May 2009 Performance Report

The last report was on May 18, 2009 and covered operation through April 2009. The information provided within this report covers unit operation from the last report through May 2009.



The heat rate KPI data through May is summarized in the table below. The potential feedwater flow indication issue (high indicated flow) is contributing to the plant heat rate being higher than the KPI target.

Plant	2009 Actual	Threshold	Target	Stretch
Rush Island	10270	10186	10066	9996

Executive Summary

- Unit 1 Heat Rate remains consistent with what was seen in last month's report. Unit 2 Heat Rate has decreased by approximately 1% following the recent SBO but remains elevated as compared to last year.
- Valve repairs and replacements during the Unit 2 outage did not result in a significant decrease in the mismatch between MS and FW flow. Performance engineering suspects feedwater flow instrumentation issues on the unit.
- Unit 1 load degradation appears to be due to LP turbine performance. This will be discussed during the upcoming quarterly performance meeting.
- Performance engineering has received the coal analysis from the test burn performed in early April and is in the process of evaluating the results.

Action Items

- Performance engineering to analyze operating data, fuel deliveries, and fuel lab analysis and provide a report on the 8800/8400 test burn.
- Performance engineering to work with the plant on JR'ing the correct instrumentation to be calibrated so that the U2 FW flow indication can be validated.
- The Instrument & other issue spreadsheet has been updated and JRs initiated for instruments that are not functional. Could the plant please review and comment on if the JRs initiated are OK, or what should be done I:\RUSH\Performance\Instrument & other issues.xls
- Performance engineering would like to be copied on notes from morning meetings.

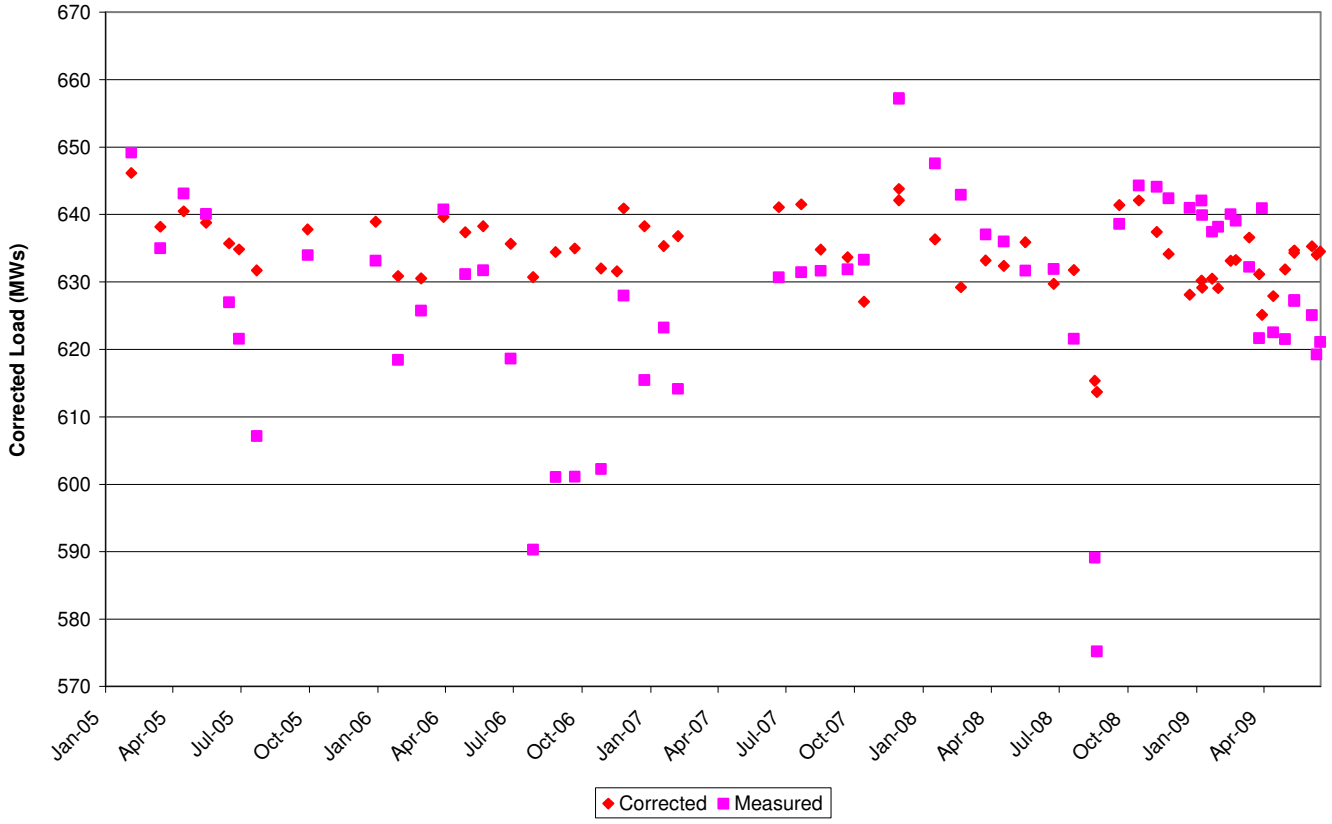
Unit 1 Observations

The following observations were noted regarding performance on Unit 1:

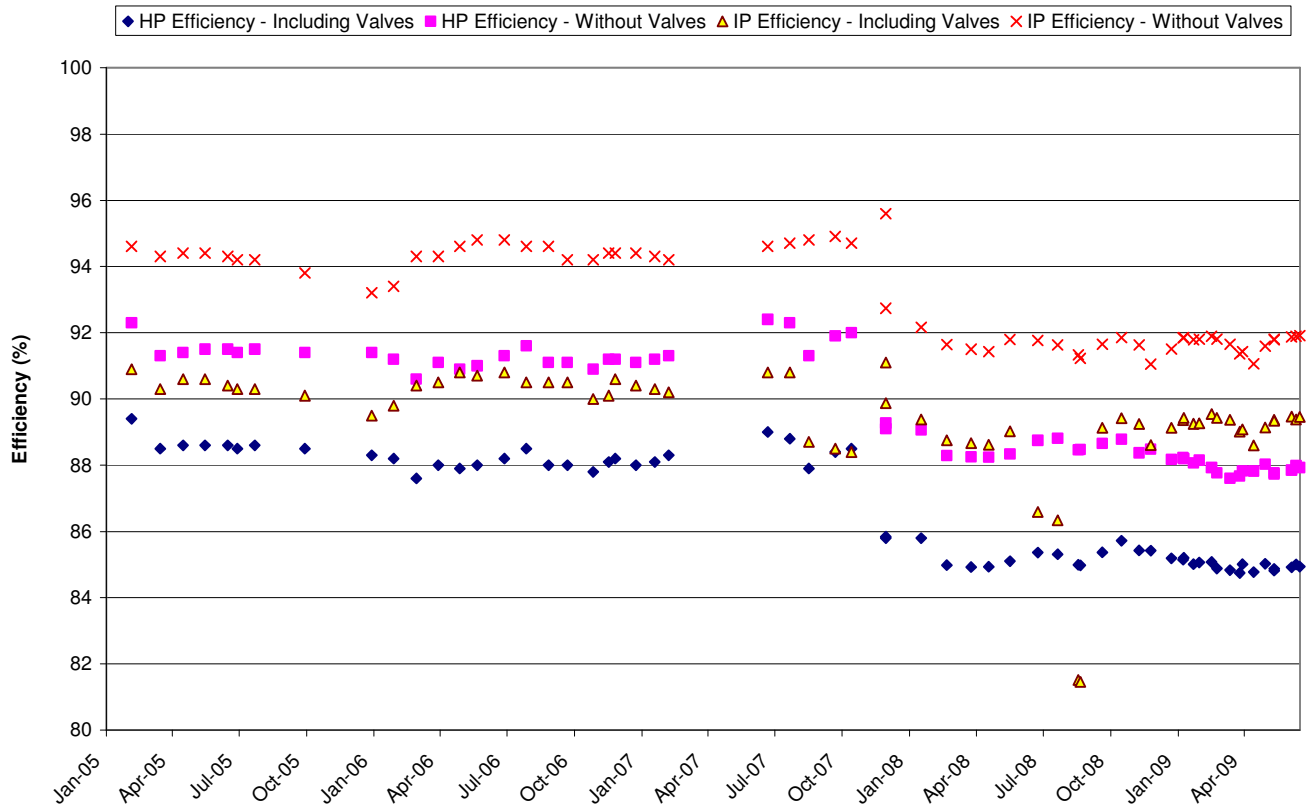
- Most performance parameters remained unchanged from April to May.
- Performance engineering has reviewed the performance of the unit in relation to the current crossover pressure limitation. This review indicates potential issues with the first couple of stages of the LP turbine which increases pressure upstream of the LP and hence leads to an elevated crossover pressure. The data points to a loss of efficiency and increased stage pressures in the LP turbine due to turbine deposits. Additional data and prose is provided below. This topic will be discussed at the upcoming performance meeting in late June.
- On average, the condenser pressure on Unit 1 is 0.4 in Hga higher than on Unit 2 (0.3 in HgA by hotwell temperature indication).
- The DCA on both the 5A and 5B FWH are higher than expected (50F actual versus 12F expected). The normal drainer on the 5A is open 100% (and has been for some time (at least 1/1/2008) and the dump valve is open 20%. The normal drainer on the 5B is open about 85% and the dump valve is closed. A level change was made on the 5A heater last August that lowered level to the same as that of the 5B. This coincided with an increase in the dump valve position on the heater. Are these heaters being operated at their design level? It is noted that the calculated extraction flow to these heaters is about 20% higher than those shown on the top load heat balance.

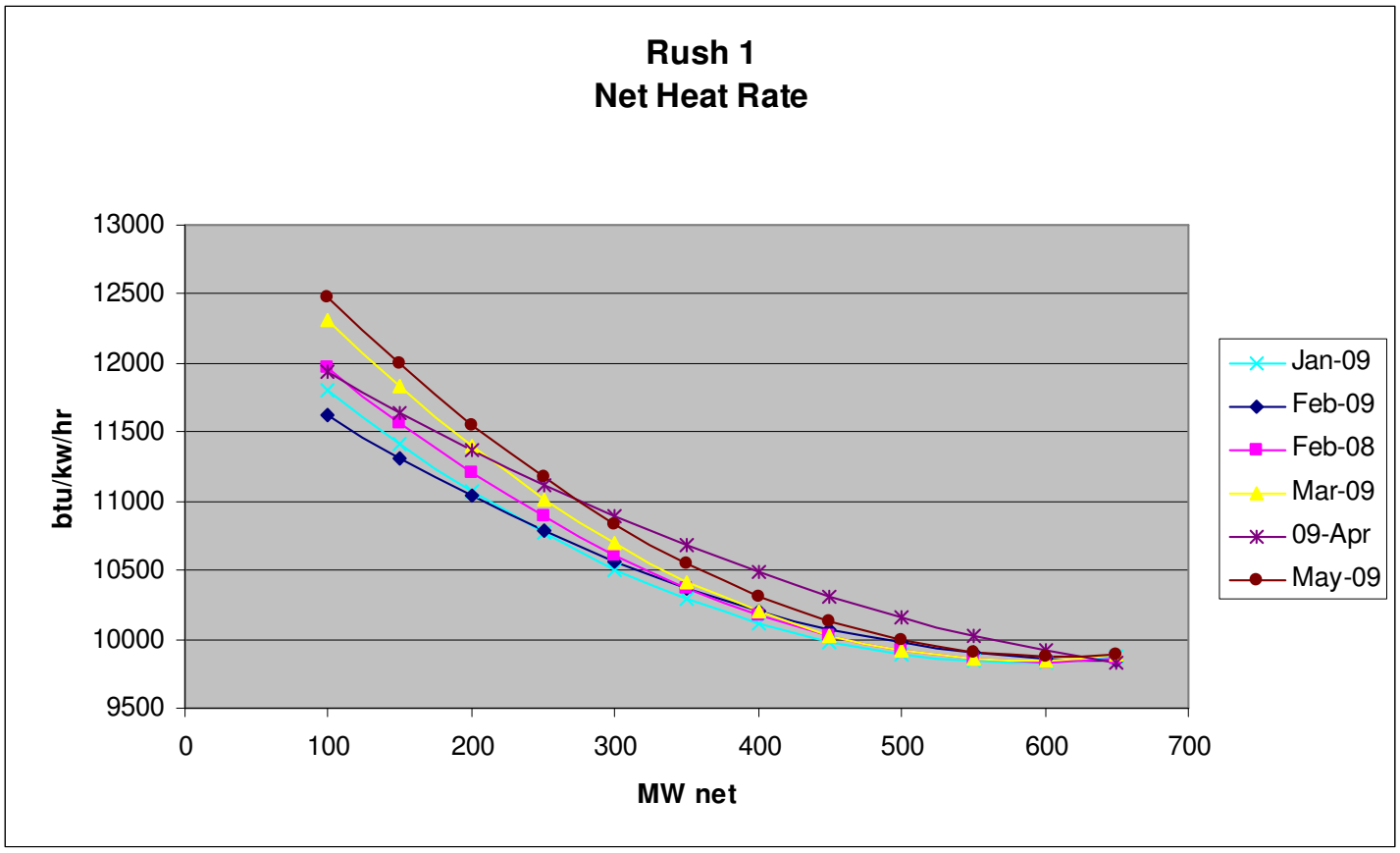
Summary of Performance Report for:						
Plant	Rush Island					
Unit	1					
Period	5/1/09	to	6/1/09			
			May-09		Apr-09	May-08
Full Load Performance						
Hours of Data			193		163	231
			Averages		**Averages**	**Averages**
GENERATOR MEGAWATTS	MW		618.5		626.1	634.8
AUX POWER	MW		30.6		32.4	29.6
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9878.0		9906.2	9758.4
Boiler Efficiency Actual	%		86.2		86.5	86.4
CONTROL VALVE POSITION LVDT	%		100.4		99.9	100.1
FEEDWATER TEMP TO ECON	degF		493.4		495.0	496.0
FEEDWATER TEMP TO HTR 1	degF		444.5		446.2	446.6
HP Turbine Efficiency Actual	%		84.9		84.8	84.9
IP Turbine Efficiency Corrected	%		89.3		88.7	92.7
Condenser Pressure	inHga		2.6		2.0	2.1
AIRHTR-A GAS OUTLET TEMP	degF		300.0		292.9	287.1
AIRHTR-B GAS OUTLET TEMP	degF		309.1		309.5	294.8
AMBIENT AIR TEMP	degF		71.8		55.6	65.7
CIRC WTR TEMP TO LP CONDB	degF		66.6		53.2	61.7
CIRC WTR TEMP TO LP CONDB	degF		64.9		51.6	60.1
Minimum River Temperature	degF		64.9		51.6	60.1
FWH 1 Temperature Rise	degF		49.0		48.8	49.3
Net Load	MW		587.9		593.7	605.2
Average Exit Gas Temperature	degF		304.5		301.2	290.9
Aux Power	%		4.9		5.2	4.7
Gross Unit Heat Rate	BTU/KW-HR		9389.2		9393.6	9303.1
Gross Turbine Heat Rate	BTU/KW-HR		8094.9		8121.4	8037.6
Measured Feedwater Flow	KPPH		4156.2		4235.3	4277.1
Calc Steam Evaporated	KPPH		4150.4		4223.5	4271.5
Steam Flow From First Stage	KPPH		3995.2		4054.7	4064.7
FW/Steam			1.0		1.0	1.1
Steam/Load			6.5		6.5	6.4
FW/Load			6.7		6.8	6.7

Rush Island Unit 1 - Load

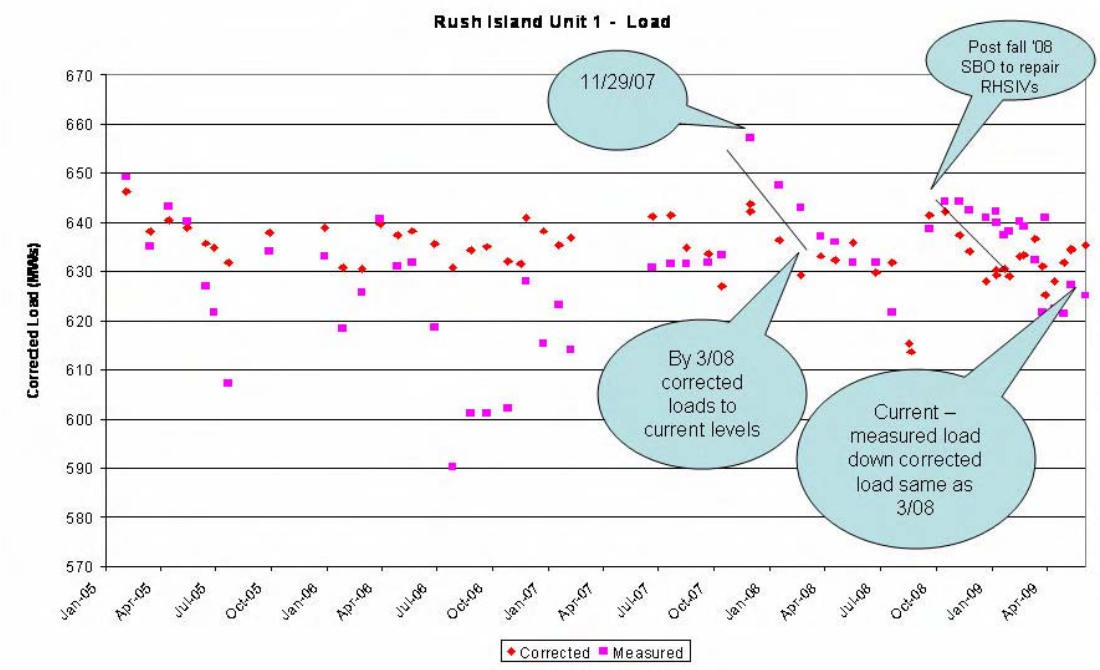


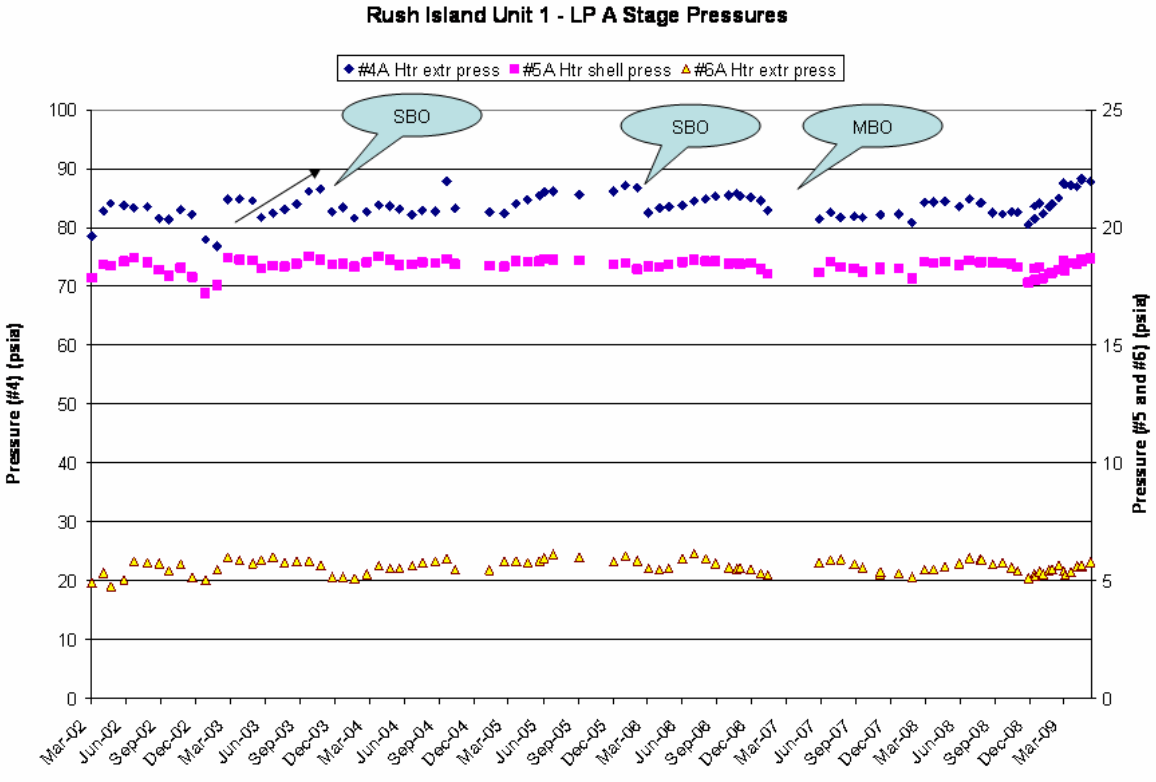
Rush Island Unit 1 - HP and IP Efficiencies





Note that the heat rate on unit 1 has remained fairly consistent at the higher loads in 2009.





These two plots show data relevant to the crossover pressure limitation data review. The top plot shows measured and corrected load over time. Corrected load on the unit was high immediately following the HP/IP outage in the fall of 2007. However, the corrected load dropped off to around 630 MWs fairly quickly (which is about equal to the current corrected load on the unit). The achievable load on the unit has dropped off at in 2009.

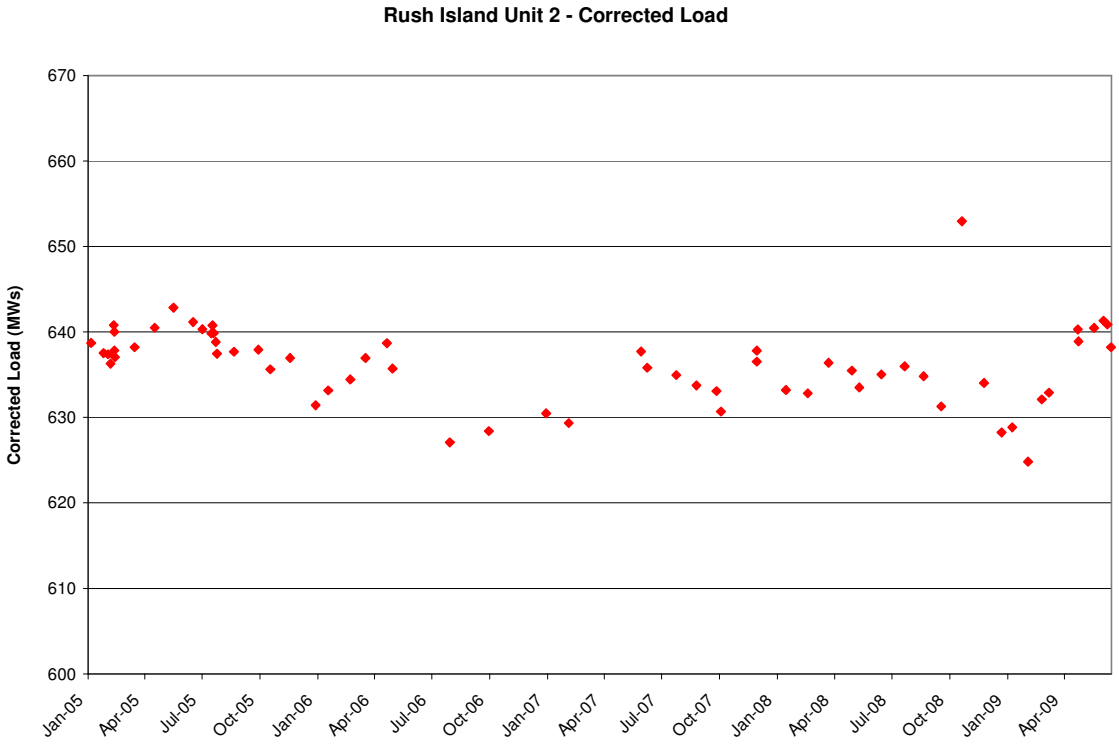
The bottom plot shows stage pressures in the A LP turbine. As shown, the stage pressures increase over time (especially at the DA extraction) and seem to recover (lower) during outages. However, the pressures did not drop following the outage in May. Crossover pressure is increasing due to the DA extraction pressure "backing up."

Unit 2 Observations

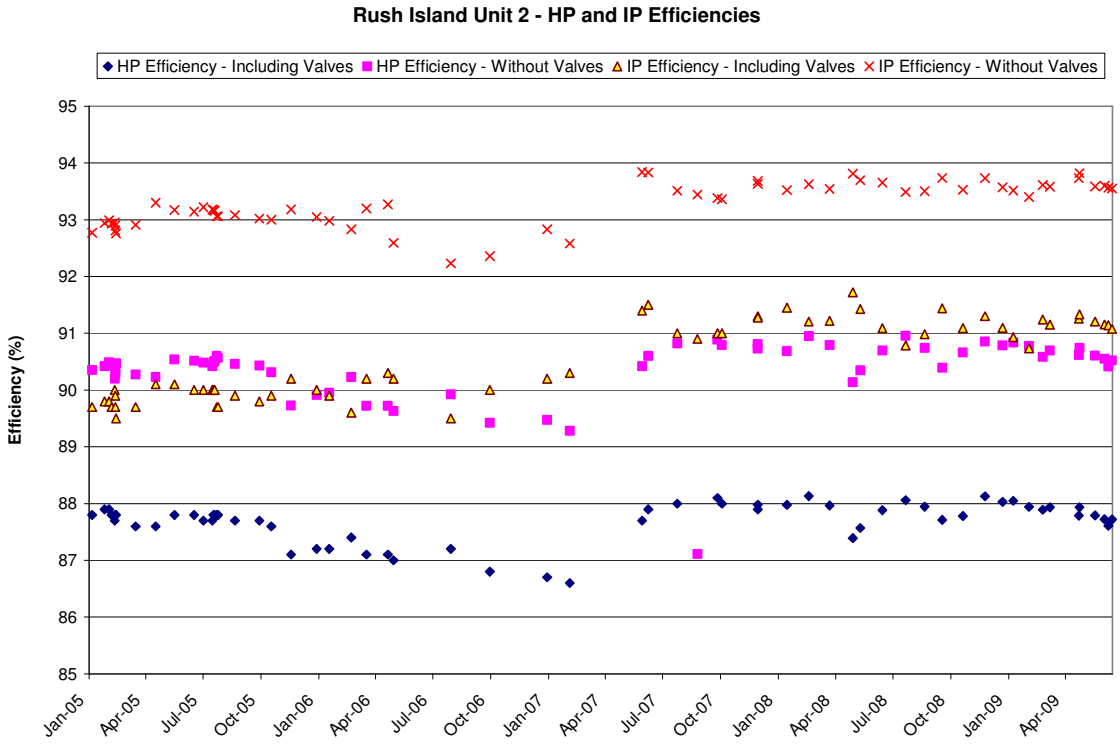
The following observations were noted regarding performance on Unit 2:

- The heat rate remains elevated with a large mismatch between feedwater and steam flow. Further discussion of a potential issue with the unit's feedwater flow indication is provided below.
- Aux. load on Unit 2 is much higher than on unit 1 (5.8% versus 4.9%), which is typical for Unit 2 since the convective pass modifications that were done on Unit 1 in 2007 have not yet been completed on Unit 2.
- The DCA on both the 5A and 5B FWH are higher than expected (50F actual versus 12F expected). The normal drainer on the 5A is open 100% (and has been for some time (at least 1/1/2008) and the dump valve is open 15%. The normal drainer on the 5B is open 100% (and has been for some time (at least 1/1/2008) and the dump valve is open 35%. Are these heaters being operated at their design level? It is noted that the calculated extraction flow to these heaters is about 30% higher than those shown on the top load heat balance.

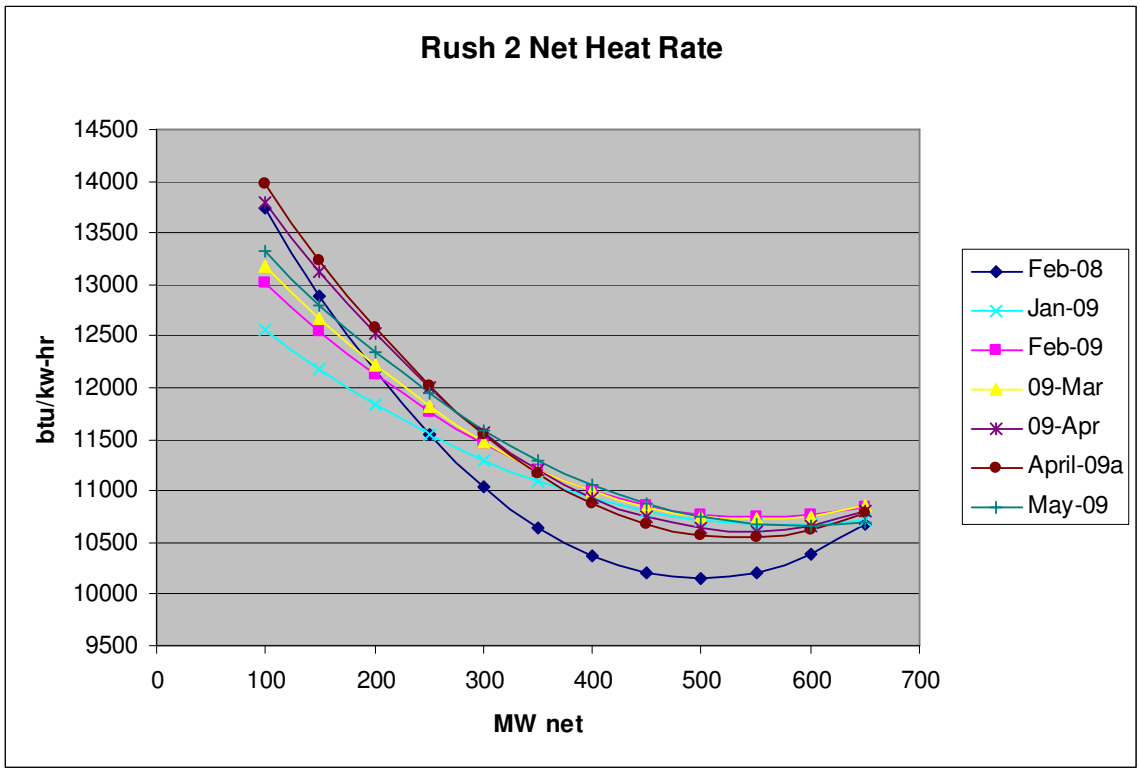
Summary of Performance Report for:						
Plant	Rush Island					
Unit	2					
Period	5/1/09	to	6/1/09			
			May-09		Apr-09	May-08
Full Load Performance						
Hours of Data			178		105	36
			Averages		**Averages**	**Averages**
GENERATOR MEGAWATTS	MW		612.9		624.5	611.9
AUX POWER	MW		35.8		36.1	34.6
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		10663.6		10652.1	10055.9
Boiler Efficiency Actual	%		85.9		85.6	85.7
CONTROL VALVE POSITION LVDT	%		99.8		99.8	100.1
FEEDWATER TEMP TO ECON	degF		485.9		488.9	489.4
FEEDWATER TEMP TO HTR 1	degF		441.7		443.7	441.5
HP Turbine Efficiency Actual	%		88.0		87.9	89.5
IP Turbine Efficiency Corrected	%		92.5		92.6	91.5
Condenser Pressure HP	inHga		2.0		1.8	1.7
AIRHTR-A GAS OUTLET TEMP	degF		311.4		311.7	295.8
AIRHTR-B GAS OUTLET TEMP	degF		322.1		326.5	307.3
AMBIENT AIR TEMP	degF		72.6		68.1	61.1
CIRC WTR TEMP TO LP CONDB	degF		65.3		58.2	61.3
CIRC WTR TEMP TO LP CONDB	degF		65.2		58.2	61.3
Minimum River Temperature	degF		65.2		58.2	61.3
FWH 1 Temperature Rise	degF		44.2		45.2	47.8
Net Load	MW		577.2		588.4	577.3
Average Exit Gas Temperature	degF		316.8		319.1	301.6
Aux Power	%		5.8		5.8	5.7
Gross Unit Heat Rate	BTU/KW-HR		10041.3		10035.8	9487.0
Gross Turbine Heat Rate	BTU/KW-HR		8628.0		8591.9	8128.8
Measured Feedwater Flow	KPPH		4333.3		4374.3	4113.1
Calc Steam Evaporated	KPPH		4394.9		4484.4	4151.8
Steam Flow From First Stage	KPPH		3934.5		4007.6	3935.7
FW/Steam			1.10		1.1	1.0
Steam/Load			6.42		6.4	6.4
FW/Load			7.07		7.0	6.7



The top plot shows corrected load on Unit 2. As shown, the corrected load increased about 8 MWs following the spring outage. This increase is judged to be partially attributable to the reduction in flow through leaking drain lines on the unit.

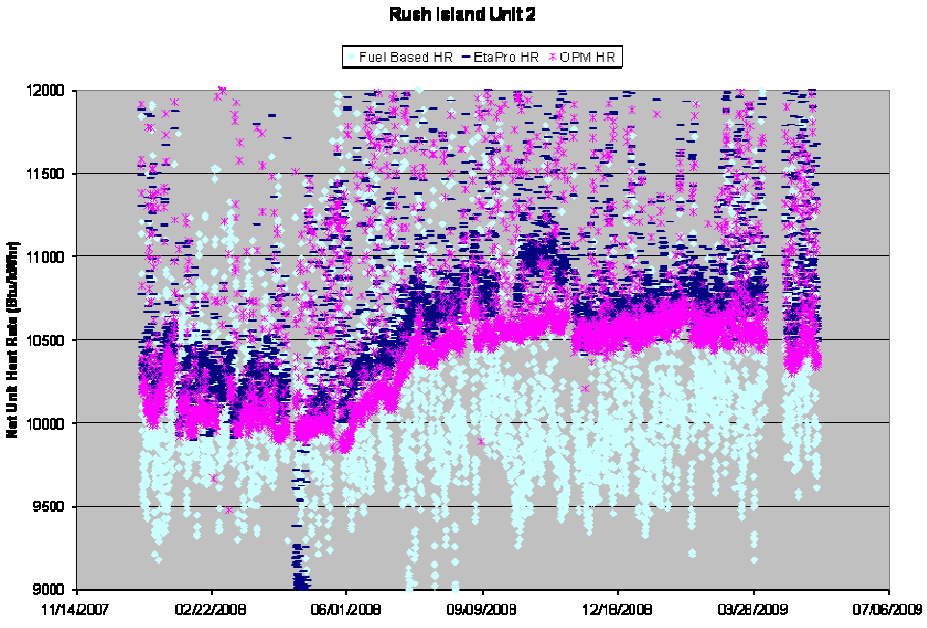


The bottom plot shows turbine efficiencies on Unit 2. As shown, the turbine efficiencies remained about the same following the spring outage.

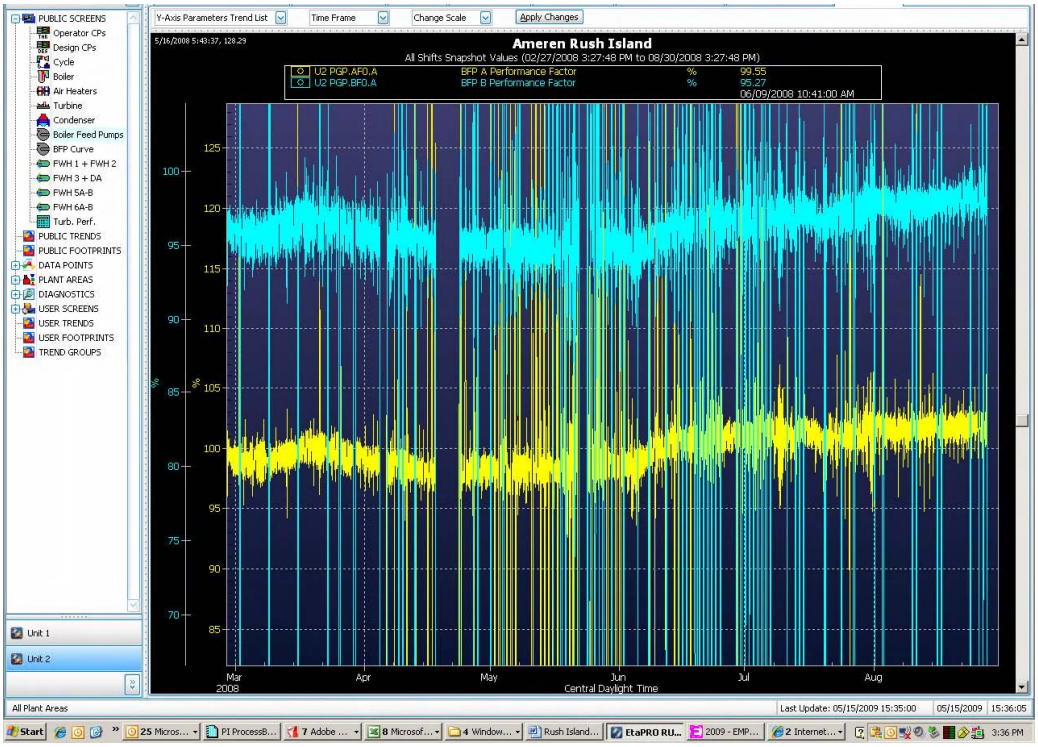


The above chart is a plot of the NUHR vs Net Load. April-09 plotted above is the entire month's data vs load and the April-09a is the April data post-outage. The post-outage data shows a slight decrease in NUHR. The data from May would indicate that the heat rate at high loads has returned to the before-outage levels.

When heat rate reductions were not observed on U2 following the recent outage, Performance Engineering took a look at the Heat Rate based on FW flow versus the heat rate based on fuel flow. Below is a chart of this data. As shown in the chart below, there was an increase in the heat rate based on the indicated FW flow in early June last year, but the fuel flow heat rate slope stays relatively shallow.

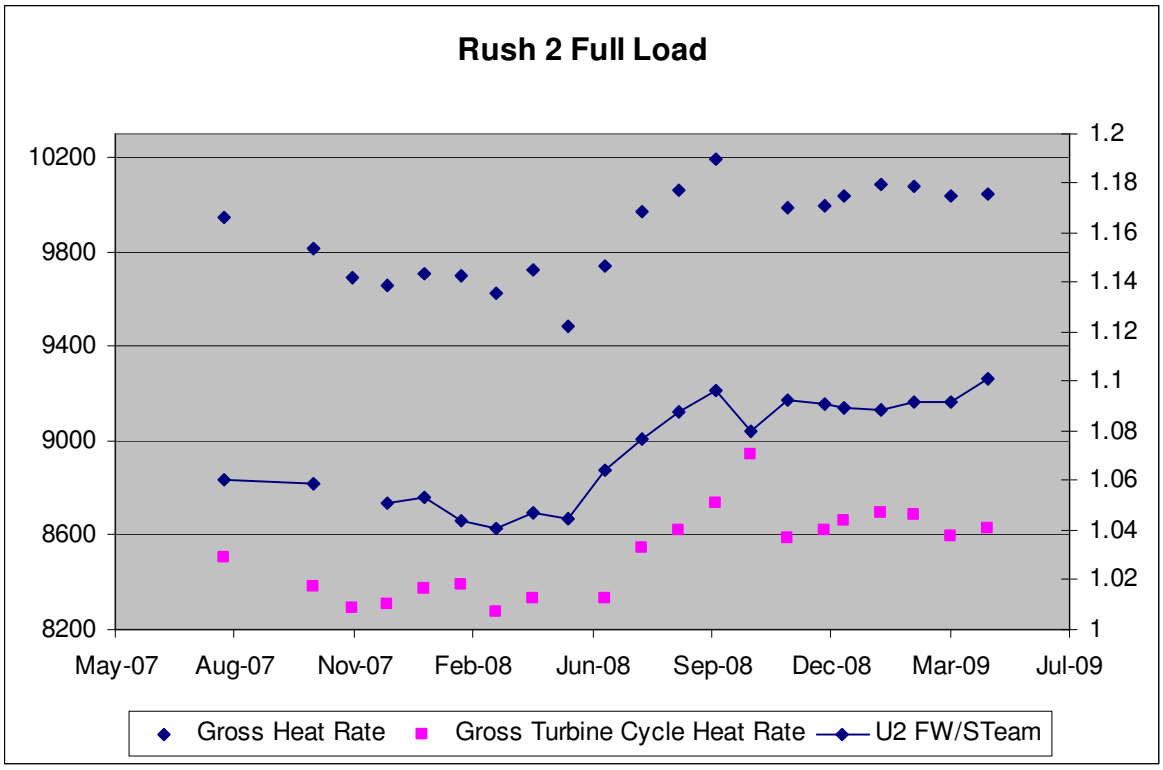


After seeing these results, Performance Engineering suspected an indication error with the feedwater flow measurement. To investigate further, Performance Engineering reviewed some boiler feedpump data. Below is a plot of the A and B boiler feed pump performance factors. Notice around the first part of June an increase in both the A and B pumps.



The pump performance factor is basically a ratio of corrected flow based on the rated speed to the actual speed to the corrected capacity at design head. Since variables involved to make this calculation are flow, pressure, and speed; any one of the field indicated values could be in error, but since the heat rate based on FW flow took a significant jump at approximately the same time that the pump performance factors trended up, performance engineering suspects there is a problem with the FW flow indication on U2 and requests a calibration of the instrumentation associated with feedwater flow. Performance engineering will investigate instruments that provide this indication and work with Rush Island plant to JR accordingly.

The above information was noted in last month's report. Below is a chart of feedwater to steam flow ratio, along with net and gross heat rate, over the last year. The information below shows a gradual trend and not a significant step change which points to either a gradual drift of 2FT-7A(1-3) &7B(1-3) flow transmitters.



5/18/2009

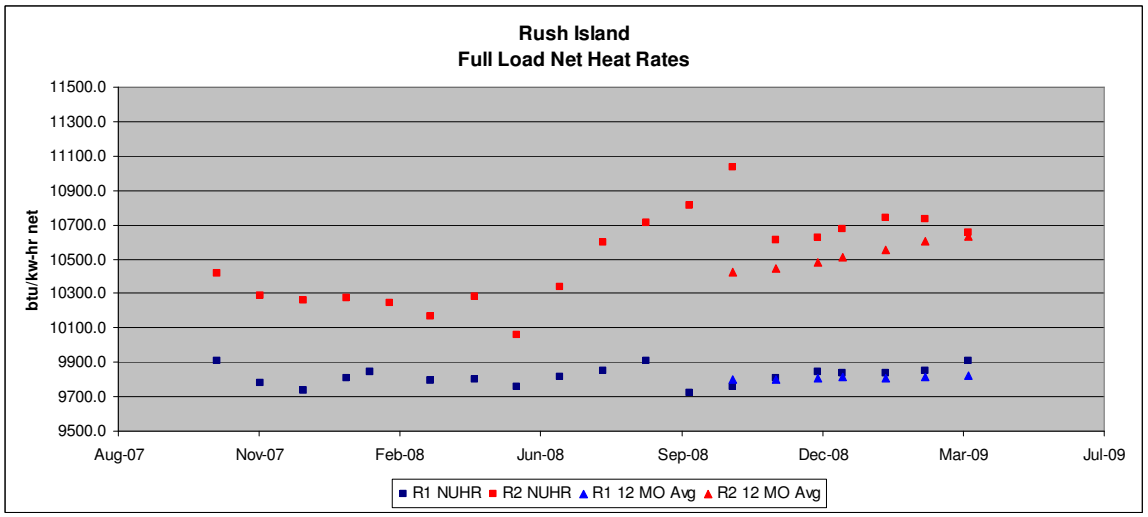
Mr. David Strubberg

From: Jim Barnett

Cc: Bob Meiners, Andy Williamson, Paul Starks, Greg Vasel, Gary Blessing, Mike Clonts, Matt Wallace, Ken Stuckmeyer, Don Clayton, Jeff Shelton, Jim Barnett, Scott Hixson, Glenn Tiffin, Fred Kutilek, Tom Ziegler, Jeff Colter, Tim Finnell, Scott McCormack, Mike Kobel

Re: Rush Island April 2009 Performance Report

The last report was on April 9, 2009 and covered operation through March 2009. The information provided within this report covers unit operation from the last report through April 2009.



Plant	2009 Actual	Threshold	Target	Stretch
Rush Island	10276	10186	10066	9996

Executive Summary

- Unit 1 Heat Rate remains consistent with what was seen in last month's report. Unit 2 Heat Rate has decreased by approximately 1% following the recent SBO.
- Valve repairs and replacements during the Unit 2 outage did not result in a significant decrease in the mismatch between MS and FW flow. Suspect Feedwater flow instrumentation.
- Unit 1 Load Degradation appears to be due to LP turbine performance. An additional meeting is being planned to discuss our study results in further detail.
- We plan to perform an impact analysis from the 8800/8400 BTU Test burn once the fuel analysis is received.

Action Items

- Performance engineering to set-up a meeting with RI plant and Turbine Engineering to discuss Unit 1 Turbine Crossover pressure limitation and causal factors leading to the crossover pressure and status of performance engineering's evaluation.
- Performance engineering to analyze operating data, fuel deliveries, and fuel lab analysis and provide a report on the 8800/8400 test burn at approximately the same time as the May thermal Report is completed.
- Performance engineering to work with the plant on JR'ing the correct instrumentation to be calibrated so the U2 FW flow indication can be validated.
- The Instrument & other issue spreadsheet has been updated and JRs initiated for instruments that are not functional. Could the plant please review and comment on if the JRs initiated are OK, or what should be done differently?
  I:\RUSH\Performance\Instrument & other issues.xls
- Performance engineering would like to be copied on notes from morning meetings

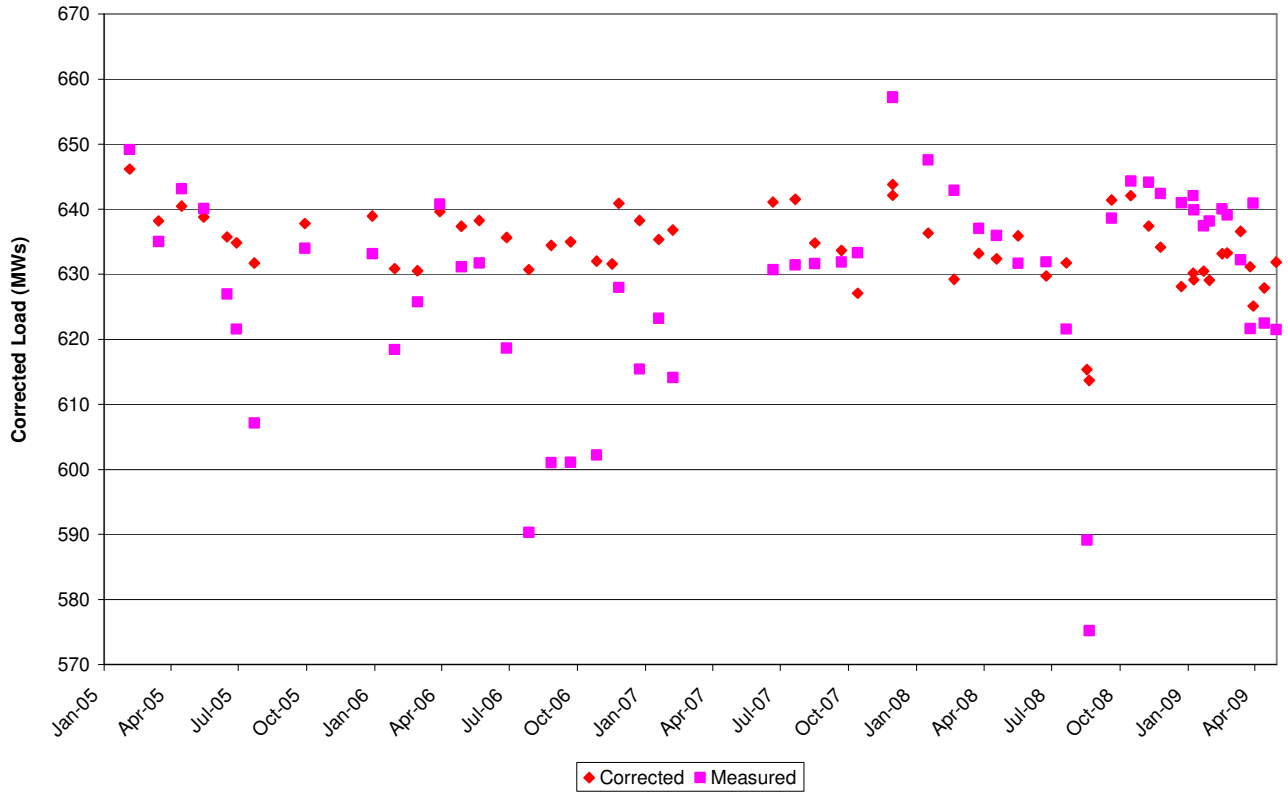
Unit 1 Observations

Summary of Performance Report for:

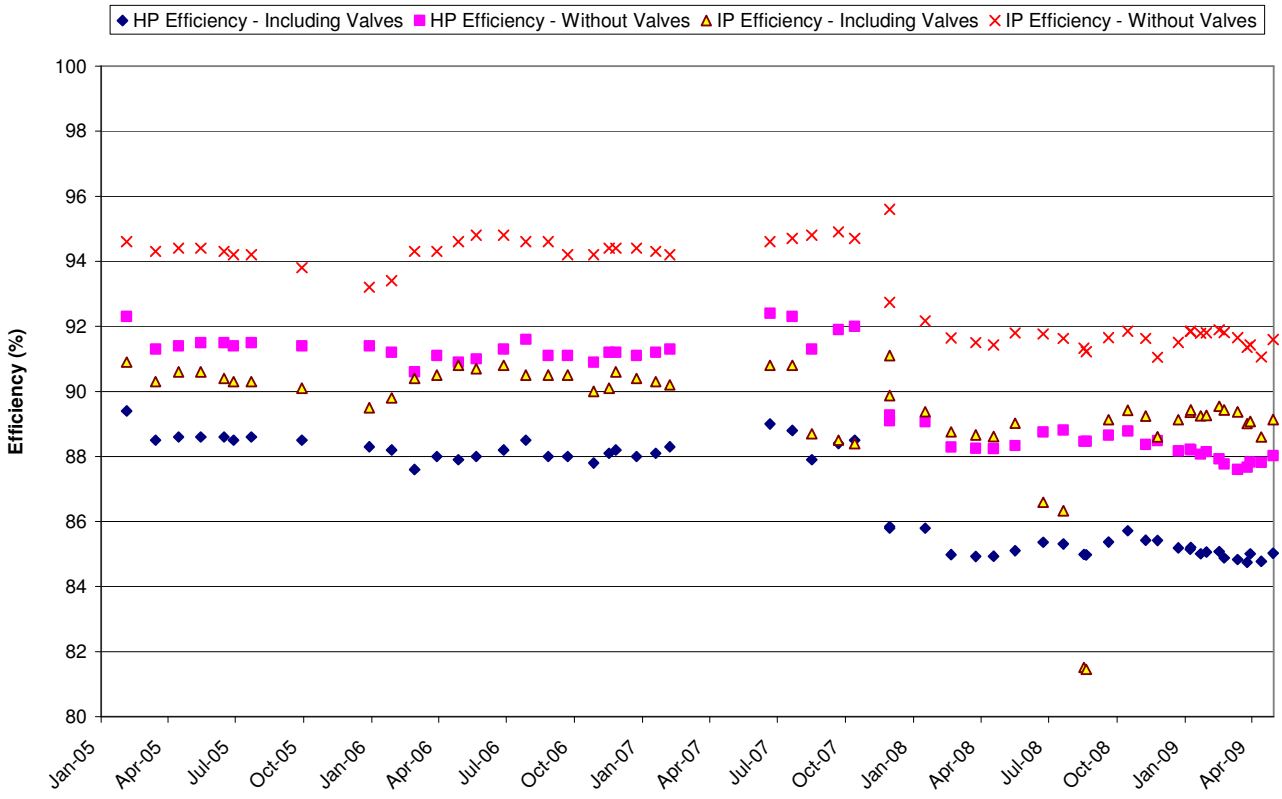
Plant	Rush Island	
Unit	1	
Period		

		Apr-08	Mar-09	Apr-09
Full Load Performance				
Hours of Data		122	203	163
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	634.4	627.9	626.1
AUX POWER	MW	30.3	29.9	32.4
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9801	9849.6	9906.2
Boiler Efficiency Actual	%	86.4	86.6	86.5
CONTROL VALVE POSITION LVDT	%	100.0	100.0	99.9
FEEDWATER TEMP TO ECON	degF	496	495.1	495.0
FEEDWATER TEMP TO HTR 1	degF	446	446.3	446.2
HP Turbine Efficiency Actual	%	84.8	84.8	84.8
IP Turbine Efficiency Corrected	%	92.4	89.2	88.7
Condenser Pressure	inHga	1.9	2.4	2.0
AIRHTR-A GAS OUTLET TEMP	degF	279	291.8	292.9
AIRHTR-B GAS OUTLET TEMP	degF	290	306.0	309.5
AMBIENT AIR TEMP	degF	54.0	52.5	55.6
CIRC WTR TEMP TO LP CONDB	degF	51.1	49.3	53.2
CIRC WTR TEMP TO LP CONDB	degF	49.6	47.7	51.6
Minimum River Temperature	degF	49.6	47.7	51.6
FWH 1 Temperature Rise	degF	49.9	48.8	48.8
Net Load	MW	604.1	598.1	593.7
Average Exit Gas Temperature	degF	284.3	298.9	301.2
Aux Power	%	4.8	4.8	5.2
Gross Unit Heat Rate	BTU/KW-HR	9334	9381.0	9393.6
Gross Turbine Heat Rate	BTU/KW-HR	8066	8121.4	8121.4
Measured Feedwater Flow	KPPH	4255	4258.5	4235.3
Calc Steam Evaporated	KPPH	4248	4247.3	4223.5
Steam Flow From First Stage	KPPH	4041	4076.4	4054.7
FW/Steam		1.05	1.0	1.0
Steam/Load		6.37	6.5	6.5
FW/Load		6.71	6.8	6.8
Rolling 12 Month Heat Rate Average			9816.3	9825.0

Rush Island Unit 1 - Load



Rush Island Unit 1 - HP and IP Efficiencies

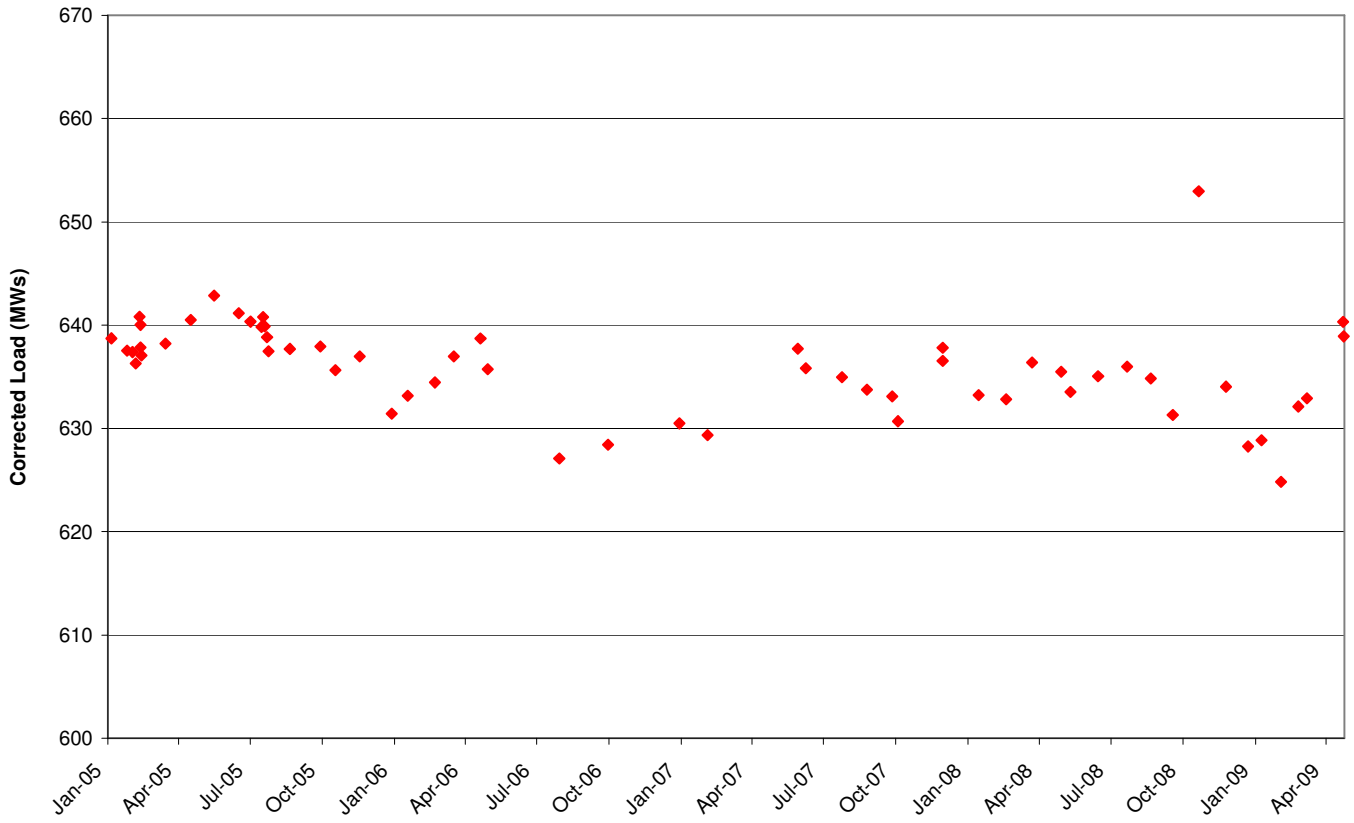


Summary of Performance Report for:

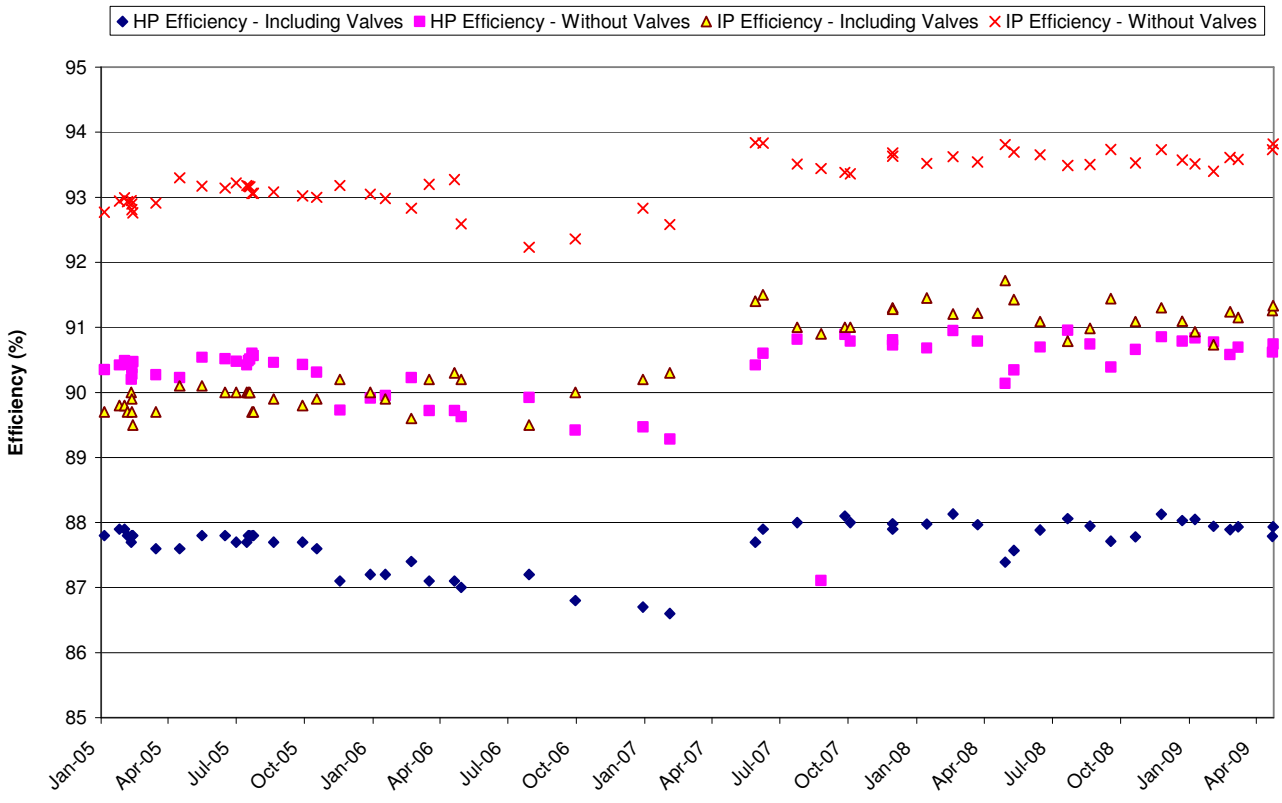
Plant Rush Island
Unit 2
Period

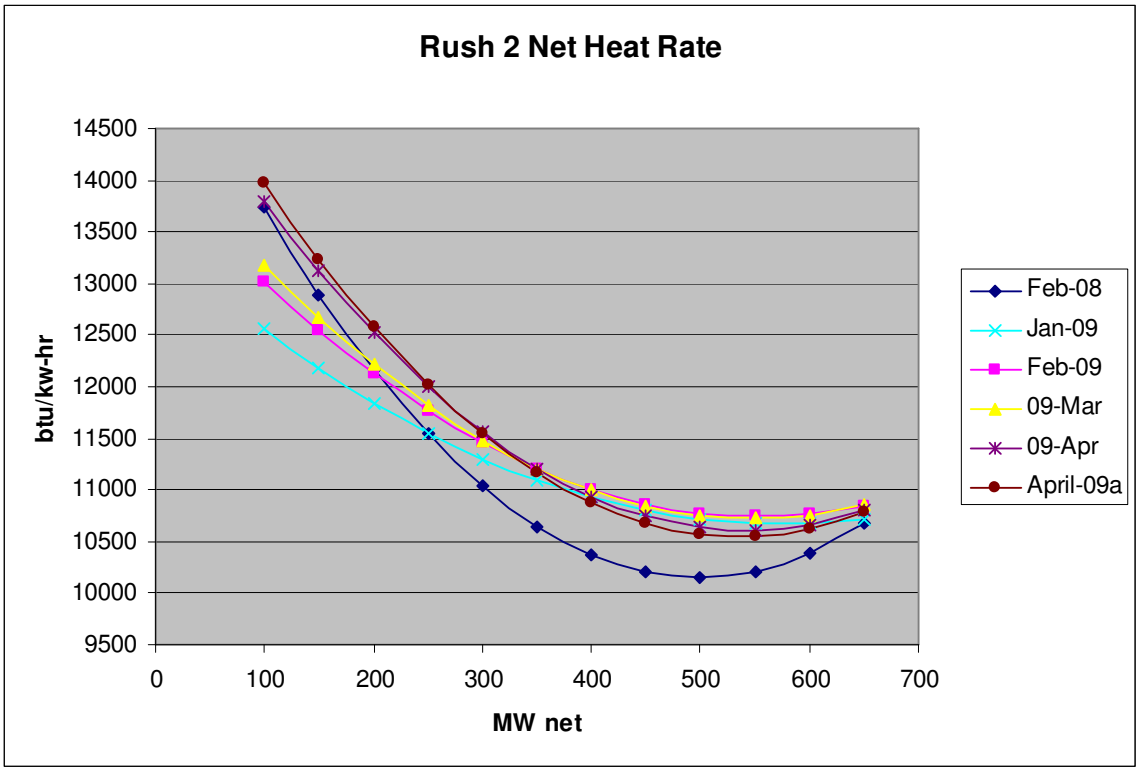
		Apr-08	Mar-09	Apr-09
Full Load Performance				
Hours of Data		137	262	105
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	587.2	608.6	624.5
AUX POWER	MW	32.0	37.2	36.1
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	10282	10734.2	10652.1
Boiler Efficiency Actual	%	85.7	86.2	85.6
CONTROL VALVE POSITION LVDT	%	99.8	99.6	99.8
FEEDWATER TEMP TO ECON	degF	487	489.6	488.9
FEEDWATER TEMP TO HTR 1	degF	439	441.4	443.7
HP Turbine Efficiency Actual	%	90.0	88.0	87.9
IP Turbine Efficiency Corrected	%	91.4	92.5	92.6
Condenser Pressure HP	inHga	2.4	2.1	1.8
AIRHTR-A GAS OUTLET TEMP	degF	287	290.7	311.7
AIRHTR-B GAS OUTLET TEMP	degF	302	330.0	326.5
AMBIENT AIR TEMP	degF	53.7	47.7	68.1
CIRC WTR TEMP TO LP CONDB	degF	51.3	47.4	58.2
CIRC WTR TEMP TO LP CONDB	degF	51.3	47.4	58.2
Minimum River Temperature	degF	51.3	47.4	58.2
FWH 1 Temperature Rise	degF	47.8	48.2	45.2
Net Load	MW	555.2	571.4	588.4
Average Exit Gas Temperature	degF	294.2	310.3	319.1
Aux Power	%	5.4	6.1	5.8
Gross Unit Heat Rate	BTU/KW-HR	9722	10078.5	10035.8
Gross Turbine Heat Rate	BTU/KW-HR	8330	8684.0	8591.9
Measured Feedwater Flow	KPPH	4290	4340.0	4374.3
Calc Steam Evaporated	KPPH	4454	4427.1	4484.4
Steam Flow From First Stage	KPPH	4096	3974.4	4007.6
FW/Steam		1.05	1.09	1.09
Steam/Load		6.60	6.53	6.42
FW/Load		6.91	7.13	7.00
Rolling 12 Month Heat Rate Average			10601.9	10632.8

Rush Island Unit 2 - Corrected Load

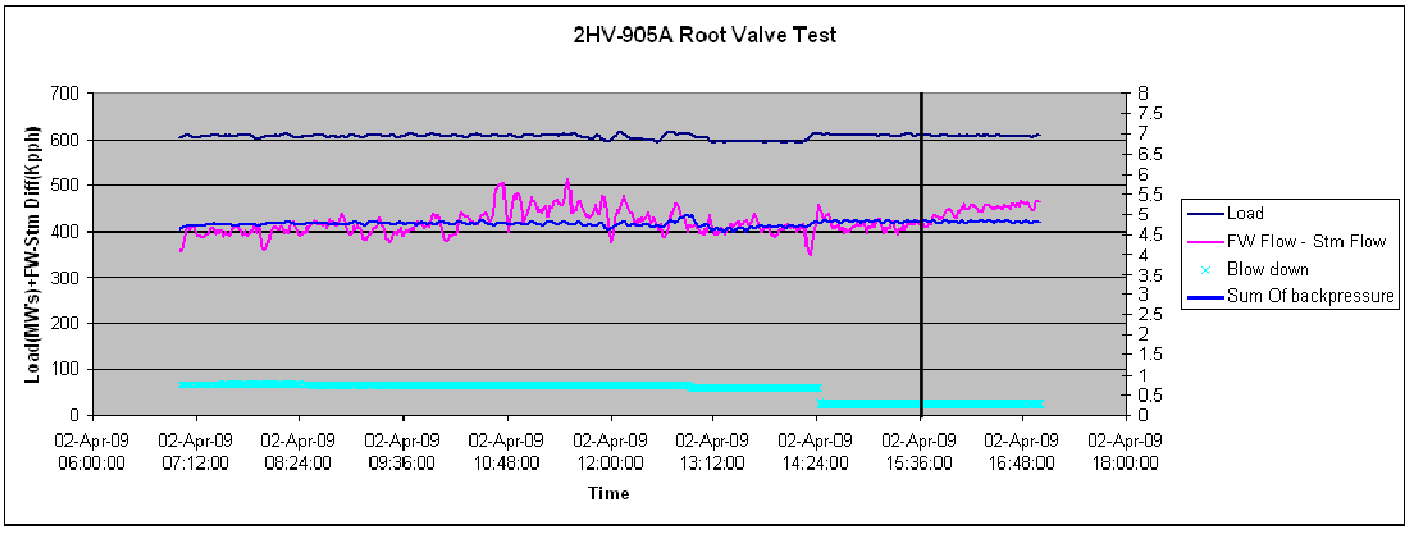


Rush Island Unit 2 - HP and IP Efficiencies





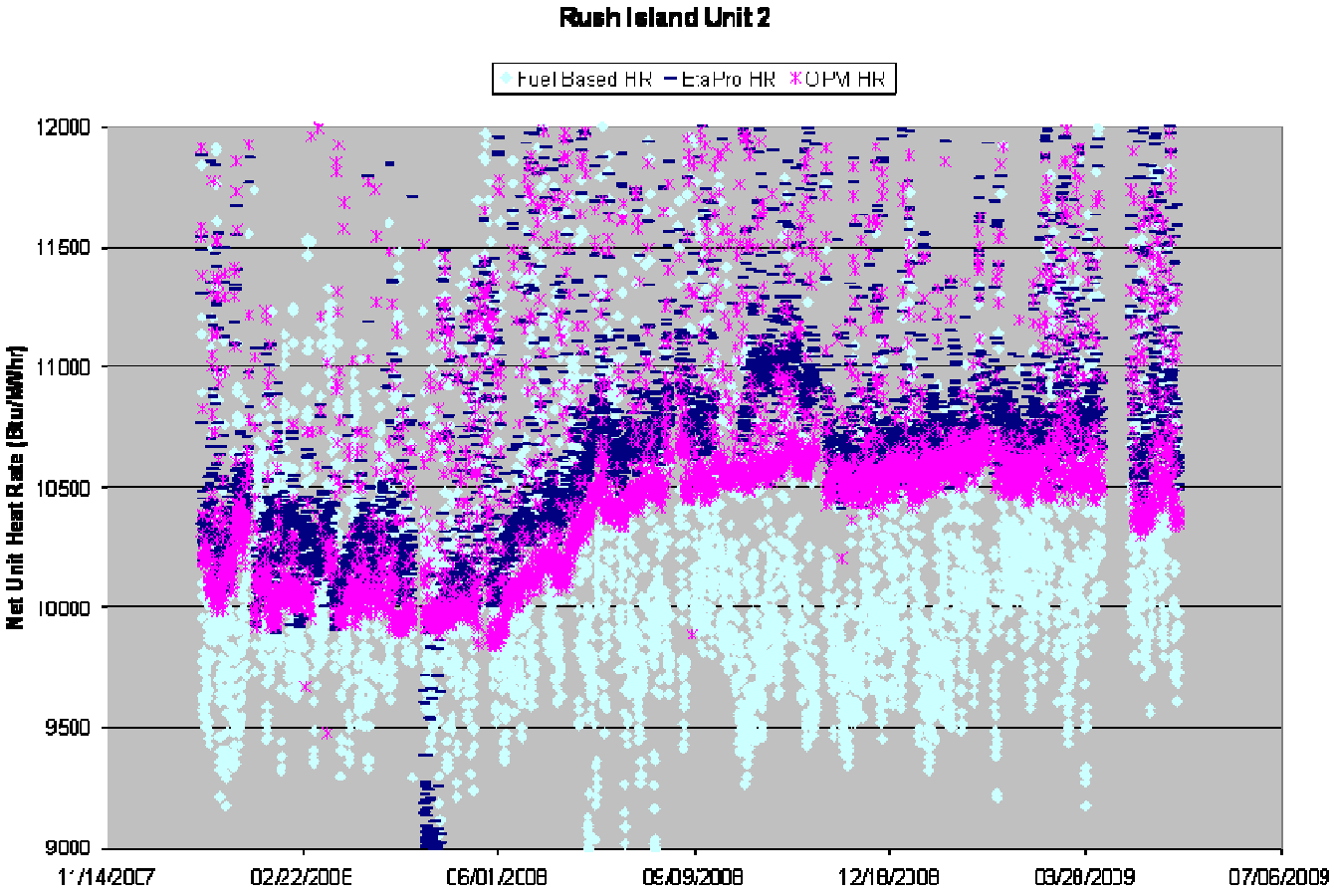
The above chart is a plot of the NUHR vs Net Load. April-09 plotted above is the entire month's data vs load and the April-09a is the April data post outage. The post-outage data shows a slight decrease in NUHR.



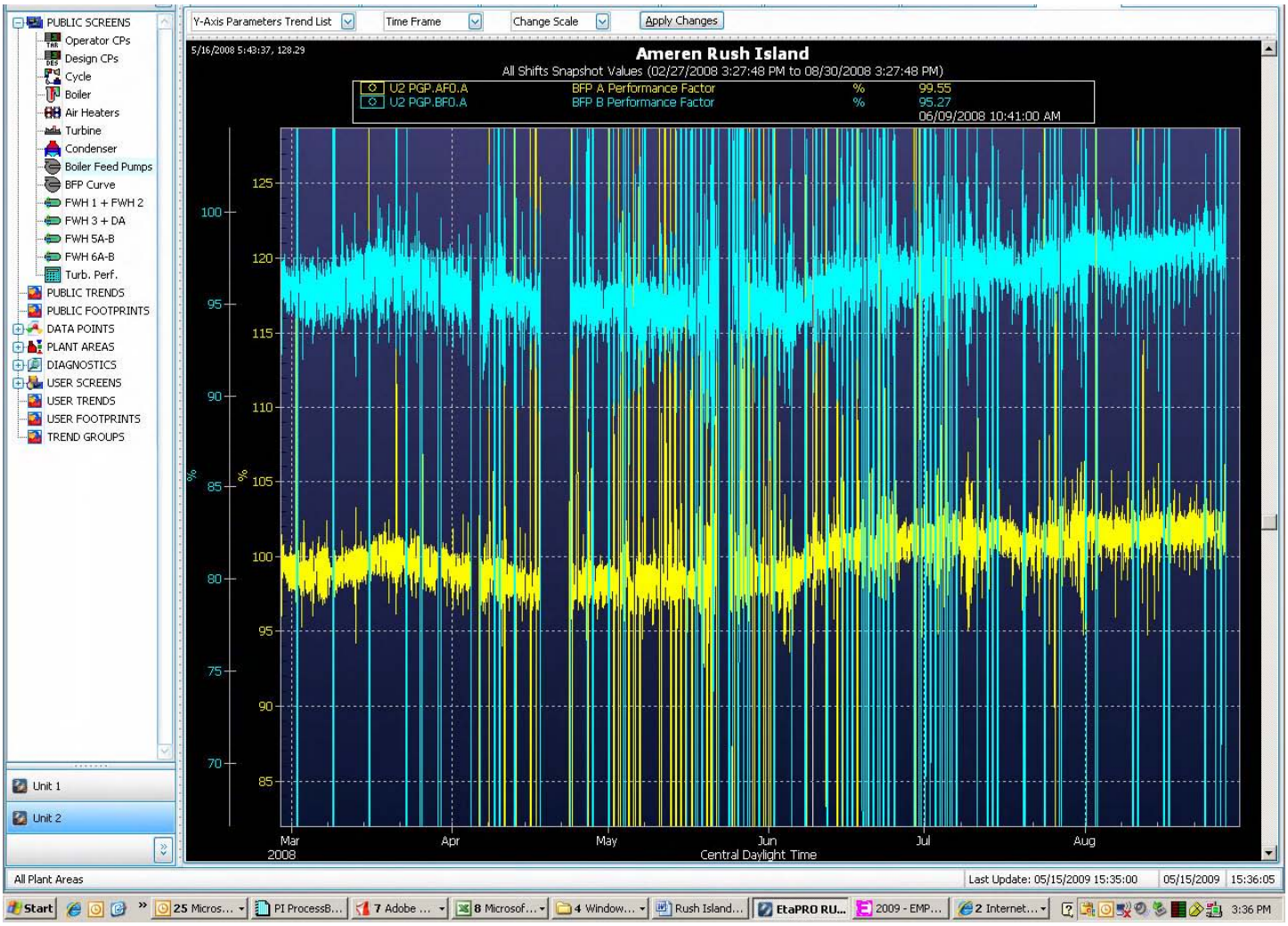
Prior to the outage there was a test completed on 04/03/09 where the root valve on valve 2HV-905A was closed and then later reopened. The change in the indicated difference between MS and FW flow was monitored and observed to be 38kpph, which correlates to 93 btu/kw-hr heat rate impact. During this test, the unit was run at steady state conditions with the Root valve to 905A closed for approximately 1 hour then the root valve was opened and the change noted above was observed. During the outage valves 2FV-612, 613 and 905A were replaced. All three noted valves were suspected to be leaking significantly based on temperature data obtained prior

to the unit coming off line, but the expected reductions based on the test noted above were not observed, after the unit was returned to service. Since the outage, all three valves that were replaced have been inspected and the seats show significant damage on each of the valves.

When heat rate reductions were not observed on U2, Performance Engineering took a look at the Heat Rate based on FW flow versus the heat rate based on fuel flow. Below is a chart of this data. As you can see from the chart below, there was an increase in the heat rate based on the indicated FW flow in early June last year, but the fuel flow heat rate slope stays relatively shallow.



After seeing these results, Perf. Eng. suspected an indication error with the feedwater flow measurement. To investigate further, Perf. Eng. reviewed some boiler feedpump data. Below is a plot of the A and B boiler feed pump performance factors. Notice around the first part of June an increase in both the A and B pumps.



The pump performance factor is basically a ratio of corrected flow based on the rated speed to the actual speed to the corrected capacity at design head. Since variables involved to make this calculation are flow, pressure, and speed any one of the field indicated values could be in error, but since the heat rate based on FW flow took a significant jump at approximately the same time that the pump performance factors trended up, performance engineering suspects there is a problem with the FW flow indication on U2 and requests a calibration of the instrumentation associated with feedwater flow. Performance engineering will investigate instruments that provide this indication and work with Rush Island plant to JR accordingly.

4/9/09

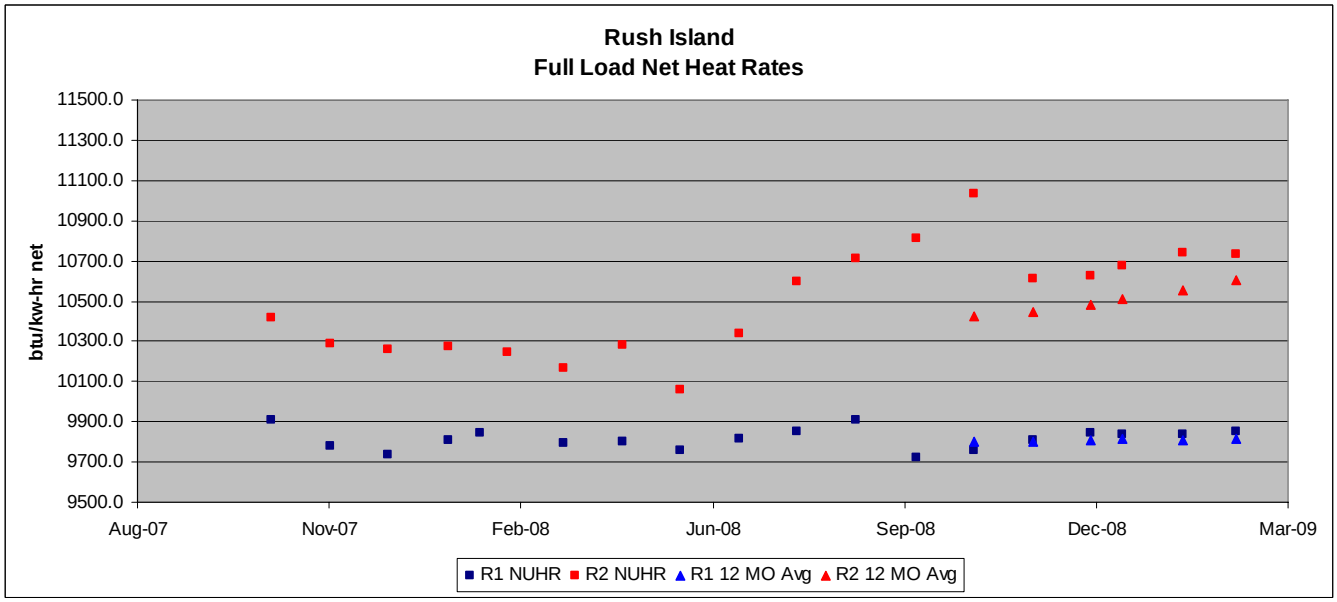
Mr. David Strubberg

From: Joe Sind and Jim Barnett

Cc: Bob Meiners, Andy Williamson, Paul Starks, Greg Vasel, Gary Blessing, Mike Clonts, Matt Wallace, Ken Stuckmeyer, Don Clayton, Jeff Shelton, Jim Barnett, Scott Hixson, Glenn Tiffin, Fred Kutilek, Tom Ziegler, Jeff Colter, Tim Finnell, Scott McCormack, Mike Kobel

Re: Rush Island March 2009 Performance Report

The last report was on March 3, 2009 and covered operation through February 2009. The information provided with in this report covers unit operation from the last report through March 2009.



Executive Summary

- Unit 1 and Unit 2 Heat Rates remain consistent with what was seen in last month's report.
- Jeff Shelton created a Steam Turbine Performance Page for Unit 2 in EtaPro (labeled Turb. Perf.) which shows an operating corrected load.
- Condenser cleaning has decreased unit back pressure on unit 1 and unit 2 backpressure continues to rise.
- Identified significant leakage in U2 Main Steam Drains and Governor Drain Valves which is suspect at being responsible for a majority of the on-going mismatch between MS and FW flow on Unit 2.

Action Items

- In our 3/6 quarterly performance meeting, Rush Island mentioned that there were several known leaking valves at the main steam energy state (these include the valves mentioned in the Executive Summary) and that some were scheduled to be replaced in the April SBO. Performance Engineering partially surveyed these valves using temperature and sonic methods. Rush Island has action to retain the old replaced valves for visual inspection and correlation to the surveyed data.
- Starting in very late March, Rush Island began a mini test burn to try and quantify the effects of burning 8400 (or less) btu/lb PRB coal as opposed to 8800 btu/lb. Performance Engineering has action to quantify the heat rate effects during the test burn. The test will probably end sometime around the end of the SBO.
- Performance Engineering has action to quantify and summarize the causal factors leading to a cross over pressure limitation on unit 1 and explain any changes in the factors since the HP/IP replacement in the fall of 2007. Results expected by the time of the next regular report.
- The Instrument & other issue spreadsheet has been updated and JRs initiated for instruments not functional. Could the plant please review and comment on if the JRs initiated are OK, or what should be done differently? I:\RUSH\Performance\Instrument & other issues.xls

Unit 1 Observations

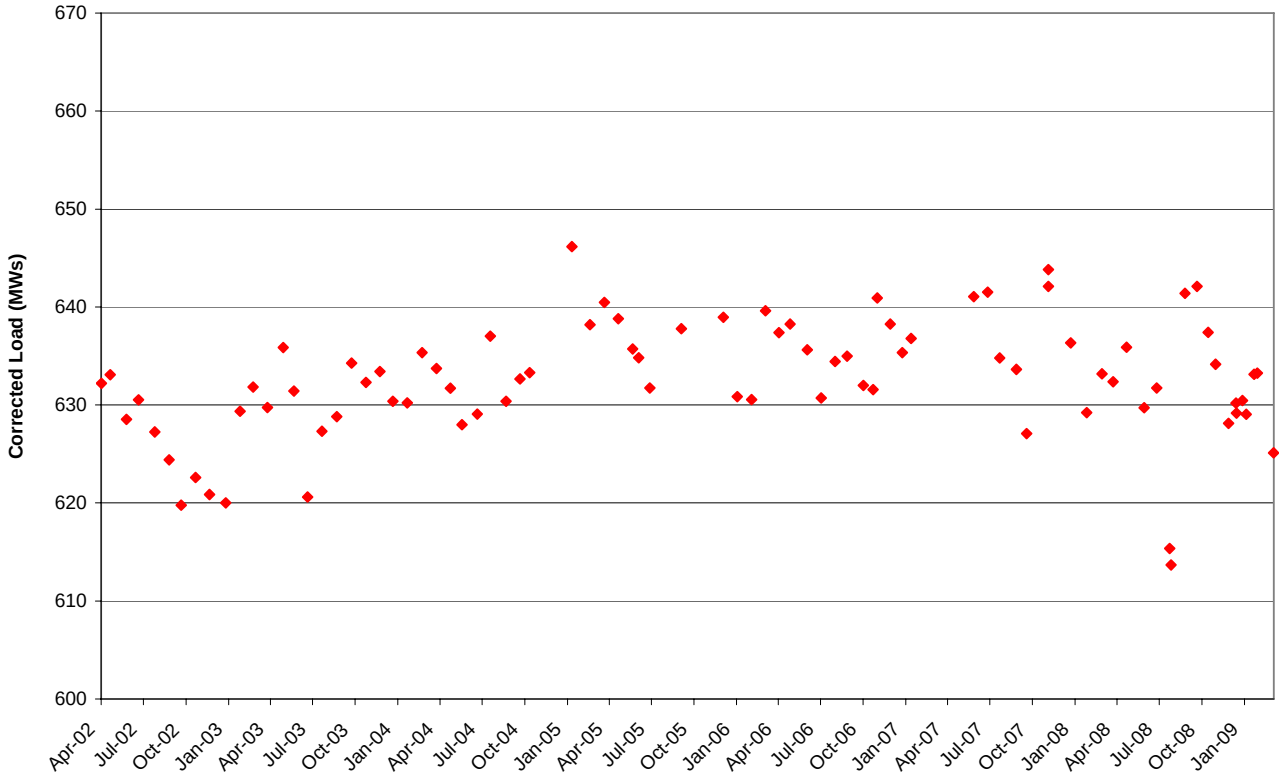
Summary of Performance Report for:

Plant	Rush Island			
Unit	1			
Period				
		Mar-08	Feb-09	Mar-09
Full Load Performance				
Hours of Data		397	362	203
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	631.2	634.7	627.9
AUX POWER	MW	30.0	31.7	29.9
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9790.9	9839.1	9849.6
Boiler Efficiency Actual	%	86.7	86.9	86.6
CONTROL VALVE POSITION LVDT	%	100.0	100.0	100.0
FEEDWATER TEMP TO ECON	degF	495.6	495.4	495.1
FEEDWATER TEMP TO HTR 1	degF	445.5	446.2	446.3
HP Turbine Efficiency Actual	%	84.7	85.7	84.8
IP Turbine Efficiency Corrected	%	92.5	89.4	89.2
Condenser Pressure	inHga	1.8	2.4	2.4
AIRHTR-A GAS OUTLET TEMP	degF	281.8	294.2	291.8
AIRHTR-B GAS OUTLET TEMP	degF	289.9	313.5	306.0
AMBIENT AIR TEMP	degF	46.1	34.9	52.5
CIRC WTR TEMP TO LP CONDB	degF	44.9	39.4	49.3
CIRC WTR TEMP TO LP CONDB	degF	43.3	37.8	47.7
Minimum River Temperature	degF	43.3	37.8	47.7
FWH 1 Temperature Rise	degF	50.1	49.1	48.8
Net Load	MW	601.3	603.0	598.1
Average Exit Gas Temperature	degF	285.8	303.9	298.9
Aux Power	%	4.7	5.0	4.8
Gross Unit Heat Rate	BTU/KW-HR	9326	9347.6	9381.0
Gross Turbine Heat Rate	BTU/KW-HR	8083	8125.3	8121.4
Measured Feedwater Flow	KPPH	4235	4316.1	4258.5
Calc Steam Evaporated	KPPH	4227	4310.0	4247.3
Steam Flow From First Stage	KPPH	4027	4132.4	4076.4
FW/Steam		1.05	1.0	1.0
Steam/Load		6.38	6.5	6.5
FW/Load		6.71	6.8	6.8
Rolling 12 Month Heat Rate Average			9811.4	9816.3

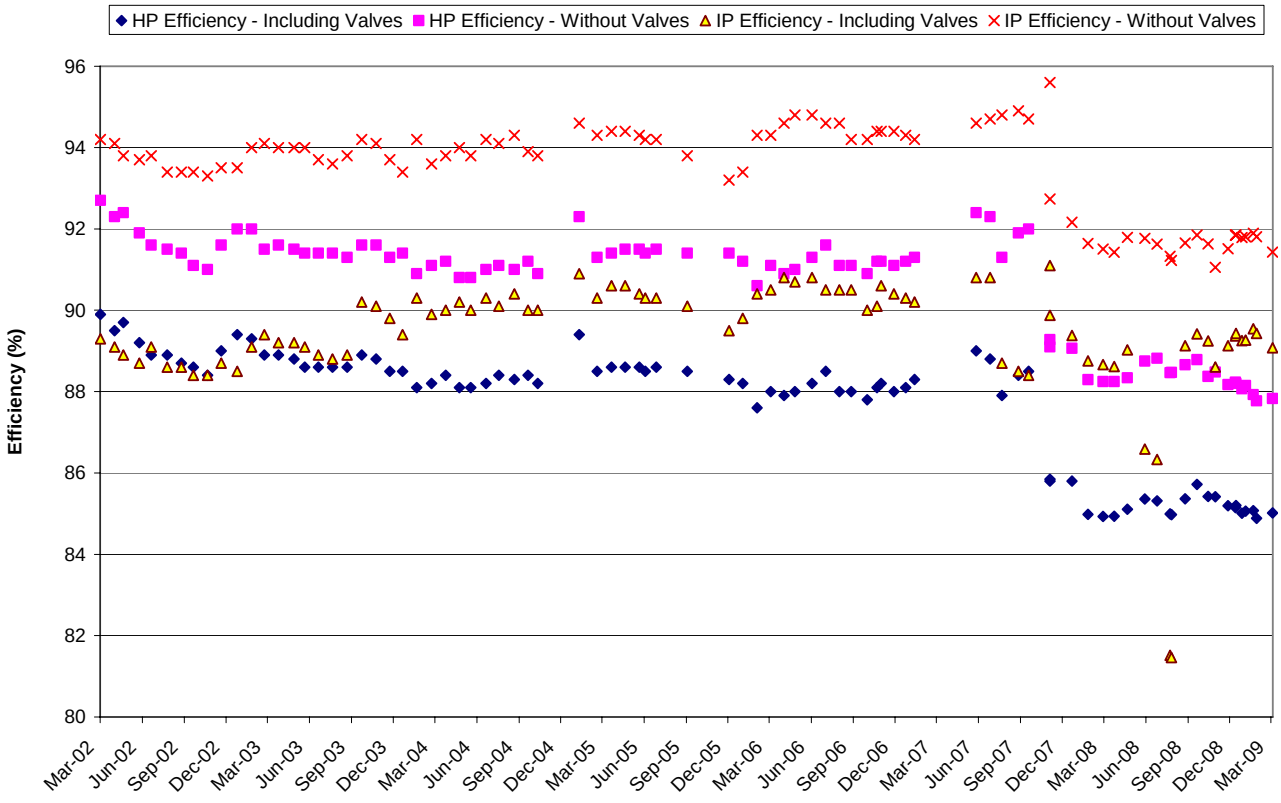
Conatins some bad quality data for CRH temp Tag 1pmn15051

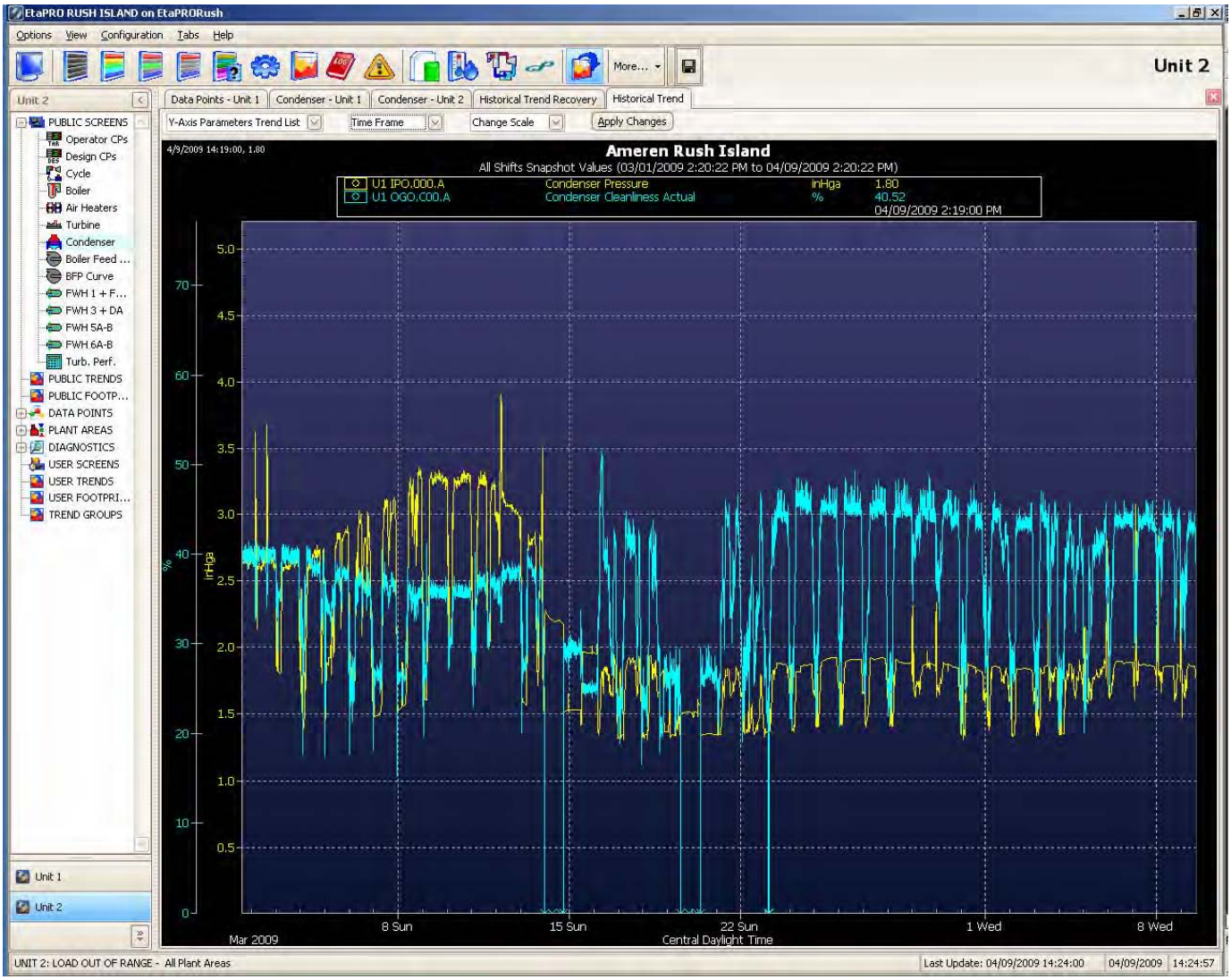
The low turbine efficiencies shown in the trend below and mentioned in last months report will be investigated as part of the cross over limitation study.

Rush Island Unit 1 - Corrected Load



Rush Island Unit 1 - HP and IP Efficiencies





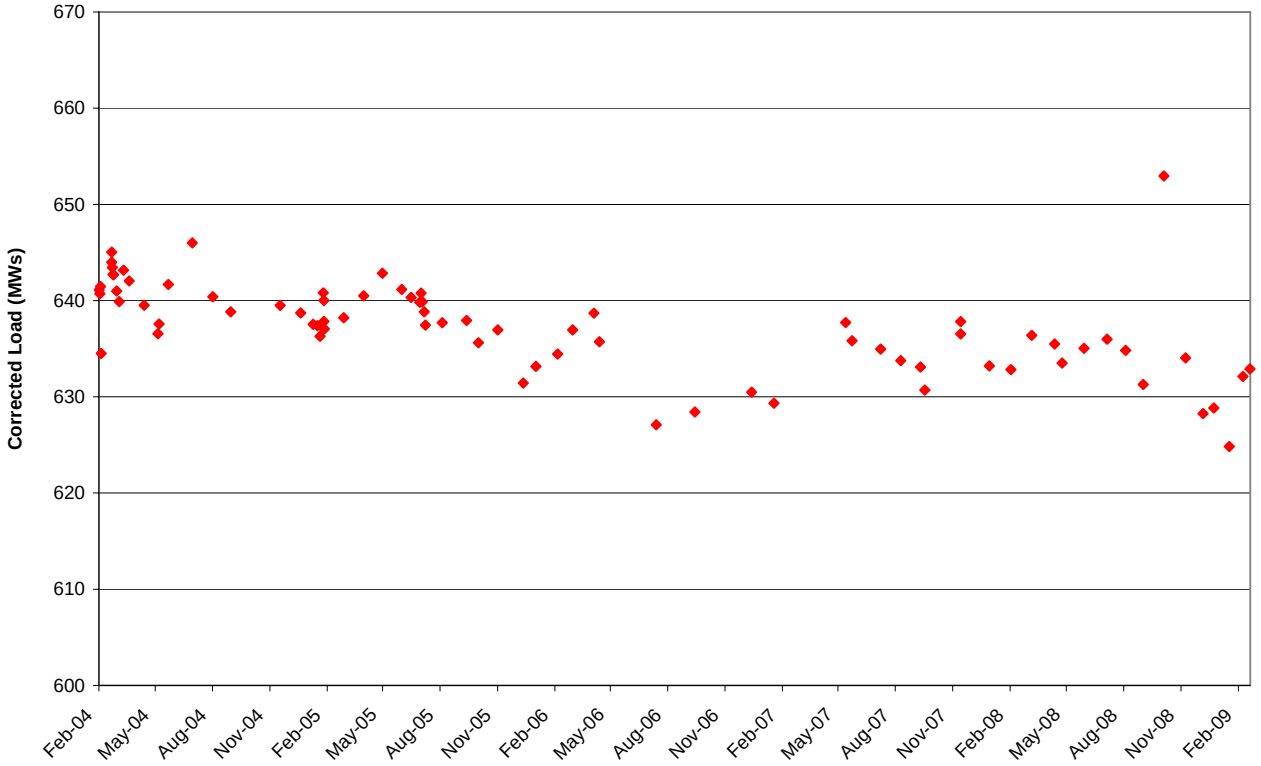
The above trend shows the effect of the condenser cleaning on unit 1. Condenser pressures improved by about 0.8 inHg and cleanliness improved less than 10%.

Unit 2 Observations

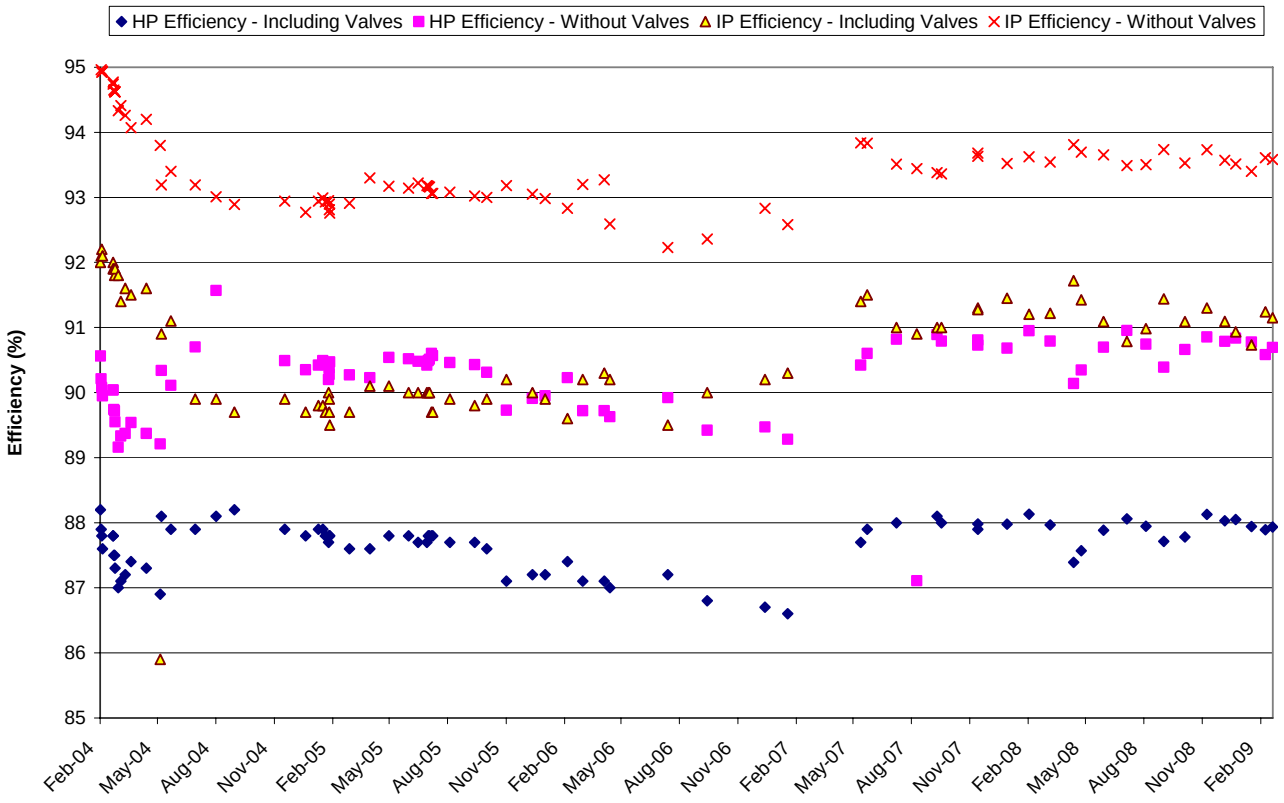
Summary of Performance Report for:

Plant	Rush Island			
Unit	2			
Period				
		Mar-08	Feb-09	Mar-09
Full Load Performance				
Hours of Data		494	328	262
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	598.5	613.5	608.6
AUX POWER	MW	32.0	37.4	37.2
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	10170.0	10742.5	10734.2
Boiler Efficiency Actual	%	86.0	86.2	86.2
CONTROL VALVE POSITION LVDT	%	99.8	99.6	99.6
FEEDWATER TEMP TO ECON	degF	488.1	490.0	489.6
FEEDWATER TEMP TO HTR 1	degF	440.3	441.5	441.4
HP Turbine Efficiency Actual	%	89.0	87.9	88.0
IP Turbine Efficiency Corrected	%	91.3	92.5	92.5
Condenser Pressure HP	inHga	2.7	1.8	2.1
AIRHTR-A GAS OUTLET TEMP	degF	291.7	294.7	290.7
AIRHTR-B GAS OUTLET TEMP	degF	304.9	331.8	330.0
AMBIENT AIR TEMP	degF	46.7	35.9	47.7
CIRC WTR TEMP TO LP CONDB	degF	44.3	40.2	47.4
CIRC WTR TEMP TO LP CONDB	degF	44.2	40.1	47.4
Minimum River Temperature	degF	44.2	40.1	47.4
FWH 1 Temperature Rise	degF	47.7	48.5	48.2
Net Load	MW	566.5	576.1	571.4
Average Exit Gas Temperature	degF	298.3	313.2	310.3
Aux Power	%	5.3	6.1	6.1
Gross Unit Heat Rate	BTU/KW-HR	9626.0	10087.2	10078.5
Gross Turbine Heat Rate	BTU/KW-HR	8273.8	8695.0	8684.0
Measured Feedwater Flow	KPPH	4052.5	4359.9	4340.0
Calc Steam Evaporated	KPPH	4128.6	4467.9	4427.1
Steam Flow From First Stage	KPPH	3894.3	4006.3	3974.4
FW/Steam		1.04	1.09	1.09
Steam/Load		6.51	6.53	6.53
FW/Load		6.77	7.11	7.13
Rolling 12 Month Heat Rate Average			10554.9	10601.9

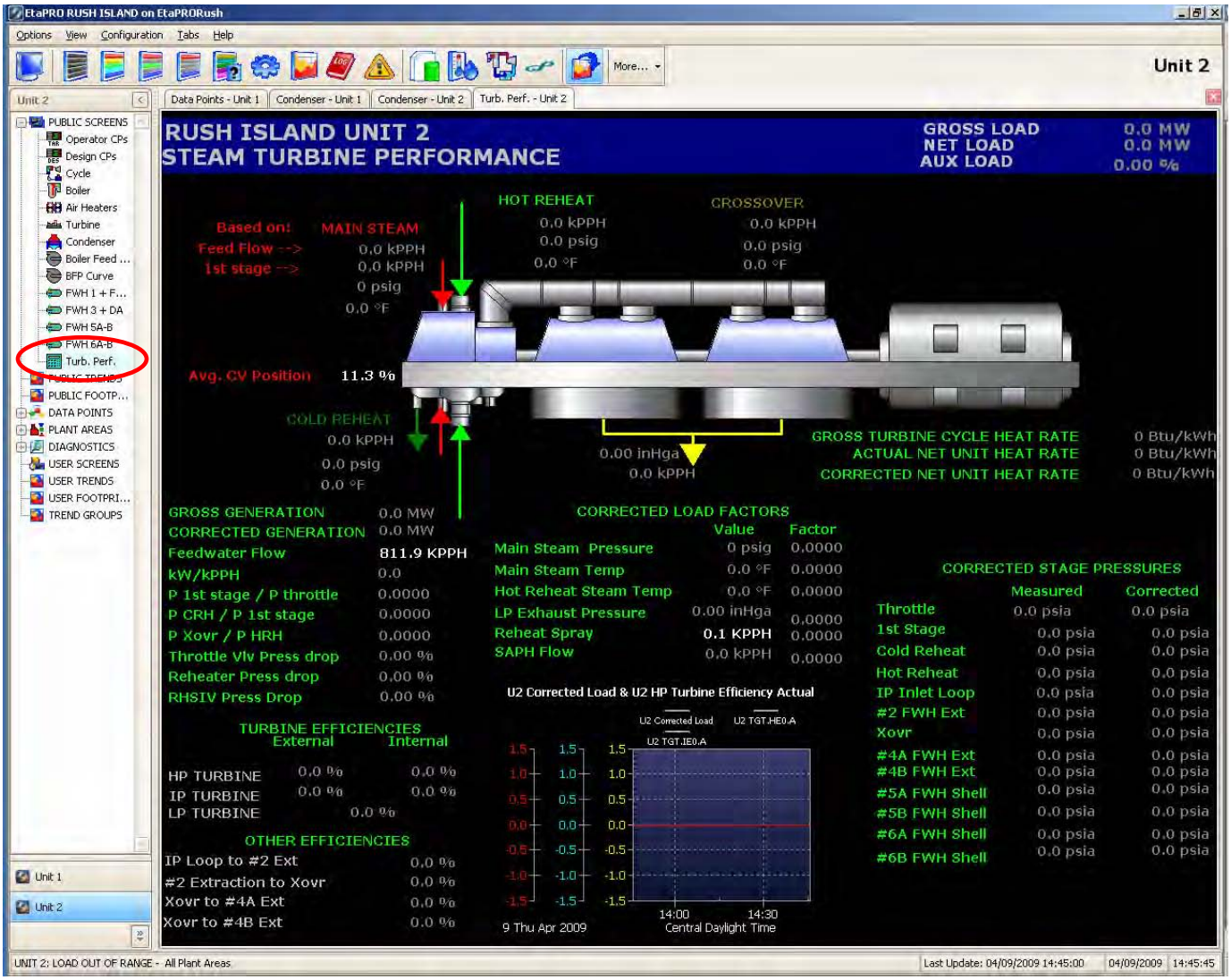
Rush Island Unit 2 - Corrected Load



Rush Island Unit 2 - HP and IP Efficiencies



Although no data is available with the unit off, the following screen shot shows the large quantity of calculated parameters Jeff Shelton added for turbine performance analysis. It also shows where the page can be found in the EtaPRO screen directory. It should be noted that these parameters are not available in Pi yet. Performance Engineering needs to meet with the Rush Pi administrator to get there approval to add approximately 100 new Pi tags to their server to accommodate EtaPRO enhancements.

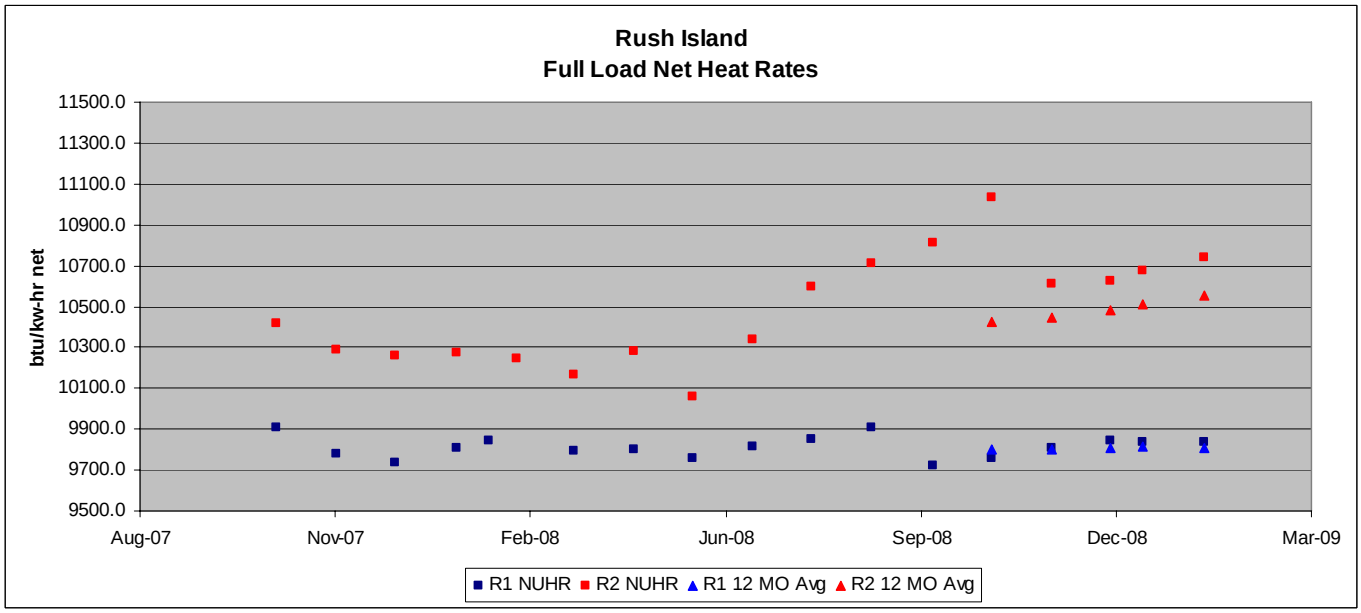


March 3, 2009

To: Mr. David Strubberg
From: Joe Sind
Cc: Bob Meiners, Andy Williamson, Paul Starks, Greg Vasel, Gary Blessing, Mike Clonts, Matt Wallace, Ken Stuckmeyer, Don Clayton, Jeff Shelton, Jim Barnett, Scott Hixson, Glenn Tiffin, Fred Kutilek, Tom Ziegler, Jeff Colter, Tim Finnell, Scott McCormack, Mike Kobel

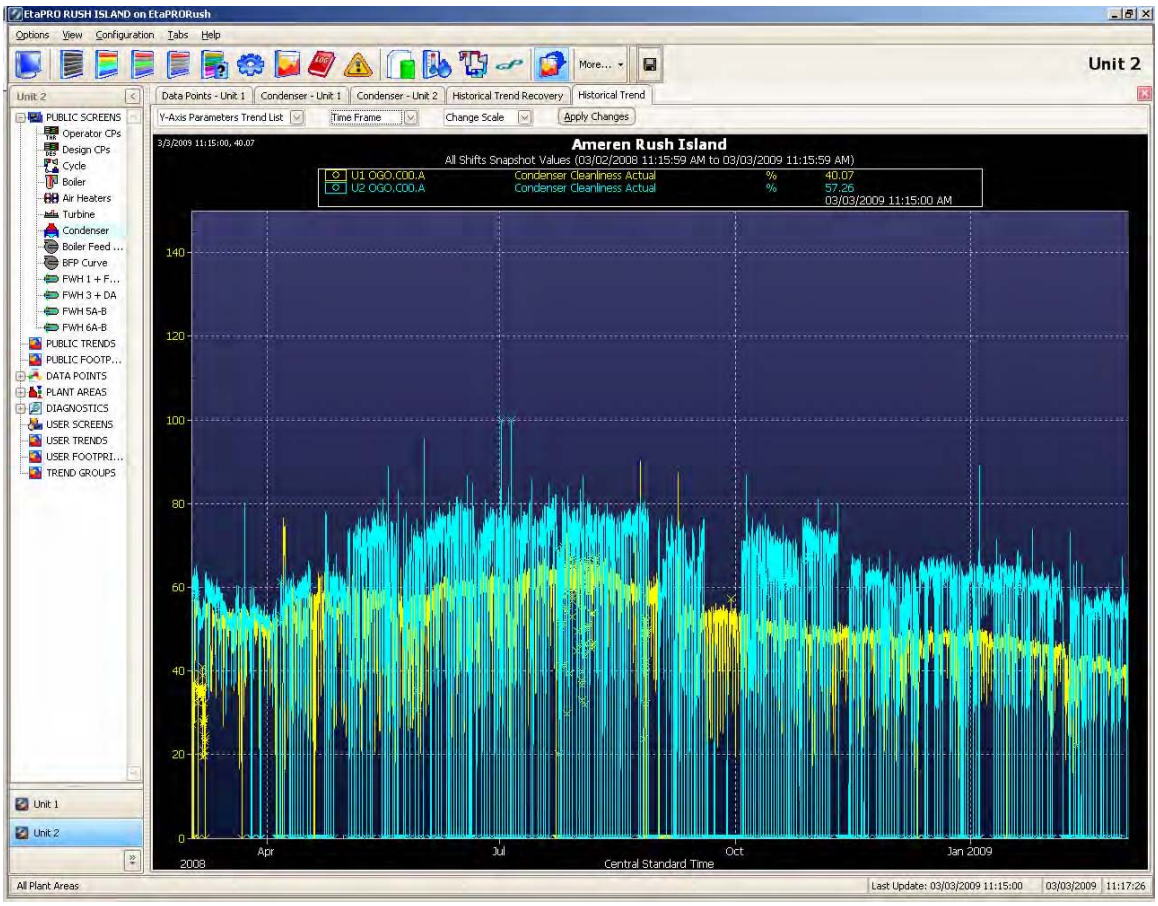
Re: Rush Island February 2009 Performance Report

The last report was on January 9, 2008 and covered operation through December 2008. Jim Barnett will be assuming primary responsibilities for Rush Island performance monitoring and reporting activities in the near future.



Executive Summary

- Unit 1 net heat rates remain stable, however Unit 2 heat rate continues it's apparent trend of getting worse.
- Both units show a decrease in condenser cleanliness, Unit 1 is by far the worse however. Hopefully plans are in place for a spring cleaning. Back pressure correction curves in EtaPRO were not configured correctly, and at high loads and low backpressures, associated losses were erroneous. This was corrected in the latter part of February.
- Unit 2 full load data indicates an increase in auxiliary power of 0.8% compared to the same period last year.



Unit's 1and 2 condenser cleanliness factors over one year

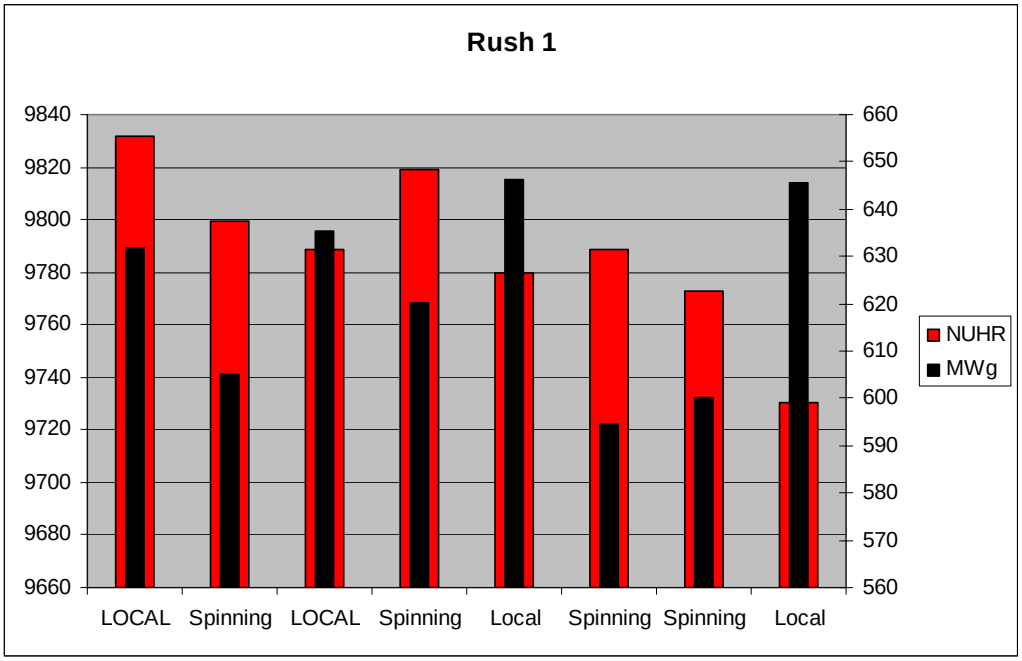
Action Items from Previous Meetings

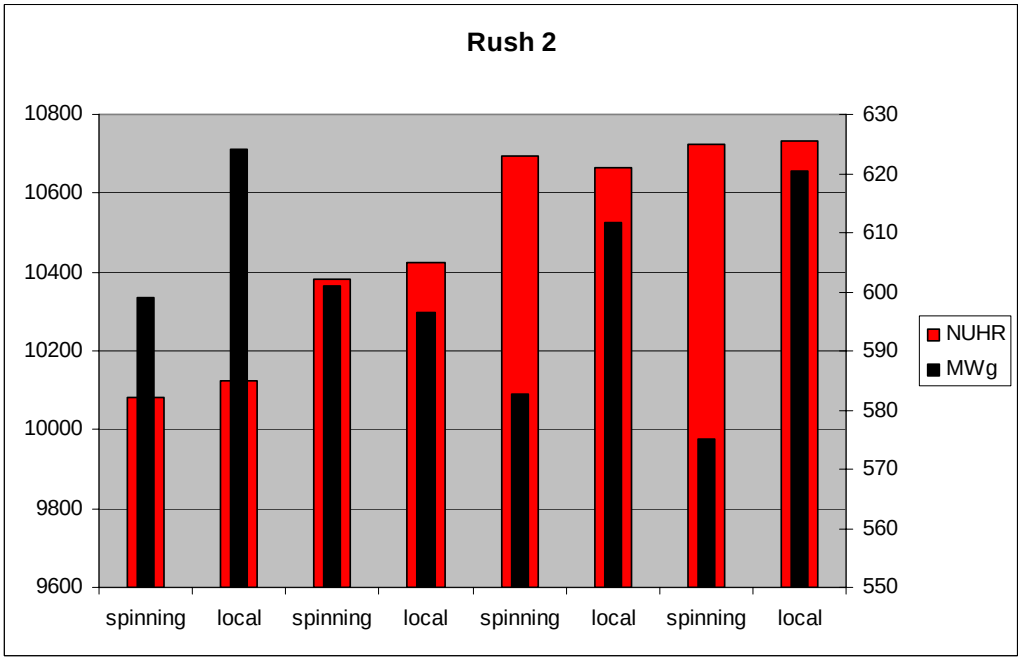
In the January report the plant was asked to take action or comment on several things.

- Provide comment and guidance on further work, if any, on the heat rate costs associated with area control operation. Any comments or guidance?
- Comment on a spreadsheet proposed to keep track of instrument issues, as well as noted EtaPRO mistakes or shortcomings. Any comments or suggestions? An updated version of the spreadsheet is attached.
- Begin investigating any cause or explanation from the difference in steam and feedwater flows on Unit 2 as this could be driving the high indicated heat rate. Any progress?

In the November 2008 meeting J. Sind got an action item to look into the heat rate effect from spinning reserve operation. A Rush Island elog search was done on the word "spinning" and several time periods (3 to 12 hours or so for each) for each unit were noted. Unit net heat rate from each of these periods, as well as a period close to those times when the unit was not in spinning reserve and not in ALC were compared. Results are shown in the attached graphs.

Note each set of bars represents a time period in 2008. No spinning reserve notations were found for 2009 when this study was done.





These graphs don't indicate any appreciable or repeatable effect of spinning reserve operation on heat rate. Any questions or comments as those requested for the ALC study, are also requested here.

Unit 1 Observations

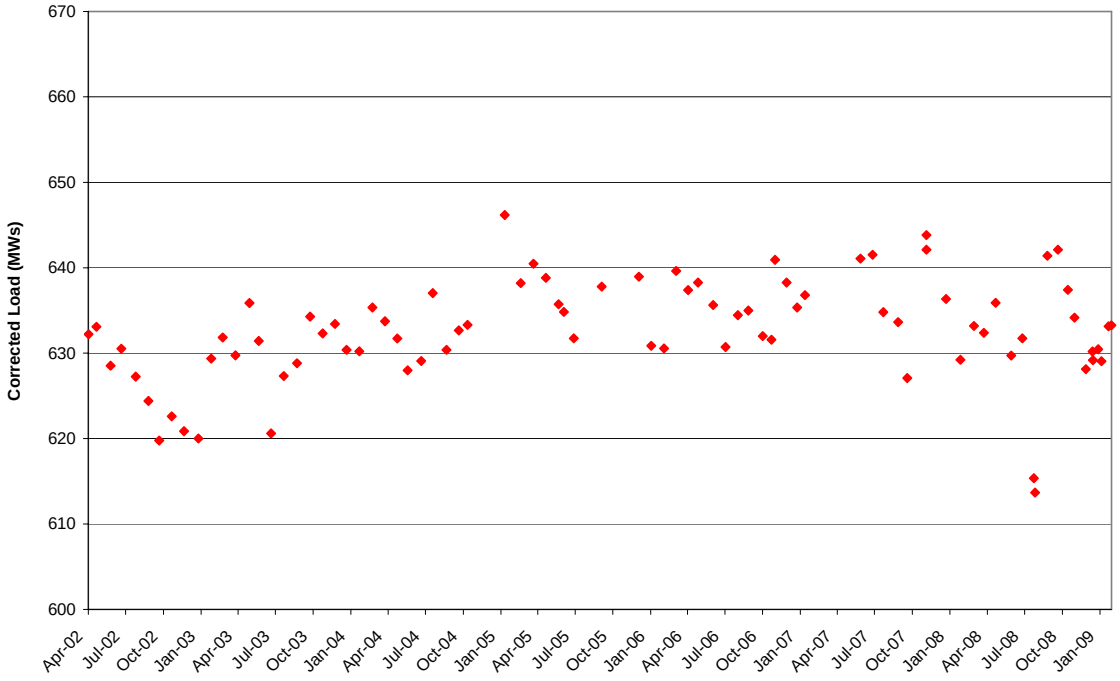
Summary of Performance Report for:

Plant	Rush Island			
Unit	1			
Period				
		Feb-08	Jan-09	Feb-09
Full Load Performance				
Hours of Data		448	530	362
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	641.7	639.0	634.7
AUX POWER	MW	31.5	31.6	31.7
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9845.1	9837.5	9839.1
Boiler Efficiency Actual	%	86.9	87.1	86.9
CONTROL VALVE POSITION LVDT	%	100.0	100.0	100.0
FEEDWATER TEMP TO ECON	degF	496.6	495.7	495.4
FEEDWATER TEMP TO HTR 1	degF	446.7	446.5	446.2
HP Turbine Efficiency Actual	%	84.8	85.1	85.7
IP Turbine Efficiency Corrected	%	91.4	91.0	89.4
Condenser Pressure	inHga	1.6	2.0	2.4
AIRHTR-A GAS OUTLET TEMP	degF	299.3	295.4	294.2
AIRHTR-B GAS OUTLET TEMP	degF	306.2	314.4	313.5
AMBIENT AIR TEMP	degF	33.6	29.3	34.9
CIRC WTR TEMP TO LP CONDB	degF	37.9	35.2	39.4
CIRC WTR TEMP TO LP CONDB	degF	36.4	33.7	37.8
Minimum River Temperature	degF	36.4	33.7	37.8
FWH 1 Temperature Rise	degF	49.9	49.2	49.1
Net Load	MW	610.2	607.4	603.0
Average Exit Gas Temperature	degF	302.7	304.9	303.9
Aux Power	%	4.9	4.9	5.0
Gross Unit Heat Rate	BTU/KW-HR	9361.3	9351.2	9347.6
Gross Turbine Heat Rate	BTU/KW-HR	8135.9	8141.2	8125.3
Measured Feedwater Flow	KPPH	4357.8	4372.9	4316.1
Calc Steam Evaporated	KPPH	4350.8	4367.4	4310.0
Steam Flow From First Stage	KPPH	4125.6	4175.9	4132.4
FW/Steam		1.1	1.0	1.0
Steam/Load		6.4	6.5	6.5
FW/Load		6.8	6.8	6.8
Rolling 12 Month Heat Rate Average			9811.9	9811.4

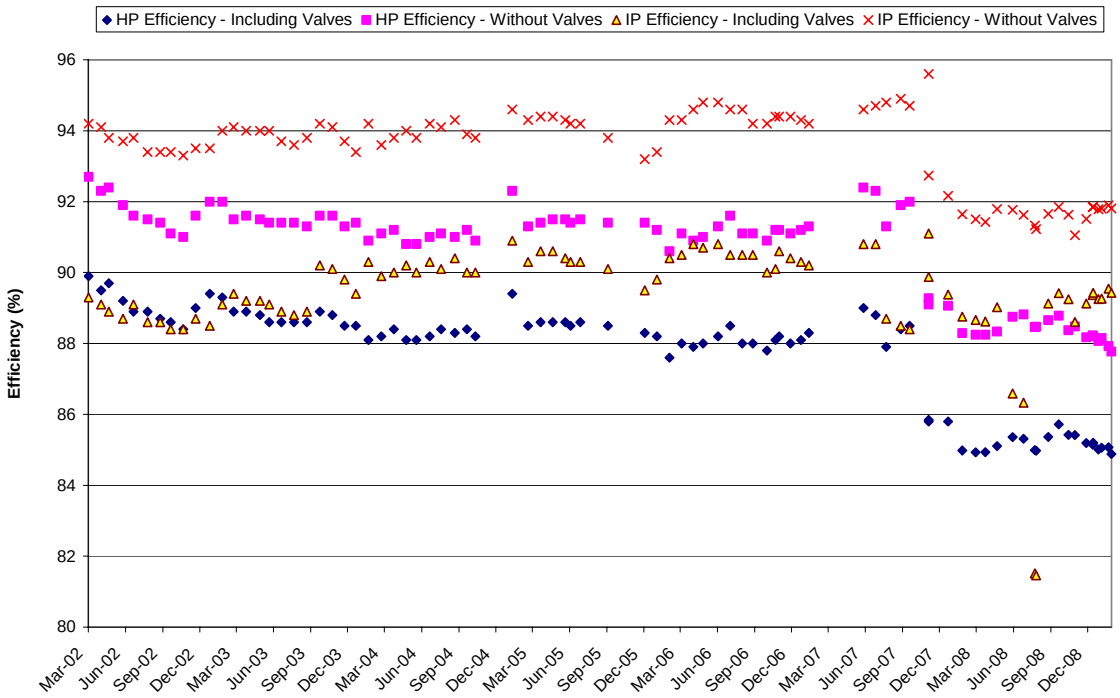
Conatins some bad quality data for CRH temp Tag 1pmn15051

The only performance concern for this unit from the previous table and following trends is the continuing degradation in HP efficiency. The bad cold reheat temps mentioned above would cause the apparent efficiency to be high and are not a factor in the efficiency trends below. These efficiencies are now at the lowest point since the replacement HP/IP retrofitted rotor was installed. No obvious reason can found from the cursory review of the data for this calculation that is part of this report's QA efforts. If the trend continues a detailed analysis of all data used in this efficiency calculation will be made and a request for calibration will be made if appropriate.

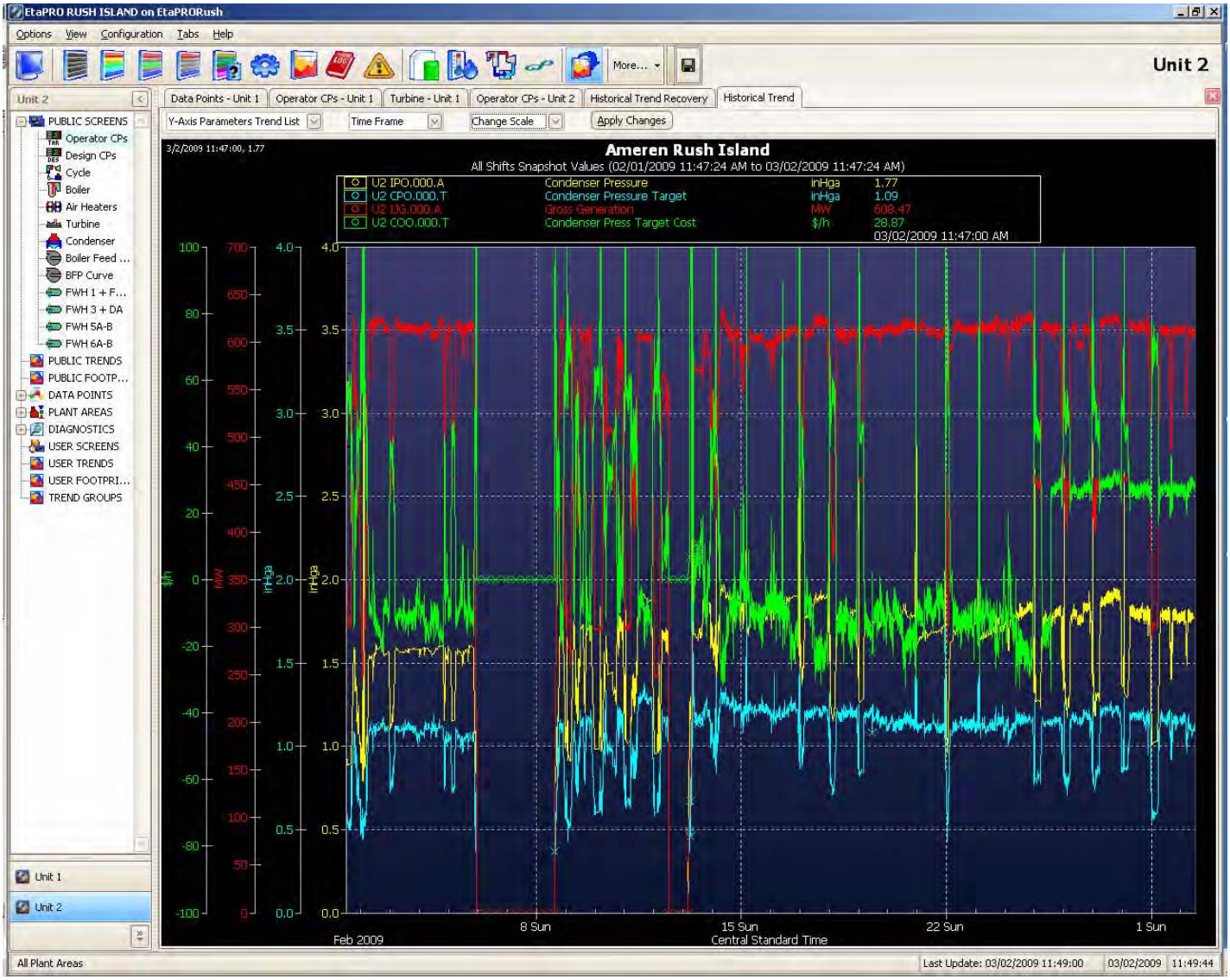
Rush Island Unit 1 - Corrected Load



Rush Island Unit 1 - HP and IP Efficiencies

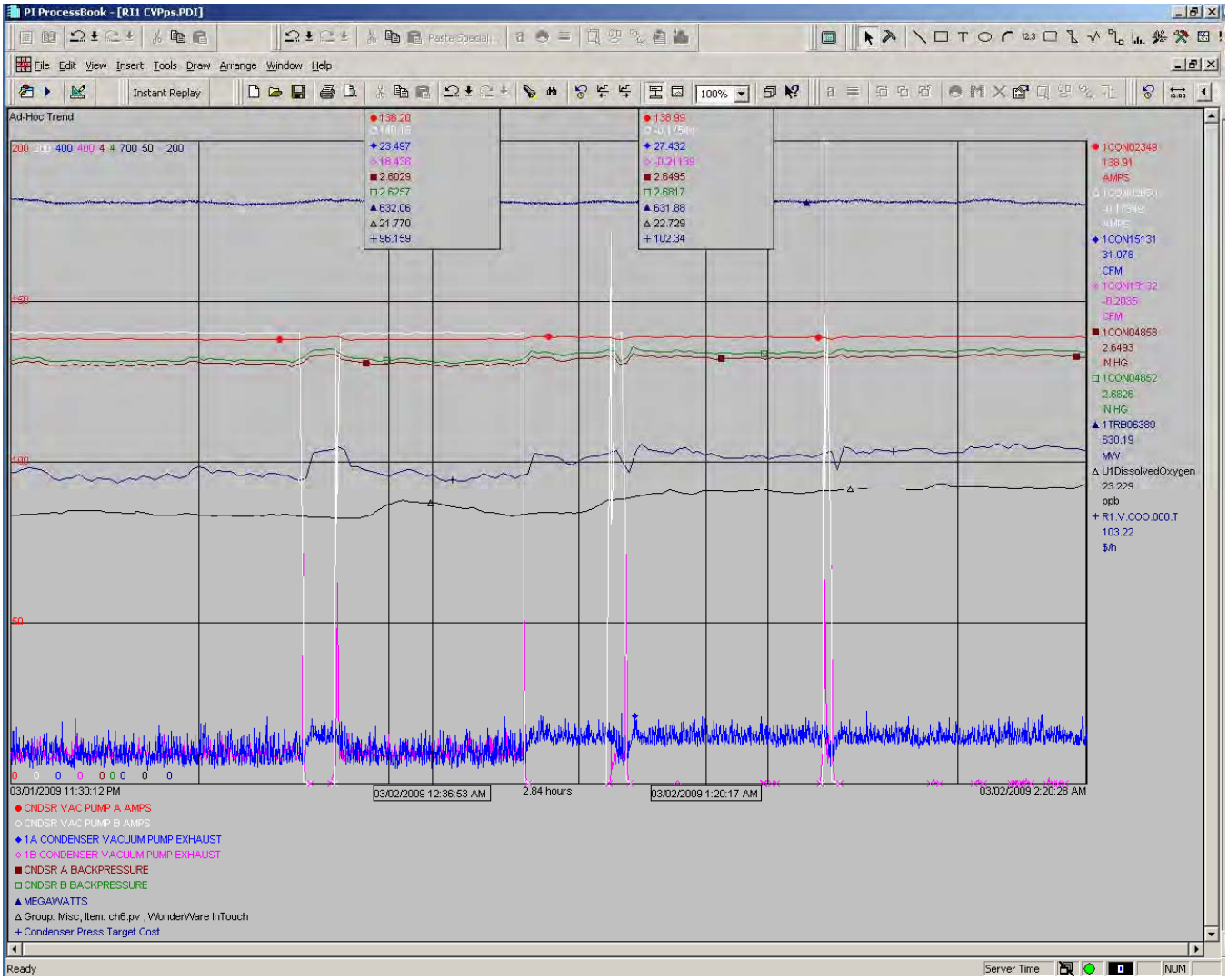


Relatively high backpressures for this time of year drew attention to the calculated loss from target backpressure. It was found that the backpressure correction curves in EtaPRO were incorrectly configured and indicated losses went negative at high loads even for backpressures substantially higher than targets. Note the majority of negative losses in the following trend. This was true for both units and corrected in late February.

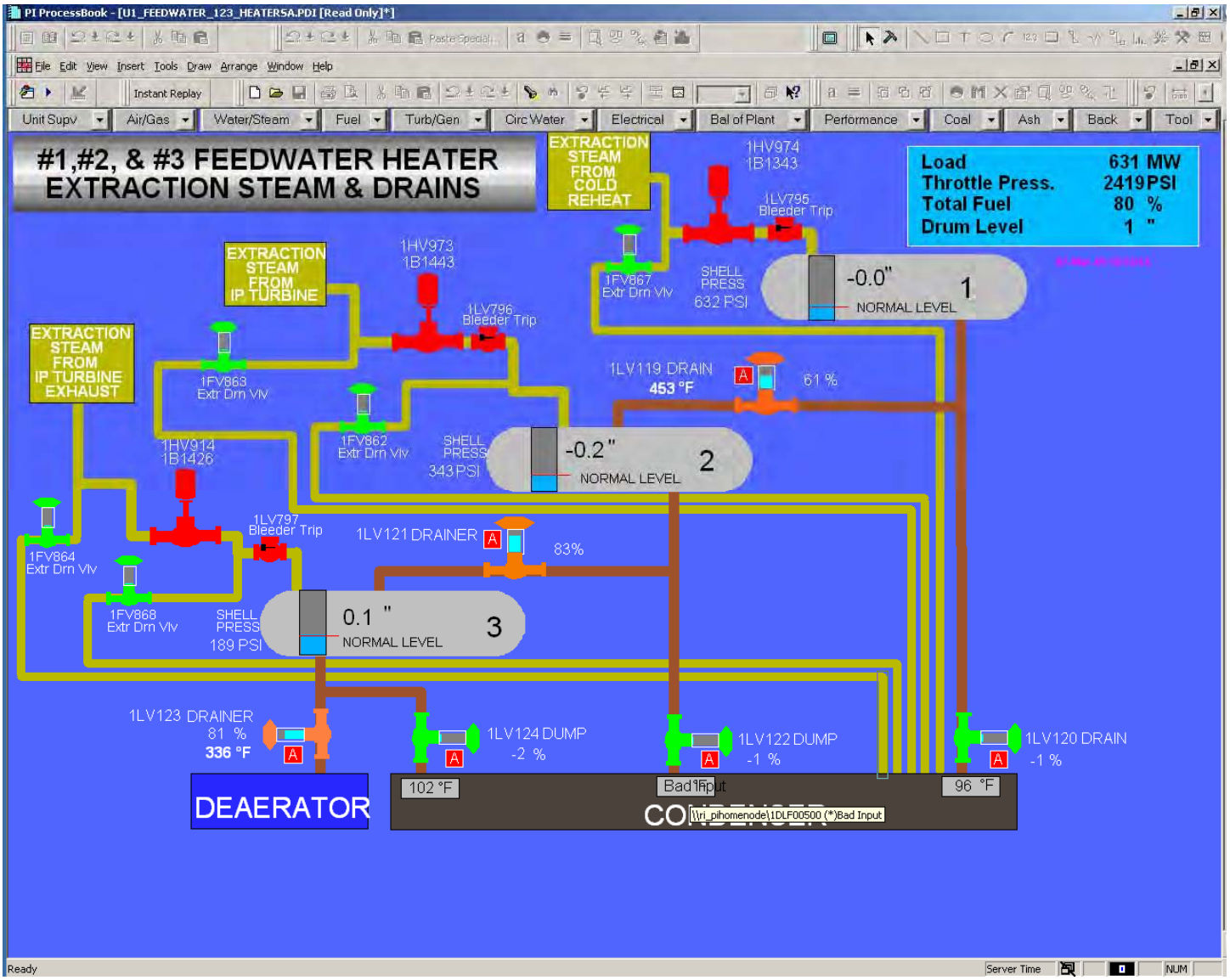


Performance Engineering is copied on the Rush Island Evening Notes email and is greatly appreciated. For quite a while now, a reference is made for both units concerning high dissolved oxygen and the need to run two condenser vacuum pumps. Recently there was also an entry concerning trying to take one CVPp off on unit 1 to see what happens. The following Pi trend would indicate that a decrease in DO on the order of 1 ppb is effected by running 2 CVPs. Backpressure also goes up slightly with an associated cost of about 6 $/hr. Assuming each pump uses about 0.1MW of auxiliary load, this would equate to about $2/hr fuel costs. Including a replacement power cost of about $40/MW-HR implies running the pump is a breakeven trade-off

concerning backpressure. Whether the 1ppb DO is a significant improvement is best answered by the Chem. E. Another interesting thing from the trend, is the change in total air-leakage flow from 2 to 1 CVPp operation. Although the flow on the in service pump does go up, it does not go to the sum of flows when two pumps are running. This may be an indication of measurement of leakage other than in the condenser. Pump seal or packing for instance. On the other hand it may be just an indication of the expected sensitivity of the leakage measurement. One thing to help analyze this would be to toggle between pumps off at the next convenient opportunity (i.e. A&B on, A off B on, B off A on).



One of the new items on the instrument issue spreadsheet is a 1DLF00500 FWH 2 DUMP TEMP. The existence of these dump lines temperatures was unknown. Is the actual temperature measurement at the condenser as shown? Do the lines enter the condenser above or below the hotwell level?


PI ProcessBook - [U1_FEEDWATER_123_HEATER5A.PDI [Read Only]*]
File Edit View Insert Tools Draw Arrange Window Help
Instant Replay
Unit Supv
Air/Gas
Water/Steam
Fuel
Turb/Gen
Circ Water
Electrical
Bal of Plant
Performance
Coal
Ash
Back
Tool
#1,#2, & #3 FEEDWATER HEATER EXTRACTION STEAM & DRAINS
EXTRACTION STEAM FROM COLD REHEAT
EXTRACTION STEAM FROM IP TURBINE
EXTRACTION STEAM FROM IP TURBINE EXHAUST
1HV974
1B1343
1LV795
Bleeder Trip
1HV973
1B1443
1LV796
Bleeder Trip
1FV867
Extr Drn Vlv
SHELL PRESS
632 PSI
-0.0"
1
NORMAL LEVEL
Load 631 MW
Throttle Press. 2419 PSI
Total Fuel 80 %
Drum Level 1 "
1FV863
Extr Drn Vlv
1LV119 DRAIN
453 °F
61 %
1FV862
Extr Drn Vlv
SHELL PRESS
343 PSI
-0.2"
2
NORMAL LEVEL
1HV914
1B1426
1LV797
Bleeder Trip
1LV121 DRAINER
83%
1FV864
Extr Drn Vlv
1FV868
Extr Drn Vlv
SHELL PRESS
189 PSI
0.1 "
3
NORMAL LEVEL
1LV123 DRAINER
81 %
336 °F
1LV124 DUMP
-2 %
1LV122 DUMP
-1 %
1LV120 DRAIN
-1 %
DEAERATOR
102 °F
Bad Input
96 °F
\\ri_pihomenode\1DLF00500 (*)Bad Input
Ready
Server Time
NUM

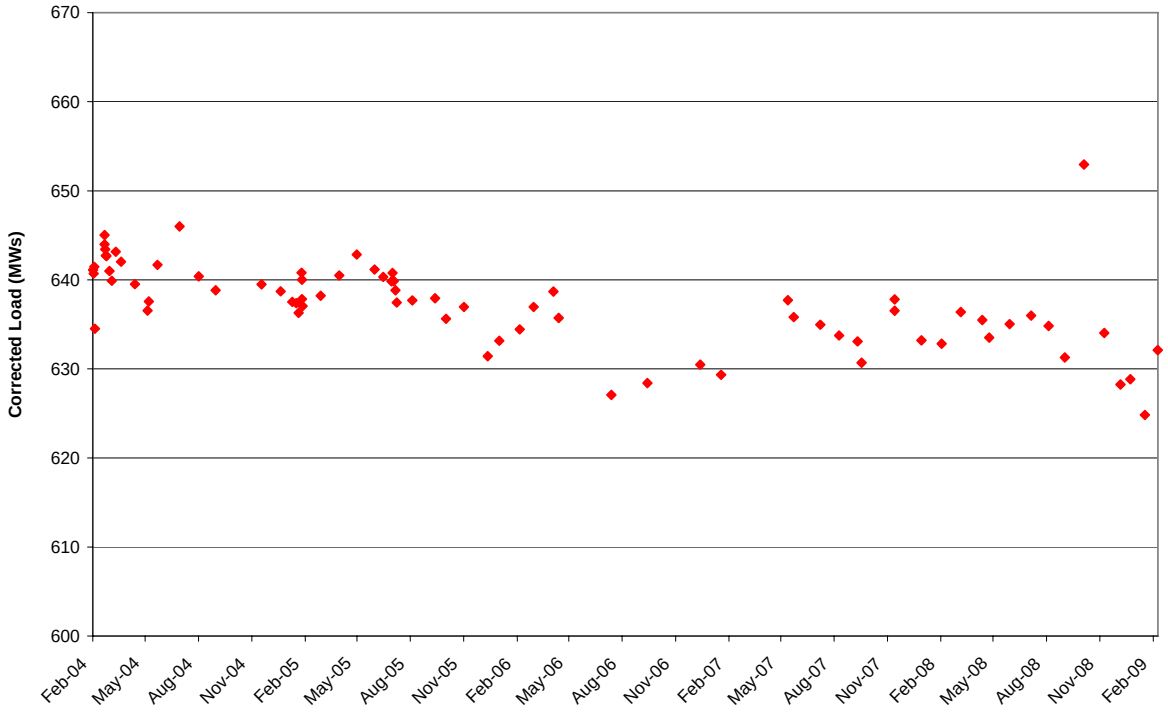
Unit 2 Observations

Summary of Performance Report for:

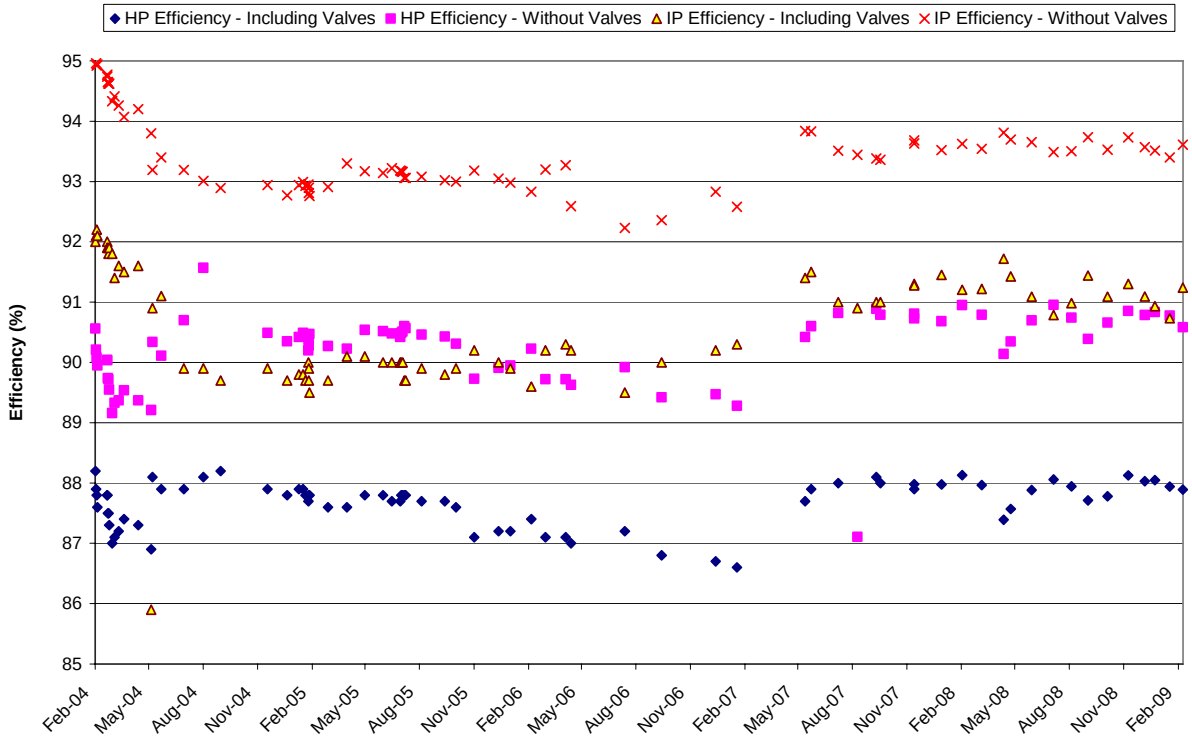
Plant	Rush Island			
Unit	2			
Period				
		Feb-08	Jan-09	Feb-09
Full Load Performance				
Hours of Data		500	452	328
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	603.4	624.1	613.5
AUX POWER	MW	32.2	37.7	37.4
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	10246.1	10677.5	10742.5
Boiler Efficiency Actual	%	86.5	86.4	86.2
CONTROL VALVE POSITION LVDT	%	99.8	99.6	99.6
FEEDWATER TEMP TO ECON	degF	488.4	491.4	490.0
FEEDWATER TEMP TO HTR 1	degF	440.2	443.0	441.5
HP Turbine Efficiency Actual	%	89.4	88.5	87.9
IP Turbine Efficiency Corrected	%	91.3	92.0	92.5
Condenser Pressure HP	inHga	2.0	1.5	1.8
AIRHTR-A GAS OUTLET TEMP	degF	305.0	289.7	294.7
AIRHTR-B GAS OUTLET TEMP	degF	317.9	340.7	331.8
AMBIENT AIR TEMP	degF	33.0	30.2	35.9
CIRC WTR TEMP TO LP CONDB	degF	37.8	35.6	40.2
CIRC WTR TEMP TO LP CONDB	degF	37.8	35.6	40.1
Minimum River Temperature	degF	37.8	35.6	40.1
FWH 1 Temperature Rise	degF	48.2	48.4	48.5
Net Load	MW	571.2	586.4	576.1
Average Exit Gas Temperature	degF	311.4	315.2	313.2
Aux Power	%	5.3	6.0	6.1
Gross Unit Heat Rate	BTU/KW-HR	9699.8	10032.8	10087.2
Gross Turbine Heat Rate	BTU/KW-HR	8386.9	8663.4	8695.0
Measured Feedwater Flow	KPPH	4072	4458.2	4359.9
Calc Steam Evaporated	KPPH	4193	4540.4	4467.9
Steam Flow From First Stage	KPPH	3900	4093.6	4006.3
FW/Steam		1.04	1.09	1.09
Steam/Load		6.46	6.56	6.53
FW/Load		6.75	7.14	7.11
Rolling 12 Month Heat Rate Average			10513.5	10554.9

The only thing requiring further investigation or action on the plants part is to reconcile the apparently high feedwater flow relative to steam flow and load.

Rush Island Unit 2 - Corrected Load



Rush Island Unit 2 - HP and IP Efficiencies

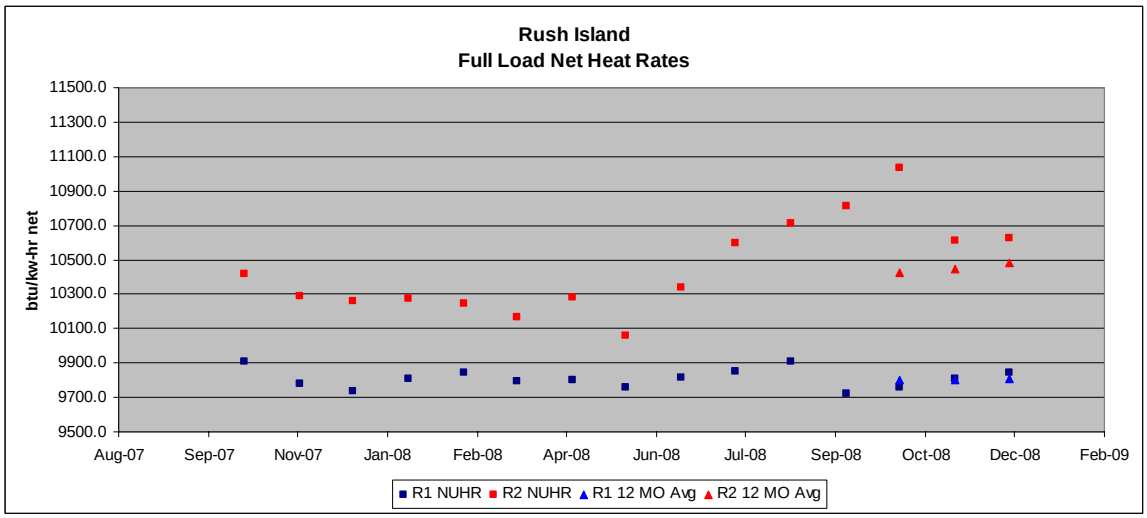


January 12, 2009

To: Mr. David Strubberg
From: Joe Sind
Cc: Andy Williamson, Paul Starks, Greg Vasel, Gary Blessing, Mike Clonts, Matt Wallace, Ken Stuckmeyer, Jeff Shelton, Jeff Colter, Tim Finnell, Don Clayton, Scott McCormack, Mike Kobel

Re: Rush Island December 2008 Performance Report

Last report was on November 12, 2008 and was for operation through October 2008. Performance Engineering has a goal to produce reports for each month in a timely manner by end of 2009.

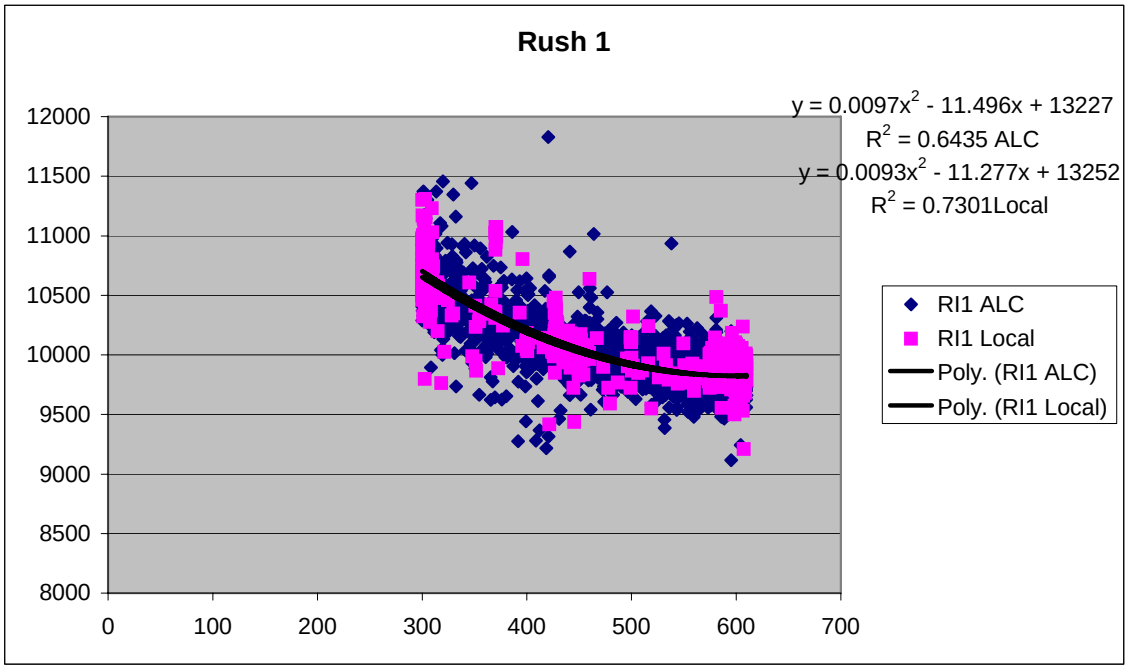


Executive Summary

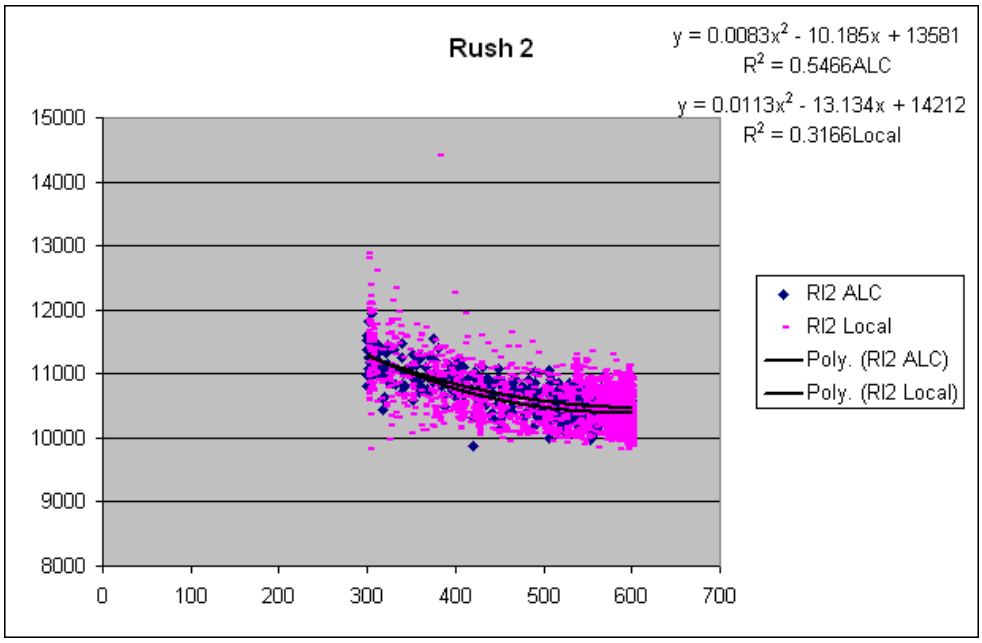
- Following Unit 2's return to service after a SBO in early November, with the top heater in service and it's leaking feedwater relief valve presumably repaired, the unit's heat rate improved but is still significantly higher than Unit 1. Detailed observations concerning this difference are in the section on Unit 2, however the plant will be requested to take action concerning cycle isolation checks and instrument calibration.

Action Items from last Performance Meeting

In the November meeting J. Sind got action items to estimate the relative cost from decreased performance for both ALC and 25MW of spinning reserve operation. Net heat rate data was sampled from all of 2008 and the following results were obtained comparing ALC to LOCAL operation. These results are not presented as final.



MW	Heat Rates ALC	Local	diff
300	10651.2	10705.9	-54.7
320	10541.56	10595.68	-54.12
340	10439.68	10492.9	-53.22
360	10345.56	10397.56	-52
380	10259.2	10309.66	-50.46
400	10180.6	10229.2	-48.6
420	10109.76	10156.18	-46.42
440	10046.68	10090.6	-43.92
460	9991.36	10032.46	-41.1
480	9943.8	9981.76	-37.96
500	9904	9938.5	-34.5
520	9871.96	9902.68	-30.72
540	9847.68	9874.3	-26.62
560	9831.16	9853.36	-22.2
580	9822.4	9839.86	-17.46
600	9821.4	9833.8	-12.4



	Heat Rates		
MW	ALC	Local	diff
300	11272.5	11288.8	-16.3
320	11171.72	11166.24	5.48
340	11077.58	11052.72	24.86
360	10990.08	10948.24	41.84
380	10909.22	10852.8	56.42
400	10835	10766.4	68.6
420	10767.42	10689.04	78.38
440	10706.48	10620.72	85.76
460	10652.18	10561.44	90.74
480	10604.52	10511.2	93.32
500	10563.5	10470	93.5
520	10529.12	10437.84	91.28
540	10501.38	10414.72	86.66
560	10480.28	10400.64	79.64
580	10465.82	10395.6	70.22
600	10458	10399.6	58.4

Data used for the this comparison were filtered to eliminate low load LOCAL data below the range also seen by ALC. Also, all data was eliminated where the top feedwater heater was out of service or other obvious non normal conditions.

As can be seen there appears to be virtually no difference for Unit 1 and the difference for Unit 2, although slightly larger, is less than 1 percent.

As mentioned, these results are presented as preliminary. Plans to further refine the comparison include trying to find comparable periods of average loading in both modes in closer time proximity (this presentation is a regression through all data throughout the year). Comments are solicited to also help refine this comparison such as:

- Other operating considerations to be filtered out?
- Known periods of 2008 where data should be ignored for some other reason?
- Any reason to expect a difference between units?
- Has there been previous work at trying to determine this difference, either at Rush Island or known in literature?

Work has not begun in trying to determine the effect of spinning reserve operation.

Instrumentation and other Performance Monitoring Issues

Two Pi tags are noted as bad quality for this report:

Unit 1 – 1PMN15104 – FWH 2 Ext pressure
Unit 2 – 2BLR04474 – Secondary Air Temp

Neither of these tags effect the heat rate calculation but due influence other performance parameters.

As an attachment to this report please find an example Excel file that is proposed to be used to keep track of instrumentation issues and other action items, including the ability to retain a historical record. Please comment on the intent, format and also a common drive to Rush and Perf. Engr., where this might be stored. We don't have write access to I:Rush.

Unit 1 Observations

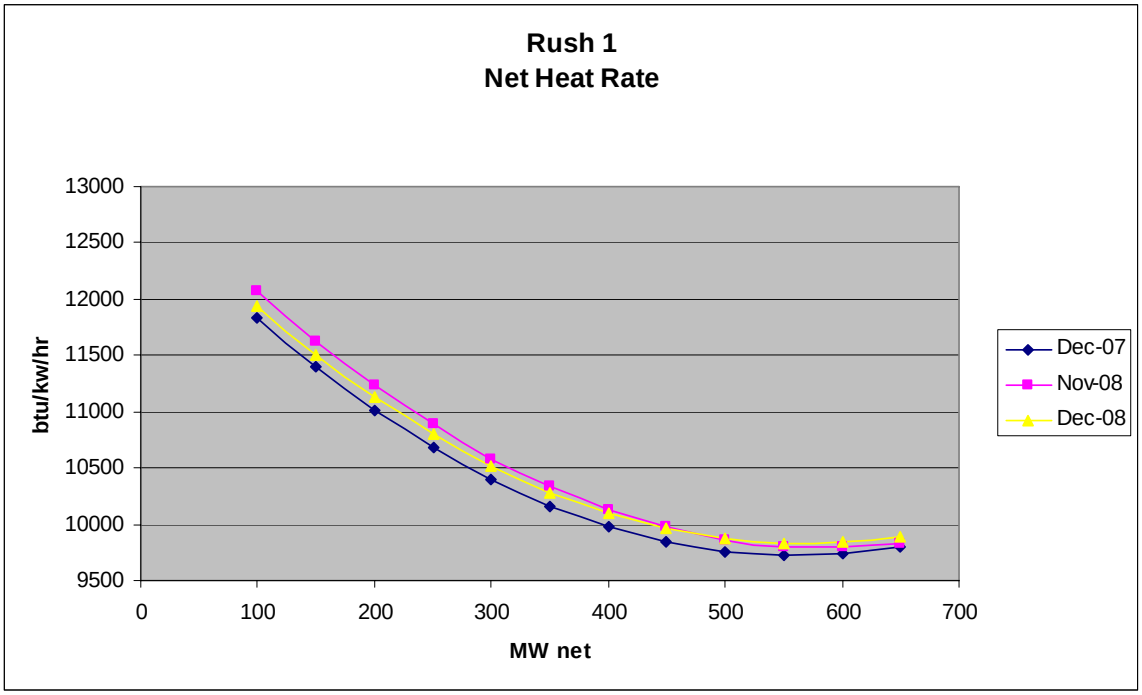
Summary of Performance Report for:

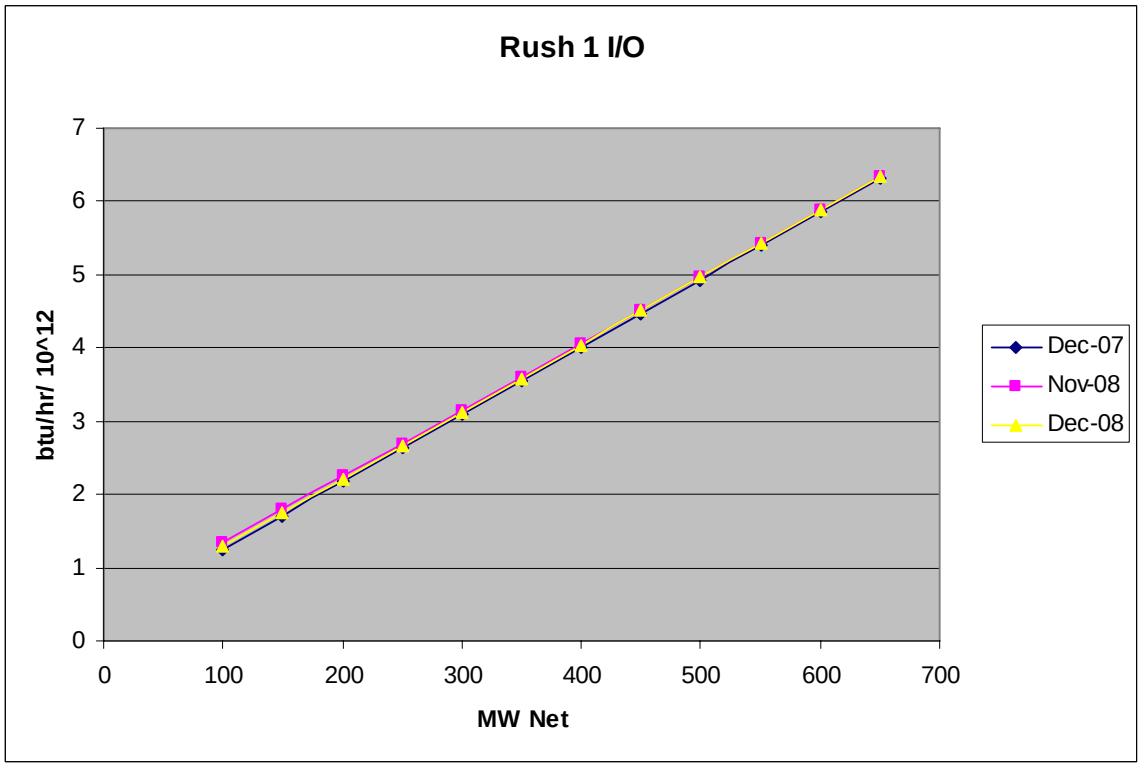
Plant	Rush Island			
Unit	1			
Period				
		Dec-07	Nov-08	Dec-08
Full Load Performance				
Hours of Data		413	464	302
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	638.2	643.5	641.0
AUX POWER	MW	29.6	31.5	31.5
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9739.0	9810.9	9844.8
Boiler Efficiency Actual	%	86.9	86.7	87.0
CONTROL VALVE POSITION LVDT	%	100.5	100.0	100.0
FEEDWATER TEMP TO ECON	degF	494.9	496.5	496.0
FEEDWATER TEMP TO HTR 1	degF	445.0	446.9	446.6
HP Turbine Efficiency Actual	%	85.1	84.9	84.9
IP Turbine Efficiency Corrected	%	93.5	92.7	92.7
Condenser Pressure	inHga	1.6	2.2	2.0
AIRHTR-A GAS OUTLET TEMP	degF	284.8	285.9	290.1
AIRHTR-B GAS OUTLET TEMP	degF	291.6	299.2	308.3
AMBIENT AIR TEMP	degF	36.0	46.4	33.3
CIRC WTR TEMP TO LP CONDB	degF	39.0	50.1	37.4
CIRC WTR TEMP TO LP CONDB	degF	37.4	48.5	36.4
Minimum River Temperature	degF	37.4	48.5	36.4
FWH 1 Temperature Rise	degF	49.9	49.6	49.4
Net Load	MW	608.5	611.9	609.4
Average Exit Gas Temperature	degF	288.2	292.5	299.2
Aux Power	%	4.6	4.9	4.9
Gross Unit Heat Rate	BTU/KW-HR	9286.8	9330.3	9360.3
Gross Turbine Heat Rate	BTU/KW-HR	8068.8	8088.1	8145.7
Measured Feedwater Flow	KPPH	4330.8	4352.1	4369.6
Calc Steam Evaporated	KPPH	4323.1	4347.4	4365.2
Steam Flow From First Stage	KPPH	4074.9	4155.9	4172.4
FW/Steam		1.1	1.0	1.0
Steam/Load		6.4	6.5	6.5
FW/Load		6.8	6.8	6.8

The only performance concern noted for this unit either from the previous heat rate trends and table, or the following d trends, is a decreasing trend in corrected load. There is no apparent reason for this change from trends of cylinder efficiencies or stage pressures. It is hard to discern from the graph, but the corrected load appears to repeat this pattern every year back to 2002. That is there is a general trend down from fall to January (the exception is the 2004-2005 outage). This may indicate an error in a correction factor or the measurement used for it (steam coil flow, backpressure?).

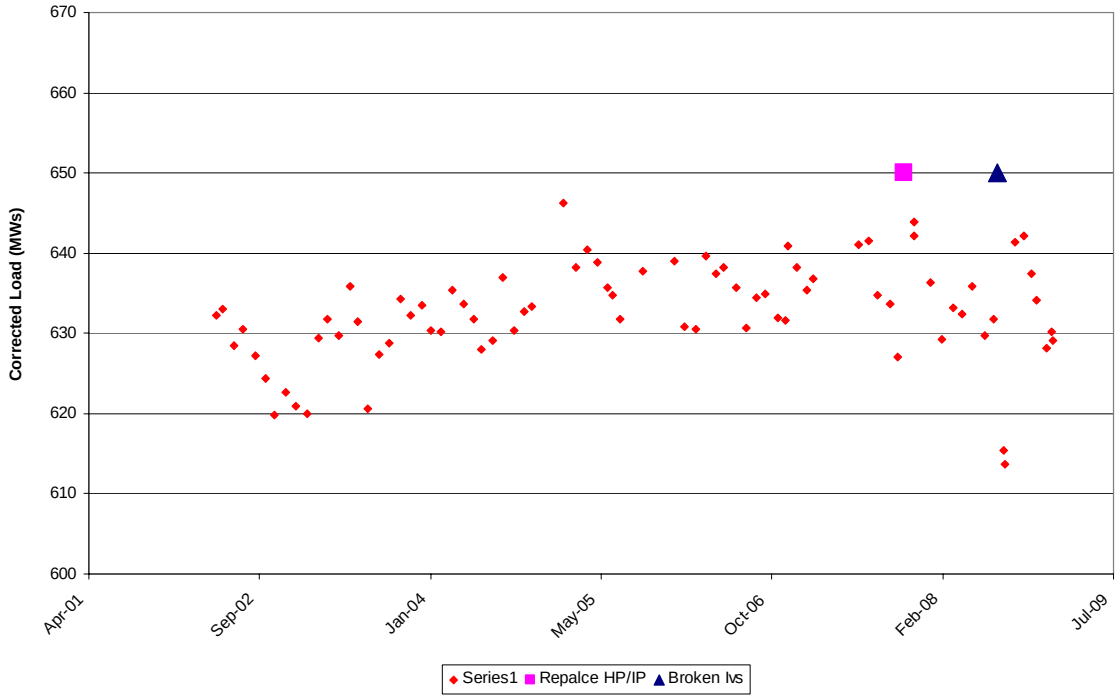
In the last report, it was pointed out that there were some unexplained step changes in turbine heat rate. Further investigation narrowed the cause down to several tags that made corresponding step changes. Efforts to determine the cause of these changes were indeterminate. Recently, efforts and changes were made to ensure that the EtaPRO system is using the same tags as have been used previously for periodic turbine

performance assessments. Hence additional step changes can be expected from December and January results. This is true for both units.

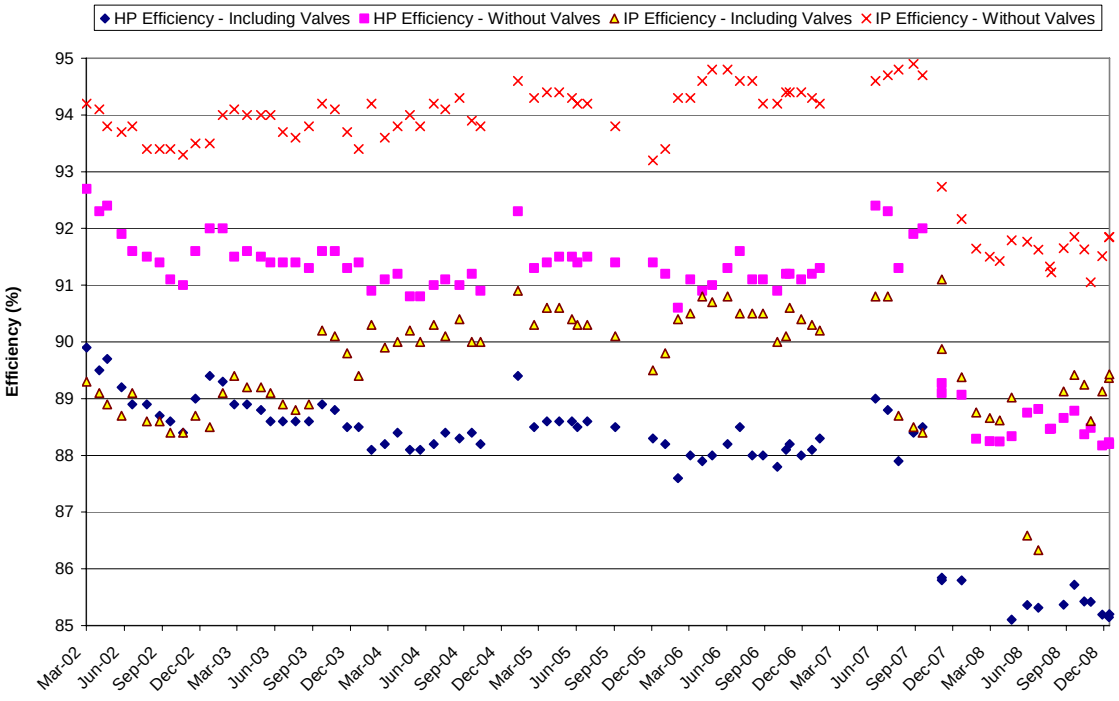




Rush Island Unit 1 - Corrected Load



Rush Island Unit 1 - HP and IP Efficiencies



Unit 2 Observations

Summary of Performance Report for:

Plant	Rush Island			
Unit	2			
Period				
		Dec-07	Nov-08	Dec-08
Full Load Performance				
Hours of Data		371	208	272
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	612.8	630.5	627.7
AUX POWER	MW	35.6	36.9	37.3
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	10256.8	10608.8	10622.3
Boiler Efficiency Actual	%	86.0	86.0	86.3
CONTROL VALVE POSITION LVDT	%	99.8	99.6	99.6
FEEDWATER TEMP TO ECON	degF	489.8	492.3	491.8
FEEDWATER TEMP TO HTR 1	degF	441.7	443.5	443.3
HP Turbine Efficiency Actual	%	89.7	90.2	90.1
IP Turbine Efficiency Corrected	%	91.3	91.7	91.5
Condenser Pressure HP	inHga	2.2	1.7	1.5
AIRHTR-A GAS OUTLET TEMP	degF	301.1	308.8	298.6
AIRHTR-B GAS OUTLET TEMP	degF	309.8	321.6	334.7
AMBIENT AIR TEMP	degF	38.6	38.9	33.9
CIRC WTR TEMP TO LP CONDB	degF	39.9	46.2	37.5
CIRC WTR TEMP TO LP CONDB	degF	39.9	46.2	37.4
Minimum River Temperature	degF	39.9	46.2	37.4
FWH 1 Temperature Rise	degF	48.1	48.9	48.6
Net Load	MW	577.2	593.7	590.5
Average Exit Gas Temperature	degF	305.5	315.2	316.6
Aux Power	%	5.8	5.8	5.9
Gross Unit Heat Rate	BTU/KW-HR	9660.9	9988.6	9991.9
Gross Turbine Heat Rate	BTU/KW-HR	8309.7	8586.3	8621.1
Measured Feedwater Flow	KPPH	4171.8	4466.1	4471.8
Calc Steam Evaporated	KPPH	4244.8	4544.9	4551.5
Steam Flow From First Stage	KPPH	3970.2	4086.9	4099.7
FW/Steam		1.050792	1.09	1.09
Steam/Load		6.479021	6.48	6.53
FW/Load		6.8081	7.08	7.12

Note that compared to the same time last year the only major difference in operating parameters was backpressure which is considerably better for 2008 however the indicated heat rate is worse. This difference is driven by the apparent increase in feedwater flow.

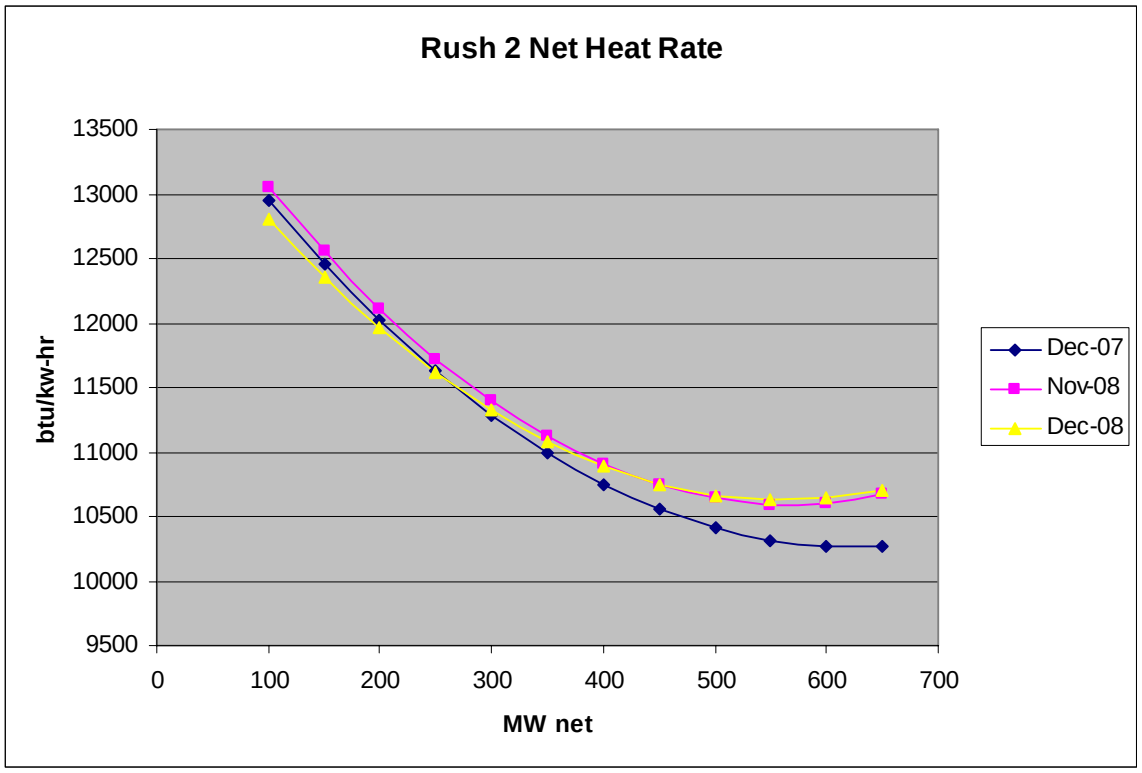
Note the large difference in feedwater to first stage determined steam flow ratio for Unit 2 compared to Unit 1. (It should be remembered that the steam flow indication for Unit 1 is probably erroneously low due to the increase in first stage nozzle area for that unit. This would make the ratio difference between the two units even larger). Also note that the steam to load ratio for both the units is very close (unit 1's would be slightly higher than shown for the foregoing explanation).

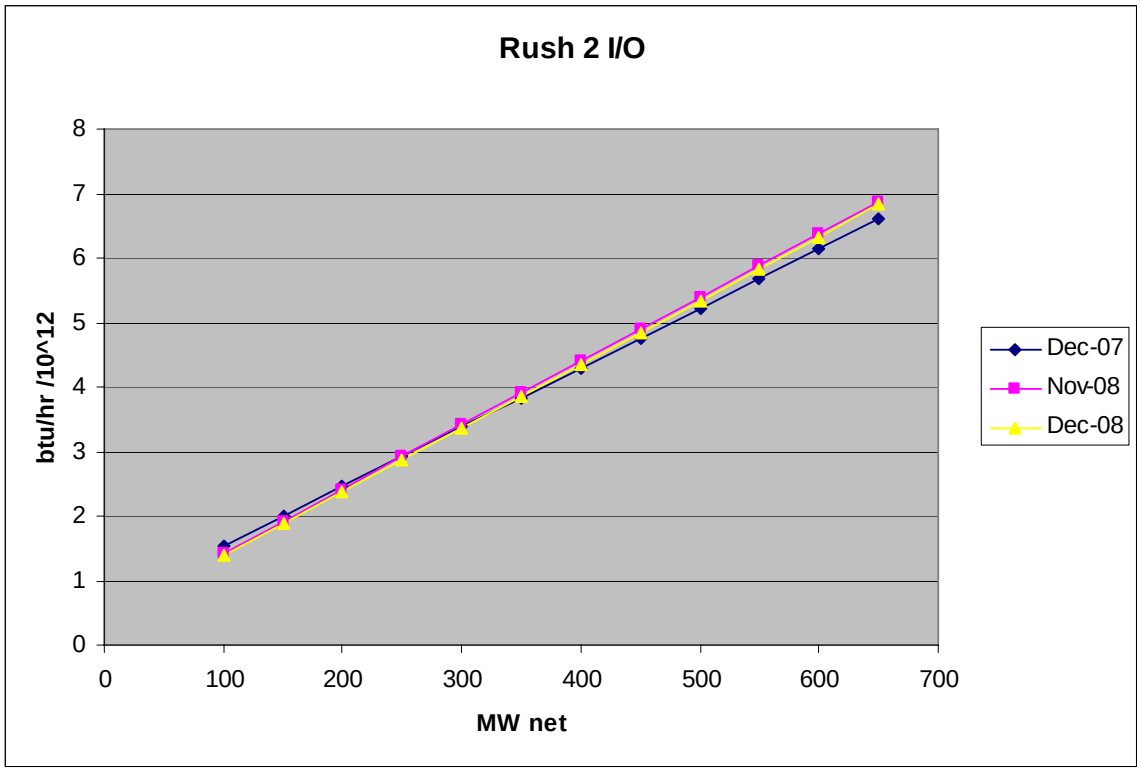
EtaPRO uses the feedwater flow for heat rate determination by calculating a steam flow from that value and adding in and subtracting appropriate other flows (sprays, blowdown, etc.) It is felt that this determined steam flow for unit 2 is erroneously high either due to an error in the feedwater flow measurement, some loss of flow from the cycle in the boiler boundary, or other isolation problem which makes the measured feedwater flow not indicative of the true flow to the economizer and hence turbine steam flow. It is recommended that a thorough field feedwater isolation check be made from the point of feedwater measurement (HPBFPp suction) to finishing superheater outlet. Also a calibration of the feedwater flow transmitters should be done.

Also as an attachment to the report is an email from Scott Anderson in Corporate Planning-Operations Analysis. The gist of this correspondence is that their comparison of the previous months' reported heat rates with that by fuel burn does not agree. Although the fuel burn heat rate is on a plant basis, it does show values very close to Unit 1. This gives further suspicion to the EtaPRO heat rate for Unit 2.

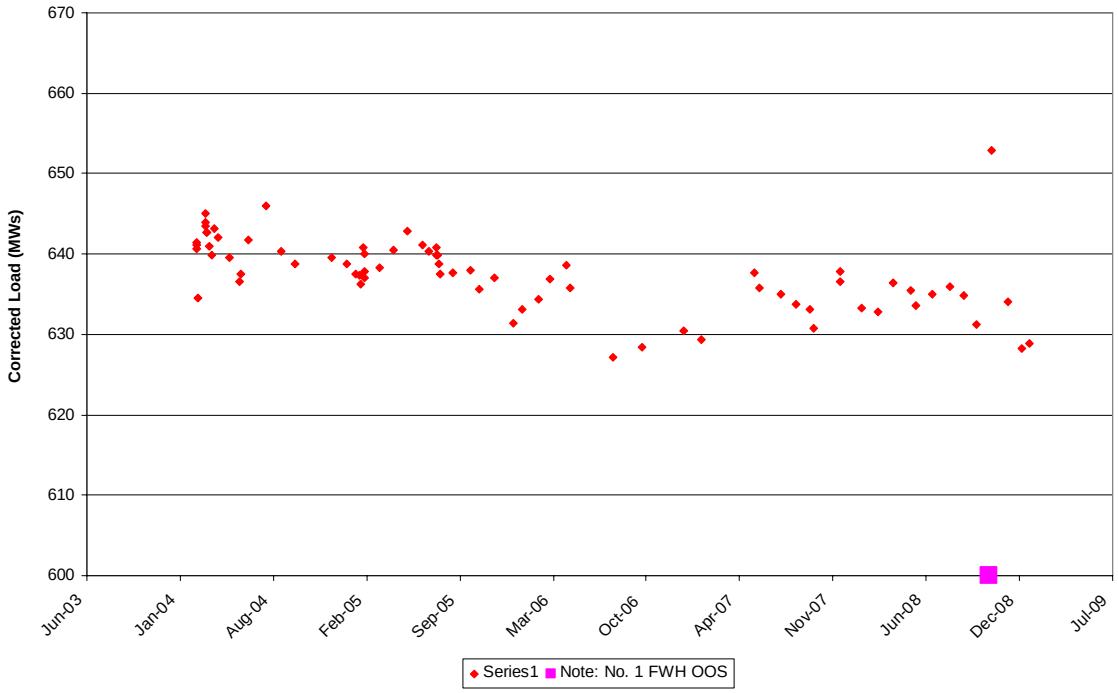
A low corrected load for this unit is noted also and although only looking back to 2004, the same sort of cycle is apparent, that is low corrected loads is more common in January. These corrected load and efficiency plots are determined from grabbing an hours worth of VWO data about once a month at random. Future improvement plans for EtaPRO include on-line corrected load calculations. Once this is complete a thorough cause/effect study can be done concerning load correction factors.

For future reference are there air heater gas bypass systems on both ducts and both units? Also is there a ProcessBook display that may indicate their status?

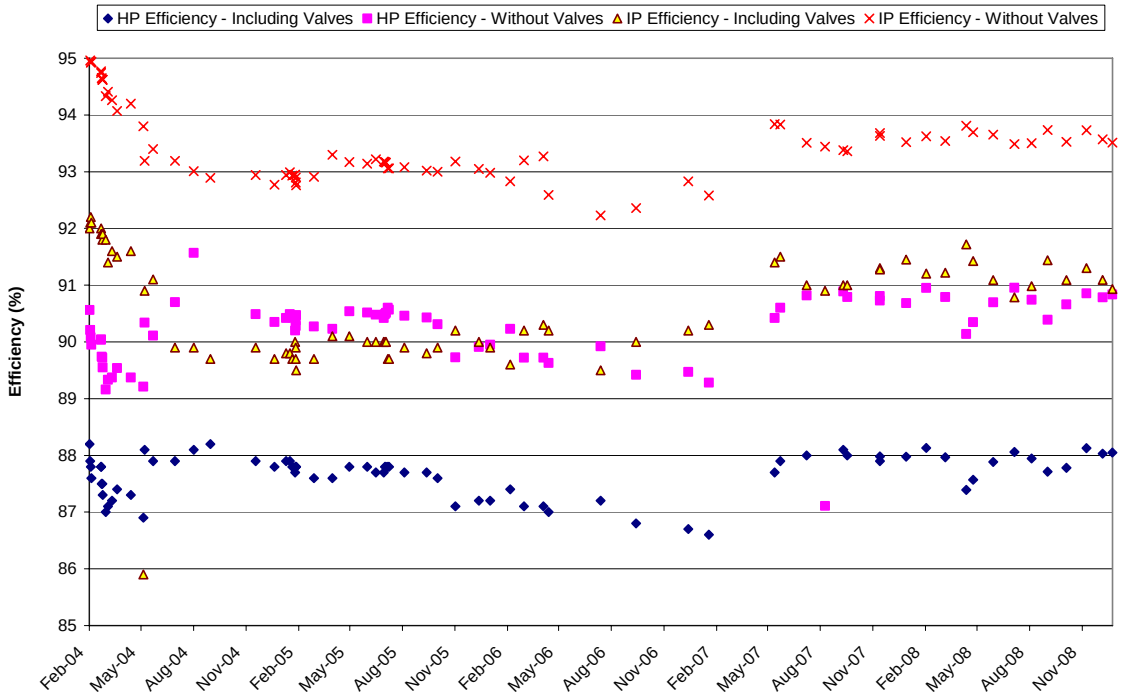

Rush 2 Net Heat Rate
13500
13000
12500
12000
11500
11000
10500
10000
9500
btu/kw-hr
0
100
200
300
400
500
600
700
MW net
Dec-07
Nov-08
Dec-08


Rush 2 I/O
8
7
6
5
4
3
2
1
0
btu/hr /10^12
0
100
200
300
400
500
600
700
MW net
Dec-07
Nov-08
Dec-08

Rush Island Unit 2 - Corrected Load



Rush Island Unit 2 - HP and IP Efficiencies



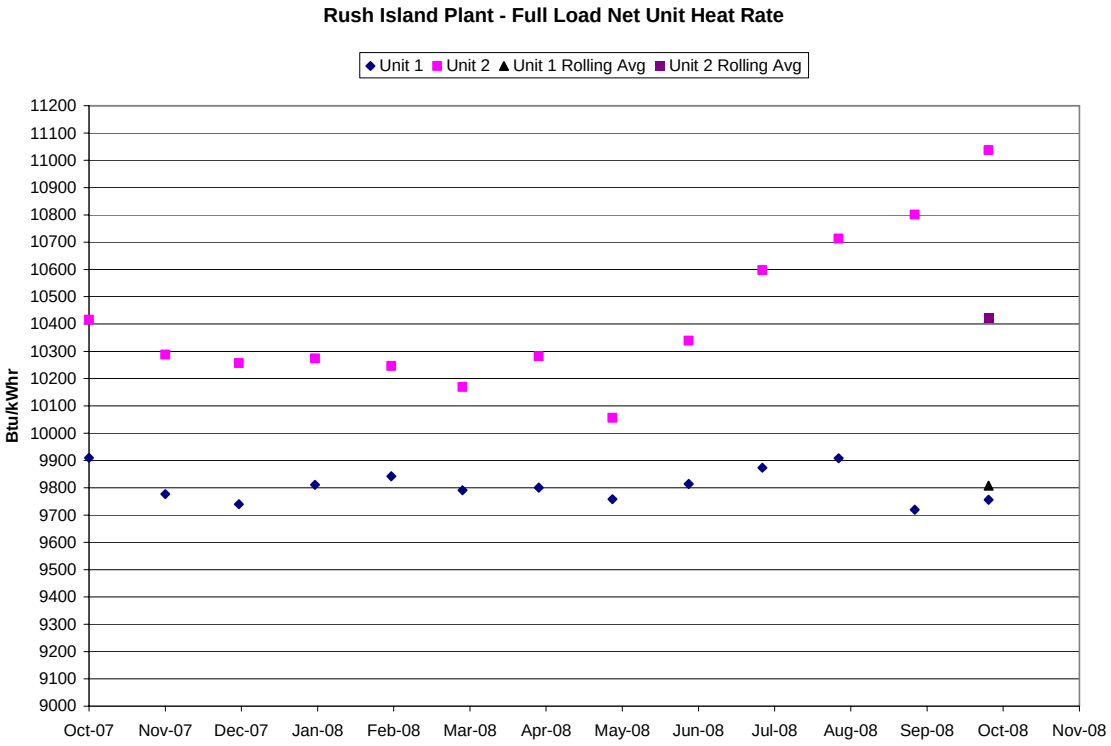
November 12, 2008

To: Mr. David Strubberg
From: Joe Sind
Cc: Andy Williamson, Paul Starks, Greg Vasel, Gary Blessing, Mike Clonts, Matt Wallace, Ken Stuckmeyer, Jeff Shelton, Jeff Colter, Tim Finnell

Re: Rush Island October Performance Report

The last report data was Sept. 2 and covered data through August 2008. No comments were received concerning the report format so this report is basically the same. However please advise on anything you think would be an improvement: presentation, content (additional or that you feel is of little use). Attempts will be made to improve the report until all recipients are satisfied.

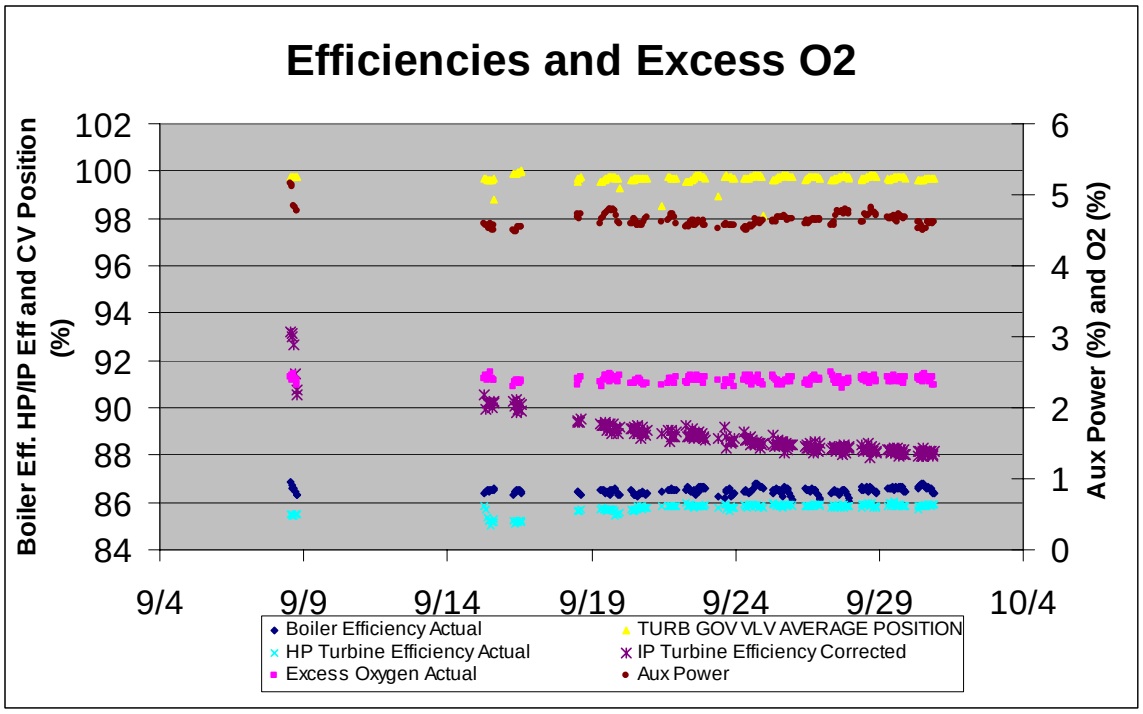
Actual data and graphs for the month's performance report are on page 4**.** Observation concerning the data, the units' operation and performance in general are as follows.



Unit 1 heat rate was improved with the repair of two the unit's intercept valves in early September. Furthermore intercept valve strainers were removed on all four IVs at that time. Jeff Shelton estimated the improvement by removing the strainers was about 1 MW to corrected load.

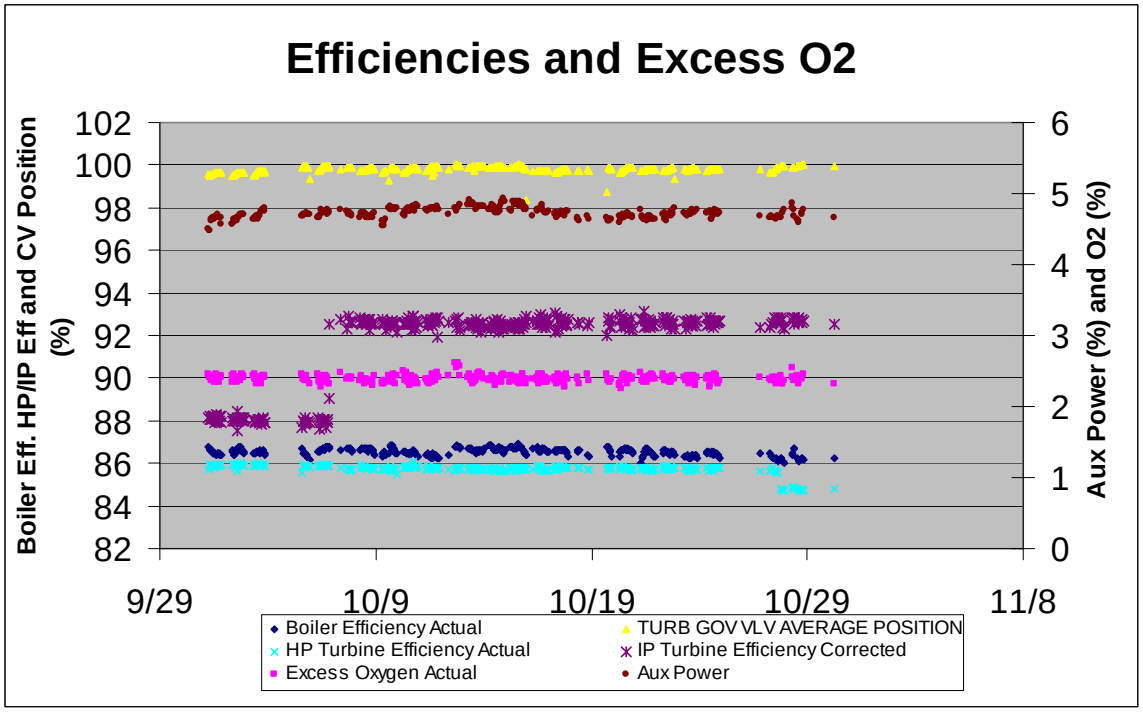
The tabular data for unit 1 that follows has some suspicious results for IP turbine efficiency. The data used for this calculation needs to be reviewed in more detail to determine the cause of step changes and unexplained trends.

UNIT 1 VWO



Note the few observations of apparent improvement in IP efficiency post RHIV repair and downward trend the remainder of the month.

UNIT 1 VWO



Note step change increase in efficiency on Oct. 6 (and decrease in HP efficiency on 10/27). J. Sind has action to review and correct these reported efficiencies provided a suitable replacement tag can be found for any identified bad data.

Unit 2 heat rate continues to get worse with the latest month being a full month with the top heater OOS. This heater is OOS due to a water side relief valve being failed on the heater and proper isolation cannot be achieved to repair. In the last report attention was drawn to Unit 2's high relative feedwater flow rate which could at least partly be attributed to this relief valve. If heat rates don't return to pre July level when the valve is repaired and the top heater is restored, a more thorough investigation into cycle isolation is recommended.

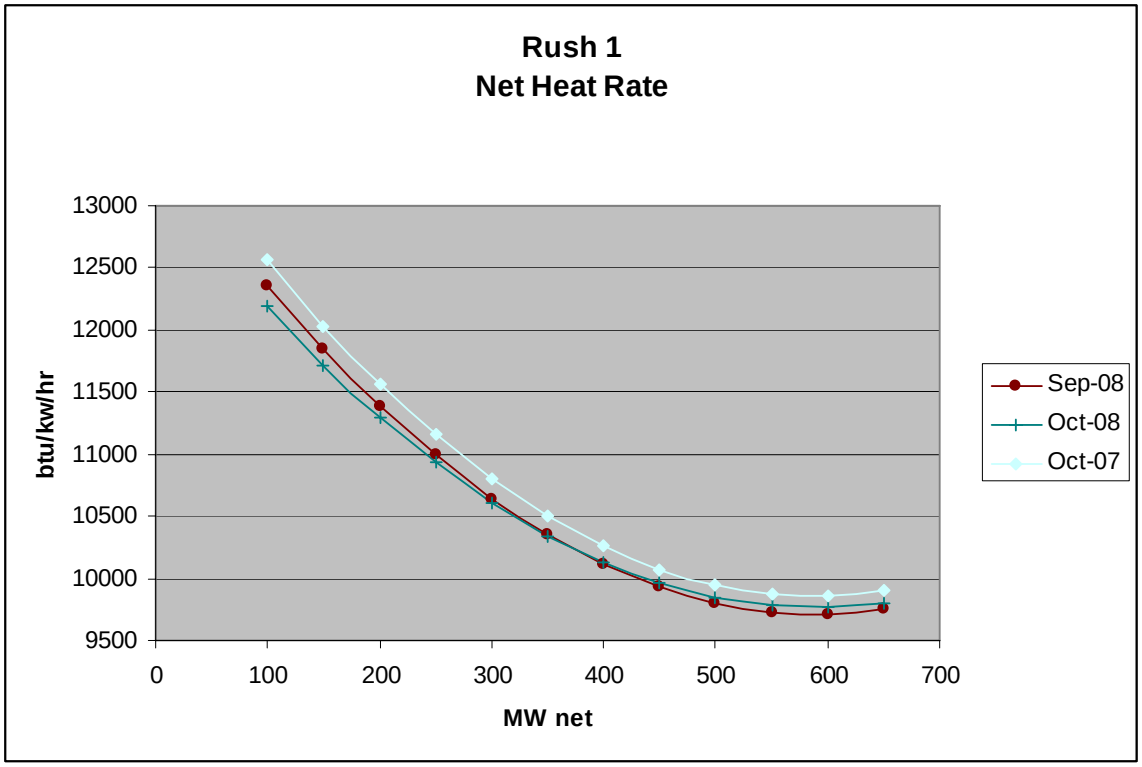
Jeff Shelton has done a great job at emulating the previous work of Gary Blessing to determine corrected unit load, HP/IP efficiencies, corrected stage pressures, etc. He has also calculated these performance indicators for some months to bridge the gap between when GSB quit performing these duties and present. Plots of corrected load and turbine efficiencies for both units are included in the back of this report. The intent is to include this information in future reports. Additional graphs of corrected stage pressure will be included if necessary to explain any changes in performance.

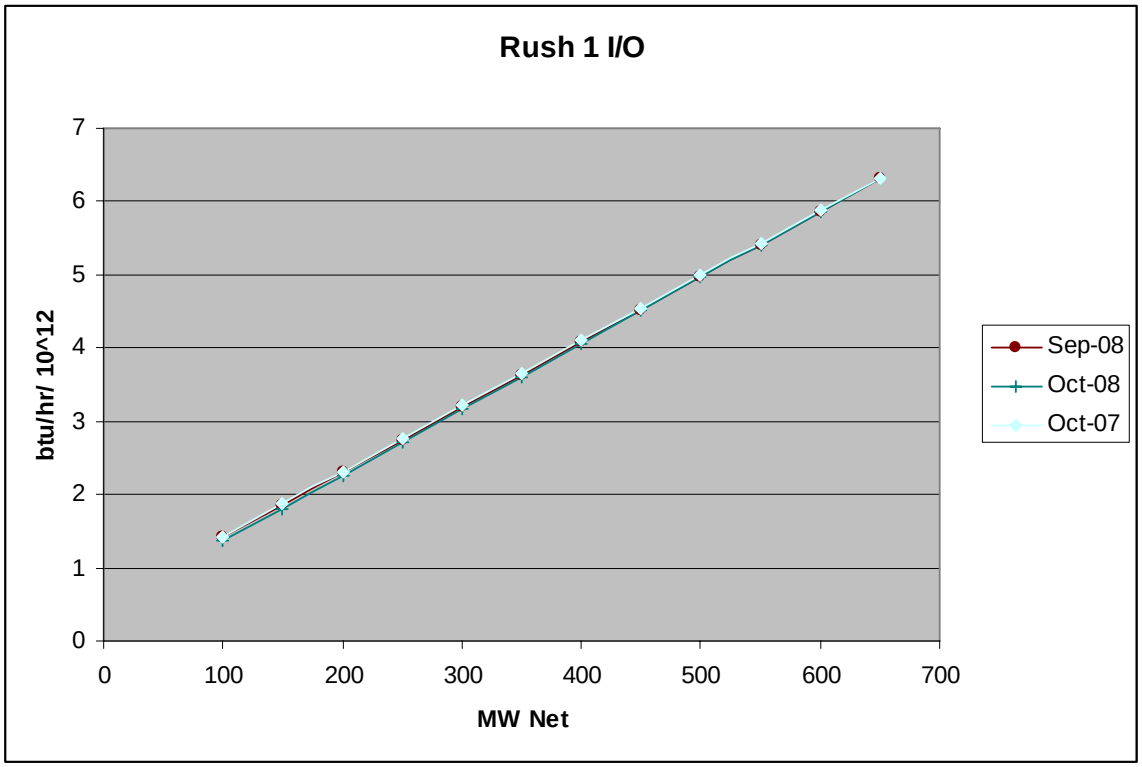
Summary of Performance Report for:

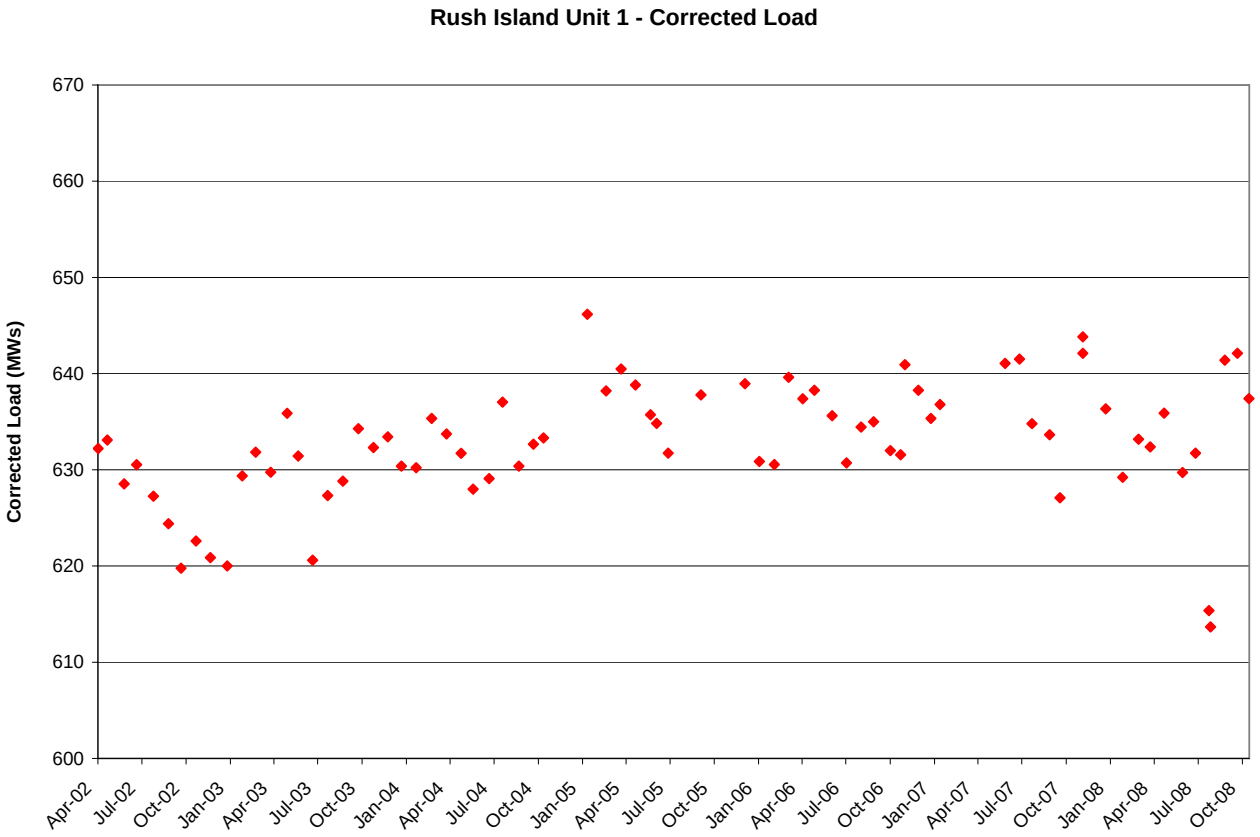
Plant Rush Island
Unit 1
Period

		Oct-07	Sep-08	Oct-08
Full Load Performance				
Hours of Data		74	201	341
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	634.7	643.3	647.1
AUX POWER	MW	30.9	29.9	30.6
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9909.5	9720.9	9755.8
Boiler Efficiency Actual	%	86.4	86.5	86.5
CONTROL VALVE POSITION LVDT	%	99.8	99.7	99.8
FEEDWATER TEMP TO ECON	degF	499.5	496.3	497.1
FEEDWATER TEMP TO HTR 1	degF	446.3	446.4	447.2
HP Turbine Efficiency Actual	%	86.7	85.8	85.7
IP Turbine Efficiency Corrected	%	90.3	88.8	91.7
Condenser Pressure	inHga	2.8	2.9	2.8
AIRHTR-A GAS OUTLET TEMP	degF	288.0	296.6	287.6
AIRHTR-B GAS OUTLET TEMP	degF	293.0	308.0	299.4
AMBIENT AIR TEMP	degF	63.9	70.3	61.6
CIRC WTR TEMP TO LP CONDB	degF	71.0	71.5	66.3
CIRC WTR TEMP TO LP CONDB	degF	69.4	69.9	64.7
Minimum River Temperature	degF	69.4	69.9	64.7
FWH 1 Temperature Rise	degF	53.2	49.9	49.9
Net Load	MW	603.8	613.5	616.5
Average Exit Gas Temperature	degF	290.5	302.3	293.5
Aux Power	%	4.9	4.6	4.7
Gross Unit Heat Rate	BTU/KW-HR	9427.0	9269.4	9294.8
Gross Turbine Heat Rate	BTU/KW-HR	8148.8	8017.7	8043.5
Measured Feedwater Flow	KPPH	4371.1	4310.6	4347.9
Calc Steam Evaporated	KPPH	4363.6	4302.4	4342.5
Steam Flow From First Stage	KPPH	4158.7	4116.3	4150.3
FW/Steam		1.1	1.0	1.0
Steam/Load		6.6	6.4	6.4
FW/Load		6.9	6.7	6.7

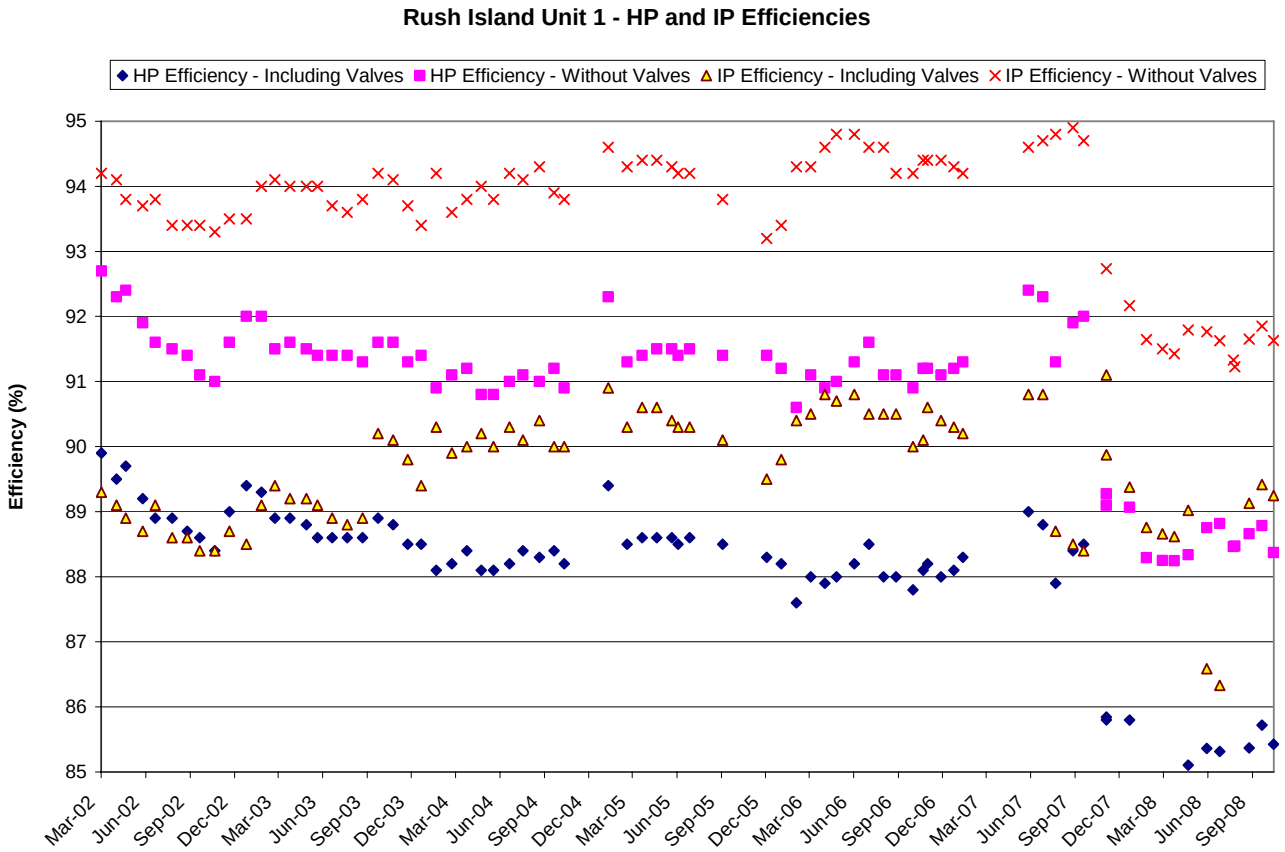
Suspect Data for IP turb Efficiency


Rush 1
Net Heat Rate
btu/kw/hr
13000
12500
12000
11500
11000
10500
10000
9500
0
100
200
300
400
500
600
700
MW net
Sep-08
Oct-08
Oct-07


Rush 1 I/O
btu/hr/ 10^12
7
6
5
4
3
2
1
0
0
100
200
300
400
500
600
700
MW Net
Sep-08
Oct-08
Oct-07



The two low load values in August were due to two broken intercept valves on the Unit.



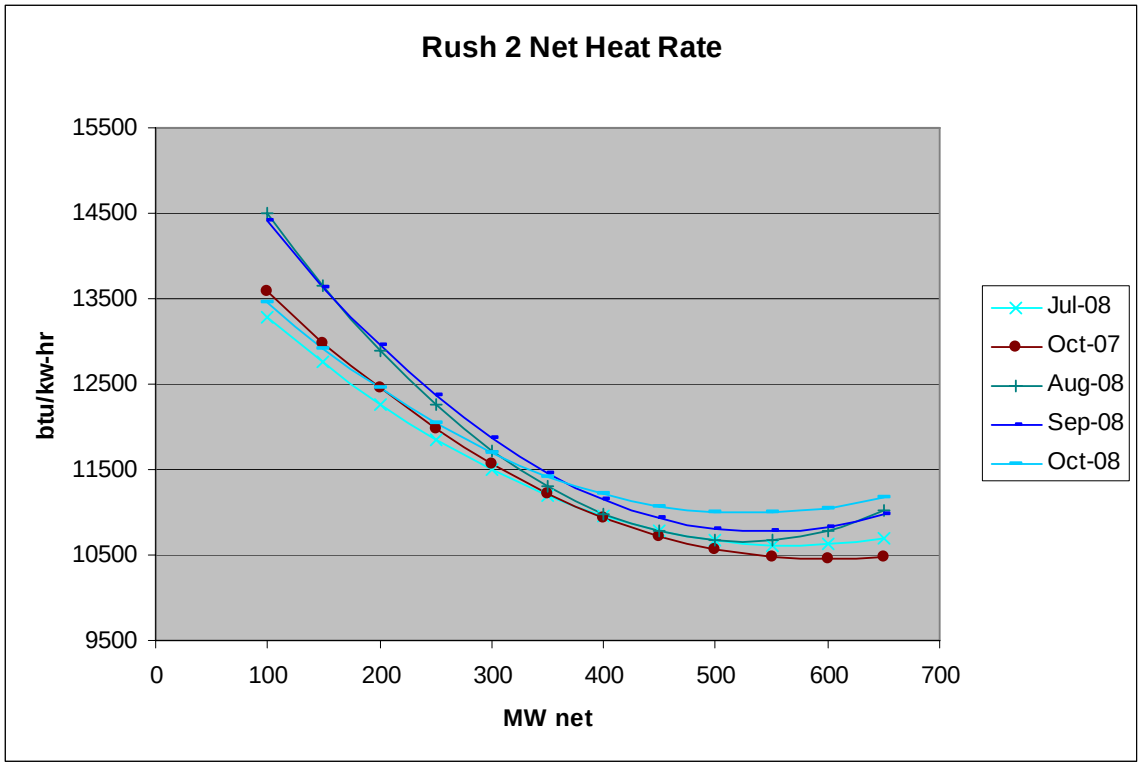
Significant efficiency changes following rotor replacement in Fall ’07. The change in IP external efficiency following the second valve failure is also apparent in Aug. ‘08

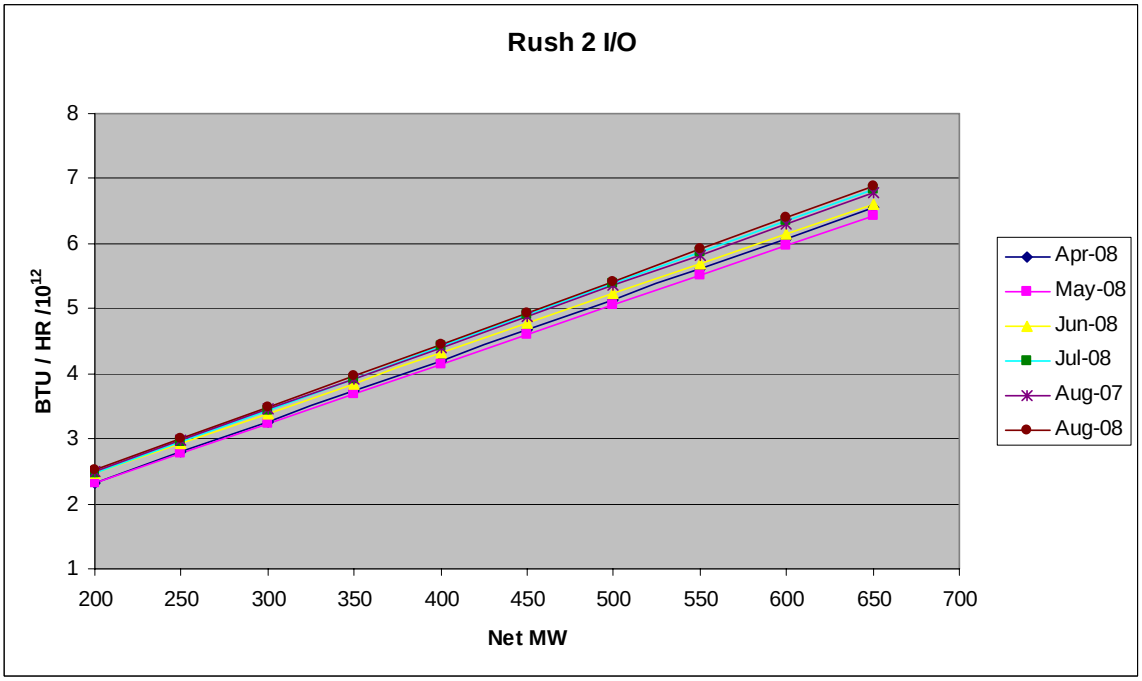
Summary of Performance Report for:

Plant Rush Island
Unit 2
Period

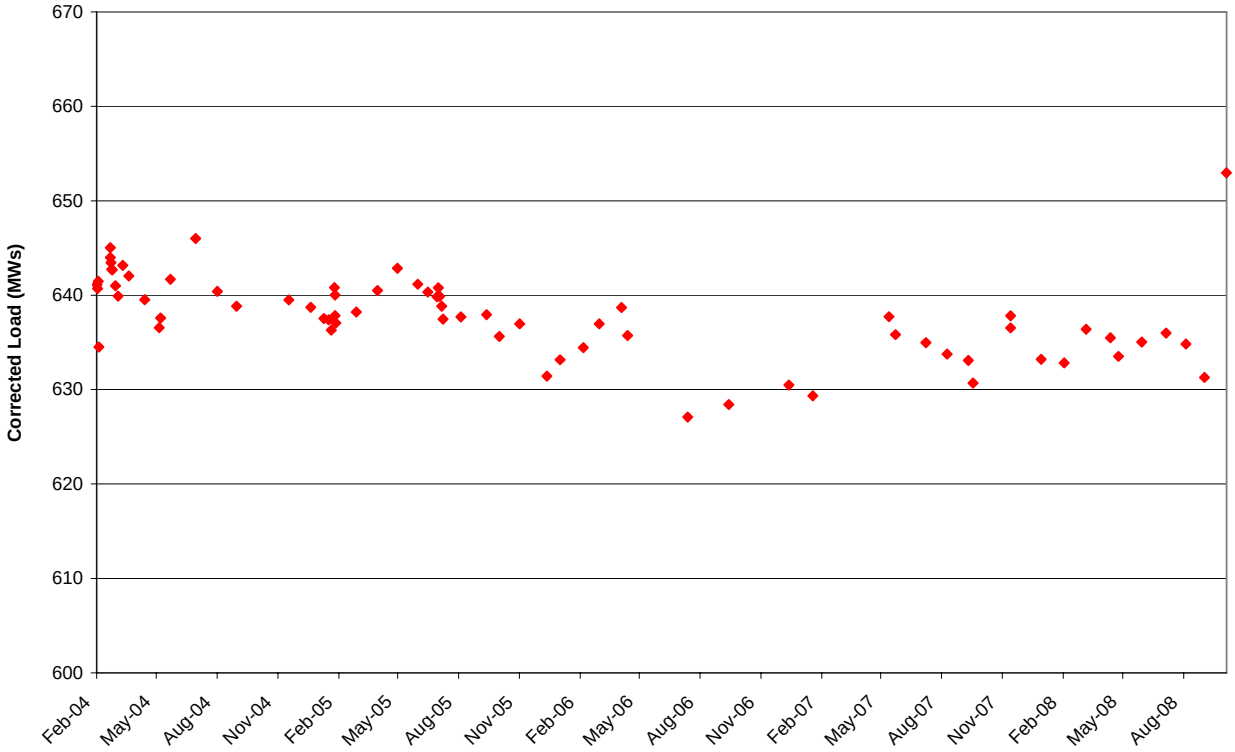
		Oct-07	Sep-08	Oct-08
Full Load Performance				
Hours of Data		183	67	62
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	621.6	611.6	613.2
AUX POWER	MW	36.3	35.1	34.9
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	10421.0	10813.3	11037.0
Boiler Efficiency Actual	%	85.5	85.7	85.9
CONTROL VALVE POSITION LVDT	%	99.7	99.5	99.5
FEEDWATER TEMP TO ECON	degF	491.9	490.8	443.7
FEEDWATER TEMP TO HTR 1	degF	443.4	441.8	#DIV/0!
HP Turbine Efficiency Actual	%	89.7	89.8	89.8
IP Turbine Efficiency Corrected	%	92.2	91.5	91.3
Condenser Pressure HP	inHga	2.6	2.7	2.2
AIRHTR-A GAS OUTLET TEMP	degF	299.6	314.6	299.1
AIRHTR-B GAS OUTLET TEMP	degF	308.7	327.8	307.3
AMBIENT AIR TEMP	degF	61.7	73.6	57.9
CIRC WTR TEMP TO LP CONDB	degF	62.0	74.4	63.1
CIRC WTR TEMP TO LP CONDB	degF	61.9	74.4	63.1
Minimum River Temperature	degF	61.9	74.4	63.1
FWH 1 Temperature Rise	degF	48.6	48.9	#DIV/0!
Net Load	MW	585.3	576.5	578.4
Average Exit Gas Temperature	degF	304.1	321.2	303.2
Aux Power	%	5.8	5.7	5.7
Gross Unit Heat Rate	BTU/KW-HR	9812.6	10192.5	10409.2
Gross Turbine Heat Rate	BTU/KW-HR	8384.9	8735.9	8944.0
Measured Feedwater Flow	KPPH	4254.7	4382.5	4160.1
Calc Steam Evaporated	KPPH	4344.8	4460.1	4362.1
Steam Flow From First Stage	KPPH	4019.4	3996.5	3852.7
FW/Steam		1.06	1.10	1.08
Steam/Load		6.47	6.53	6.28
FW/Load		6.84	7.17	6.78

No 1 heater OOS


Rush 2 Net Heat Rate
15500
14500
13500
12500
11500
10500
9500
btu/kw-hr
0
100
200
300
400
500
600
700
MW net
Jul-08
Oct-07
Aug-08
Sep-08
Oct-08

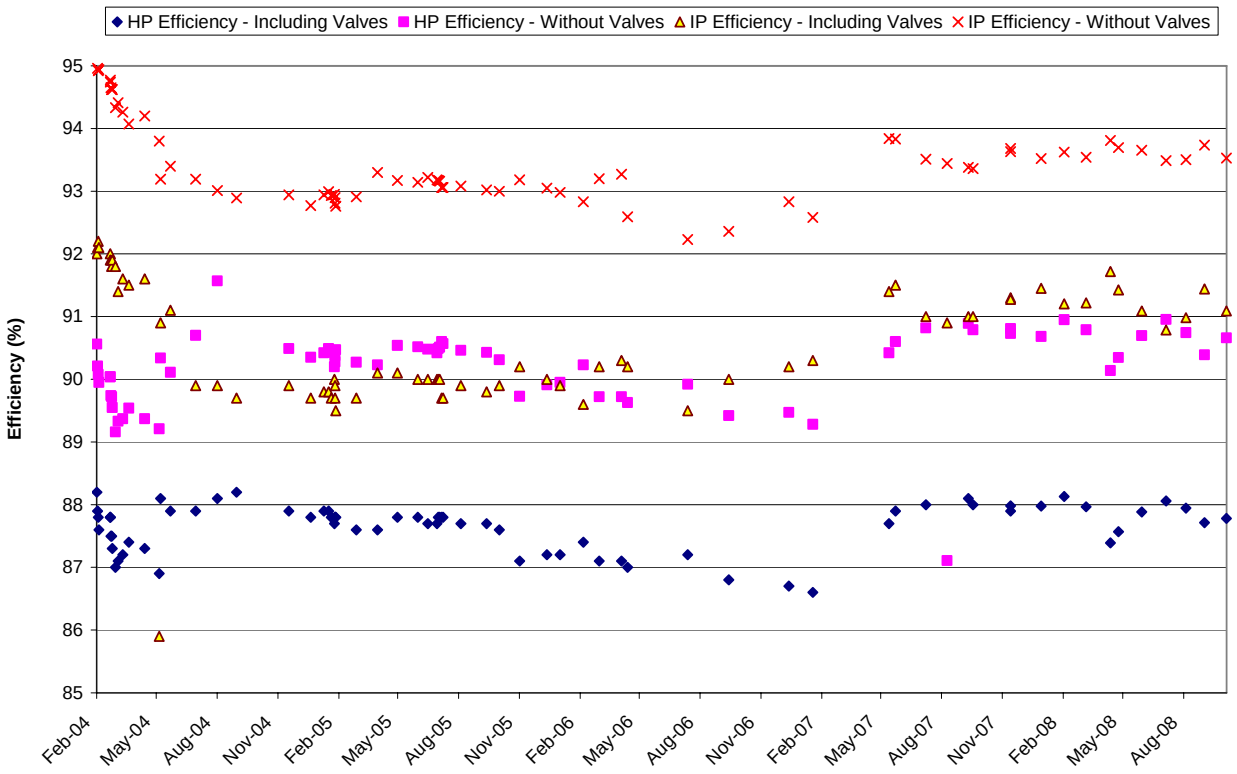

Rush 2 I/O
8
7
6
5
4
3
2
1
BTU / HR /10^12
200
250
300
350
400
450
500
550
600
650
700
Net MW
Apr-08
May-08
Jun-08
Jul-08
Aug-07
Aug-08

Rush Island Unit 2 - Corrected Load



The last load point is high due to the top heater being out of service.

Rush Island Unit 2 - HP and IP Efficiencies



September 2, 2008

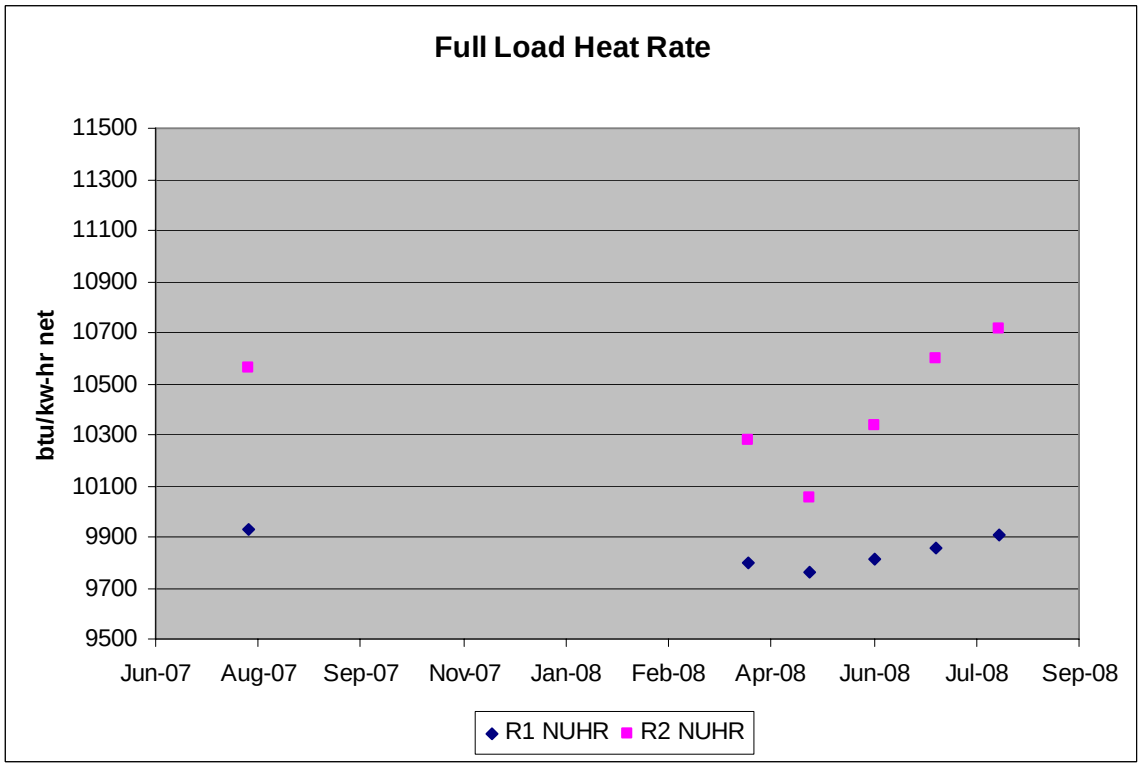
To: Mr. David Strubberg
From: Joe Sind
Cc: Andy Williamson, Paul Starks, Greg Vasel, Gary Blessing, Mike Clonts, Matt Wallace, Ken Stuckmeyer, Jeff Shelton, Jeff Colter, Tim Finnell

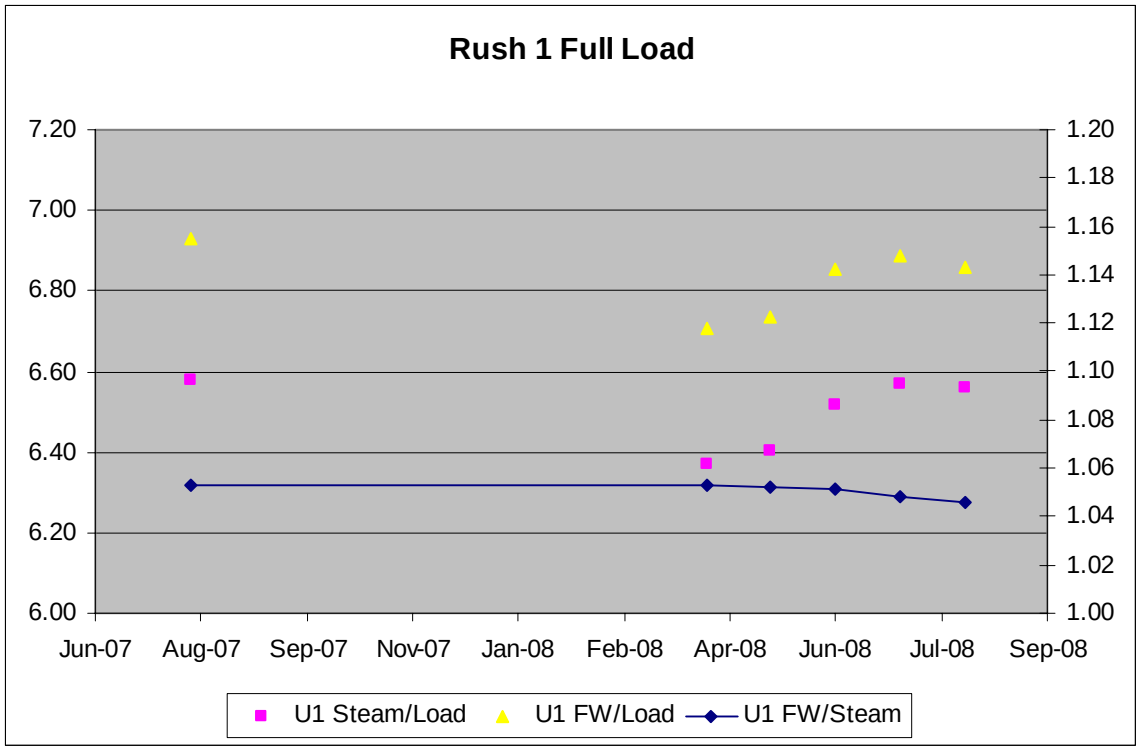
Re: Rush Island August Performance Report

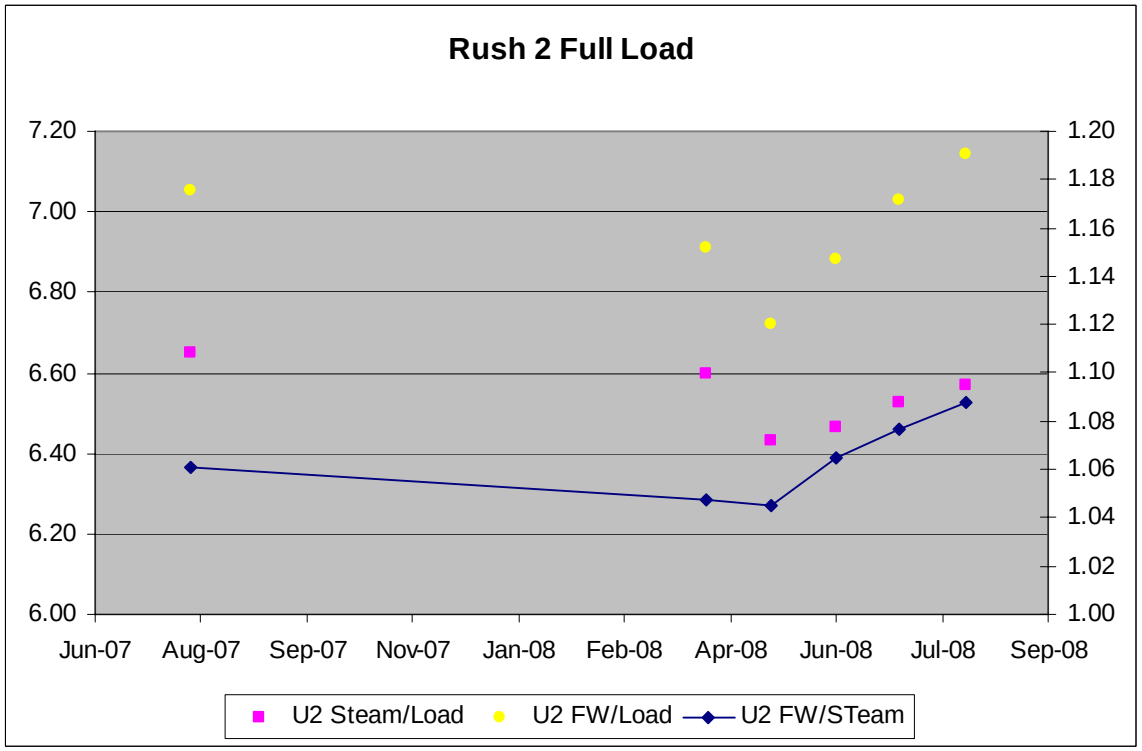
This is the first regular report following the initial demonstration in July's performance meeting. Some of the suggestions Gary Blessing made have been incorporated, but the report should not be considered in it's final form for regular publication. Please advise on anything you think would be an improvement: presentation, content (additional or that you feel is of little use). Attempts will be made to improve the report until all recipients are satisfied.

Actual data and graphs for the month's performance report are on page 4. Observation concerning the data, the units' operation and performance in general are as follows.

- The first observation is that Unit 2 heat rate is appreciably worse than Unit 1s, on the order of 5 % or more, and getting worse. The following three trends show both units data. The second and third are indicators of feedwater/steam flow/load relations.







Please note that heat rates are those calculated by EtaPRO at VWO (>98%) and use the feedwater flow to determine the turbine cycle heat input. Both units exhibit an expected increase in heat rate from May due to rising river temps and backpressures. They also

both show the same change in steam flow/mw, however the feedwater/mw is much higher for unit 2 reflecting the change in indicated heat rate. The disparity in feedwater/steam for unit 2 indicates either an instrumentation error or a loss of isolation.

As of the date of this report we are aware of a problem with a feedwater relief valve problem on the discharge of the No. 1 heater on Unit 2. This would definitely contribute to this disparity, however the difference in feedwater/load is on the order of almost 3%. Depending on the relative location of the feedwater measurement, other possible reasons for the high feedwater to load and steam ratio could be BFPp recirc., unmeasured boiler blowdown, boiler drains, drains before the turbine first stage (main steam line), etc.
It is recommended that unless a dramatic improvement is seen following the relief valve repair a thorough investigation of unit 2 feedwater isolation be undertaken.

Following are examples of the normal tables and graphs that will be included in each report. Some relevant comments are:

- Unit 1 IP efficiency change from May to June to July reflects the first intercept valve failure. The second IV failure in August would not show up as there was not any VWO data after that.
- The abnormal shape of the heat rate curve for unit 1 in August is due to operation with the top heaters OOS. Note these are plots of the trendlines of actual data. For unit 1 in August the actual data appeared as 2 distinct groups with the higher grouping with the FWHs OOS. The trendline terminating at a lower heat rate is not a true indication, just a result of the bad fit. Efforts could be made to glean all “bad operation” data from these plots but it is felt that this would diminish their purpose. Note the FWH OOS data does not get reflected in full load VWO data.
- Please note the low number of VWO hours for Unit 2 in May.

Please let me know if you have any questions regarding the data and once again I would appreciate any comments on how to make the report more valuable.

Summary of Performance Report for:

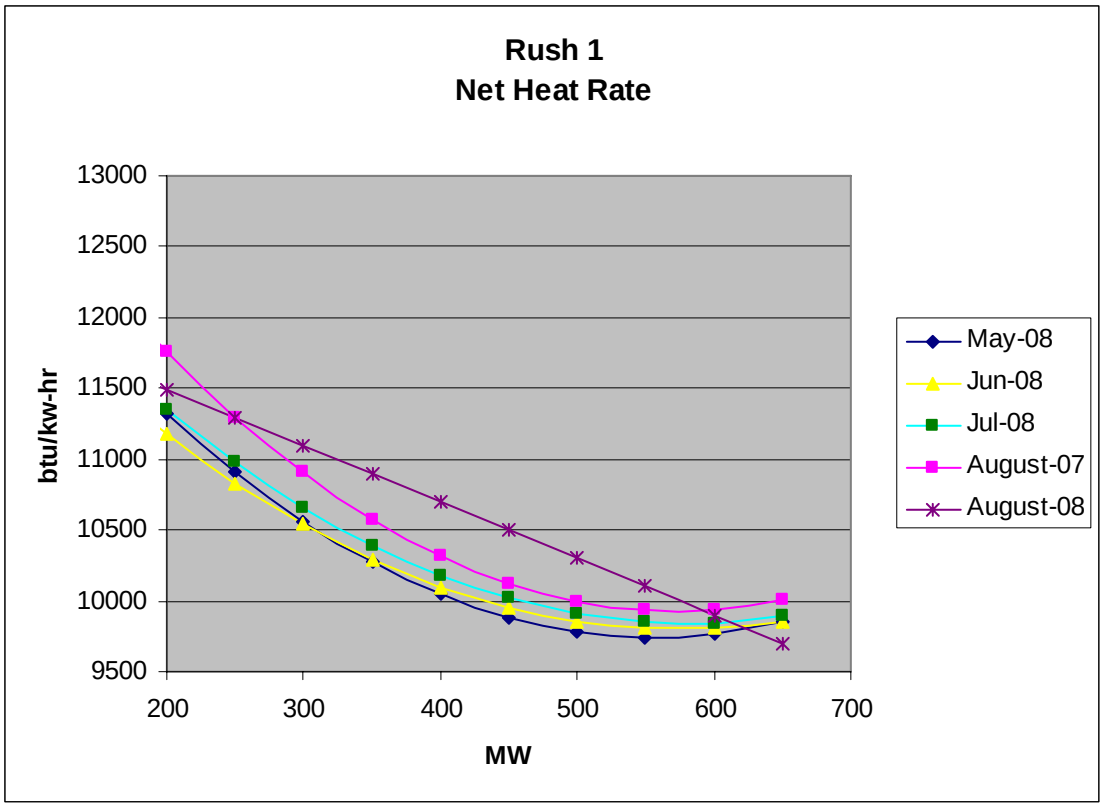
Plant Rush Island
Unit 1
Period

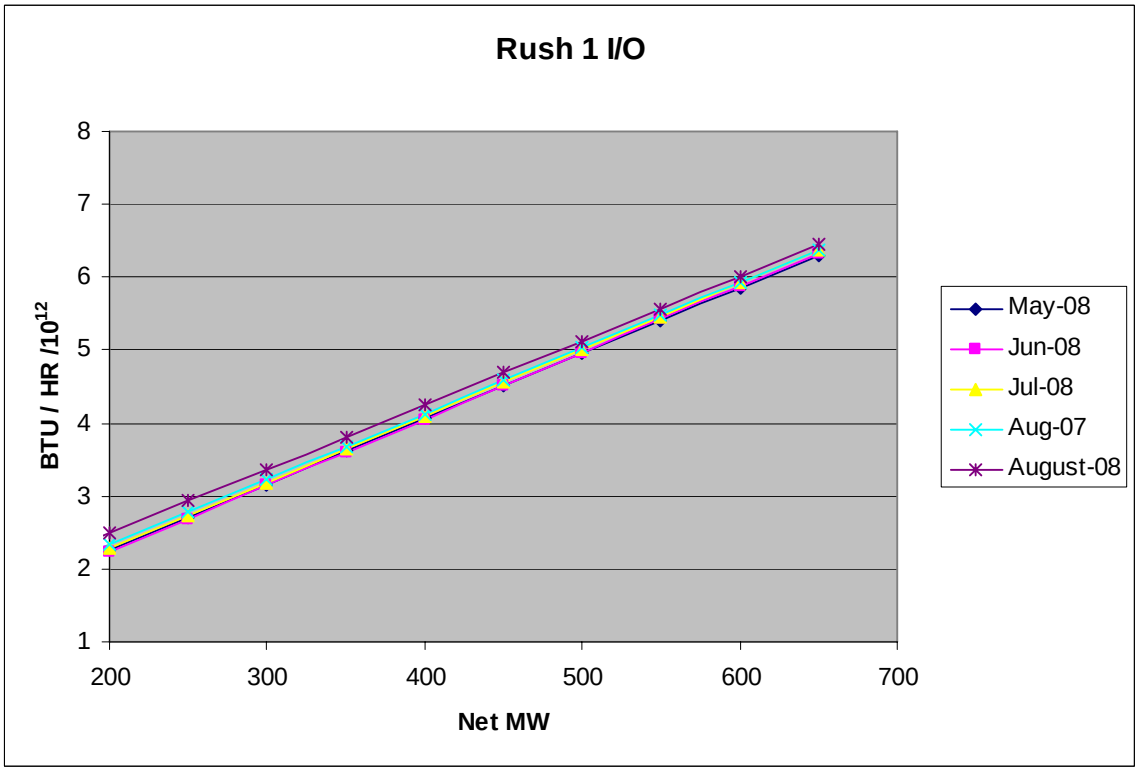
		August-07	April-08	May-08	June-08	July-08	August-08
Full Load Performance							
Hours of Data		434	122	231	329	335	152
		Averages	**Averages**	**Averages**	**Averages**	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	629.6	634.4	634.8	632.9	626.7	622.7
AUX POWER	MW	29.1	30.3	29.6	30.7	30.5	30.4
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9926	9801	9758	9814	9854	9909
Boiler Efficiency Actual	%	86.6	86.4	86.4	86.5	86.6	86.6
CONTROL VALVE POSITION LVDT	%	100.2	100.0	100.1	99.9	99.9	99.9
FEEDWATER TEMP TO ECON	degF	500	496	496	497	499	499
FEEDWATER TEMP TO HTR 1	degF	446	446	447	447	447	447
HP Turbine Efficiency Actual	%	86.3	84.8	84.9	85.4	85.3	85.1
IP Turbine Efficiency Corrected	%	90.4	92.4	92.7	91.5	89.5	89.6
Condenser Pressure	inHga	3.7	1.9	2.1	2.8	3.1	3.3
AIRHTR-A GAS OUTLET TEMP	degF	294	279	287	300	300	297
AIRHTR-B GAS OUTLET TEMP	degF	295	290	295	305	305	305
AMBIENT AIR TEMP	degF	86.9	54.0	65.7	80.0	82.1	75.2
CIRC WTR TEMP TO LP CONDB	degF	85.5	51.1	61.7	75.3	79.9	82.2
CIRC WTR TEMP TO LP CONDB	degF	83.8	49.6	60.1	73.7	78.3	80.6
Minimum River Temperature	degF	83.8	49.6	60.1	73.7	78.3	80.6
FWH 1 Temperature Rise	degF	53.7	49.9	49.3	50.0	51.9	51.9
Net Load	MW	600.5	604.1	605.2	602.2	596.2	592.3
Average Exit Gas Temperature	degF	294.4	284.3	290.9	302.5	302.8	301.4
Aux Power	%	4.6	4.8	4.7	4.9	4.9	4.9
Gross Unit Heat Rate	BTU/KW-HR	9467	9334	9303	9338	9375	9424
Gross Turbine Heat Rate	BTU/KW-HR	8197	8066	8038	8076	8115	8157
Measured Feedwater Flow	KPPH	4362	4255	4277	4339	4315	4271
Calc Steam Evaporated	KPPH	4354	4248	4271	4334	4310	4266
Steam Flow From First Stage	KPPH	4142	4041	4065	4126	4117	4084

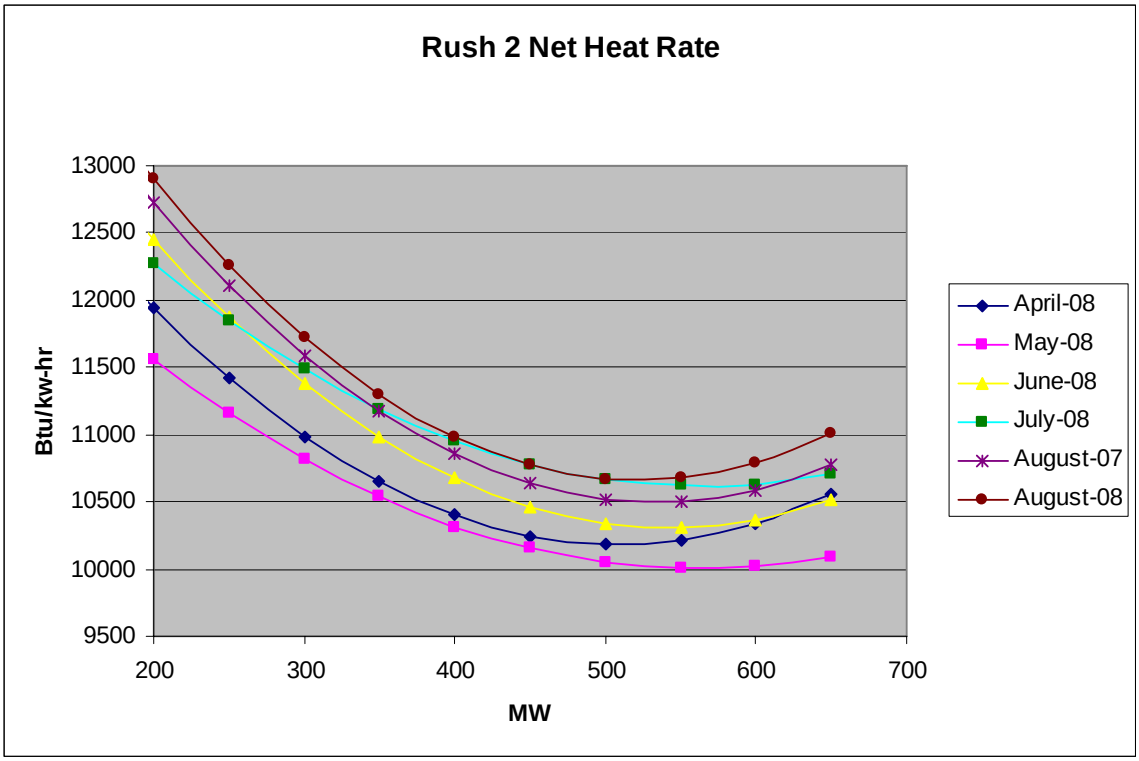
Summary of Performance Report for:

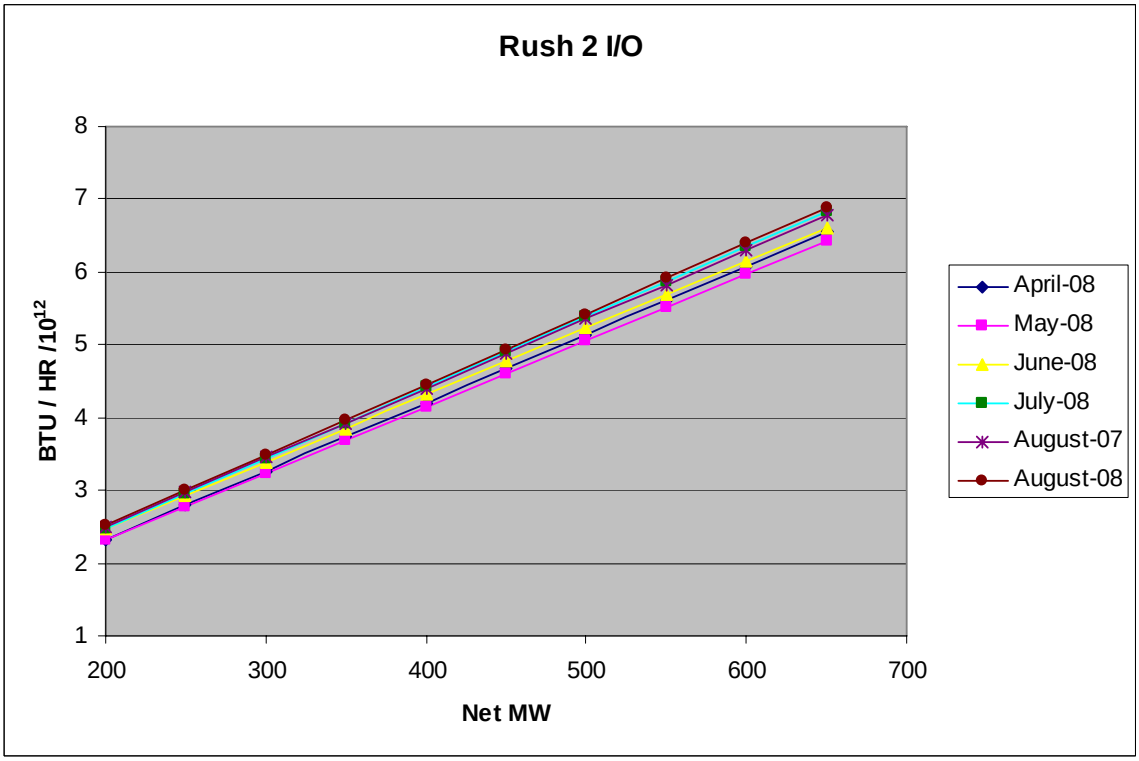
Plant Rush Island
Unit 2
Period

		August-07	April-08	May-08	June-08	July-08	August-08
Full Load Performance							
Hours of Data		354	137	36	224	233	351
		Averages	**Averages**	**Averages**	**Averages**	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	607.4	587.2	611.9	616.0	599.1	610.9
AUX POWER	MW	35.5	32.0	34.6	35.9	35.4	37.3
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	10561	10282	10056	10339	10597	10713
Boiler Efficiency Actual	%	85.6	85.7	85.7	85.6	85.7	85.7
CONTROL VALVE POSITION LVDT	%	99.7	99.8	100.1	100.2	100.1	100.1
FEEDWATER TEMP TO ECON	degF	491	487	489	490	488	491
FEEDWATER TEMP TO HTR 1	degF	443	439	442	442	440	442
HP Turbine Efficiency Actual	%	90.1	90.0	89.5	89.9	90.0	90.0
IP Turbine Efficiency Corrected	%	92.5	91.4	91.5	91.4	91.4	91.2
Condenser Pressure HP	inHga	3.9	2.4	1.7	2.4	2.8	2.9
AIRHTR-A GAS OUTLET TEMP	degF	316	287	296	317	315	319
AIRHTR-B GAS OUTLET TEMP	degF	325	302	307	329	327	331
AMBIENT AIR TEMP	degF	87.1	53.7	61.1	80.8	82.5	79.0
CIRC WTR TEMP TO LP CONDB	degF	85.2	51.3	61.3	75.1	79.8	80.7
CIRC WTR TEMP TO LP CONDB	degF	85.1	51.3	61.3	75.1	79.7	80.6
Minimum River Temperature	degF	85.1	51.3	61.3	75.1	79.7	80.6
FWH 1 Temperature Rise	degF	48.6	47.8	47.8	48.2	48.2	48.5
Net Load	MW	571.9	555.2	577.3	580.2	563.8	573.6
Average Exit Gas Temperature	degF	320.5	294.2	301.6	323.0	320.9	324.7
Aux Power	%	5.8	5.4	5.7	5.8	5.9	6.1
Gross Unit Heat Rate	BTU/KW-HR	9943	9722	9487	9737	9972	10059
Gross Turbine Heat Rate	BTU/KW-HR	8506	8330	8129	8333	8544	8617
Measured Feedwater Flow	KPPH	4284	4290	4113	4239	4211	4365
Calc Steam Evaporated	KPPH	4331	4454	4152	4294	4278	4416
Steam Flow From First Stage	KPPH	4039	4096	3936	3982	3911	4013


Rush 1
Net Heat Rate
13000
12500
12000
11500
11000
10500
10000
9500
btu/kw-hr
200
300
400
500
600
700
MW
May-08
Jun-08
Jul-08
August-07
August-08


Rush 1 I/O
8
7
6
5
4
3
2
1
BTU / HR /10^12
200
300
400
500
600
700
Net MW
May-08
Jun-08
Jul-08
Aug-07
August-08


Rush 2 Net Heat Rate
Btu/kw-hr
13000
12500
12000
11500
11000
10500
10000
9500
200
300
400
500
600
700
MW
April-08
May-08
June-08
July-08
August-07
August-08


Rush 2 I/O
BTU / HR /10^12
8
7
6
5
4
3
2
1
200
300
400
500
600
700
Net MW
April-08
May-08
June-08
July-08
August-07
August-08

Sioux

Heat Rate Performance Reports

Attachment D

July 16, 2009

To: Karl Blank
From: Scott Hixson
Cc: Bob Meiners, Keith Stuckmeyer, Harry Benhardt, John Romano, Pat Weir, Greg Gilbertsen, David Azar, Mark Selvog, Steve Garner, Scott McCormack, Lisa Meyer, Ken Stuckmeyer, Don Clayton, Joe Sind, Jim Barnett, Glenn Tiffin, Matt Wallace, Jeff Shelton

Subject: Sioux June 2009 Performance Report

Executive Summary

The most notable items regarding Sioux unit performance were:

- Total plant heat rate increased 124 Btu/kwh from May to June. This increase in heat rate can be primarily attributed to increased condenser pressure due to higher river temperatures and lower apparent cleanliness.
- Feed water recirculation valves FIC 2-1418-V1 FIC 2-1418-V2 were re-inspected and verified to not be leaking.

Instrumentation issues have been moved to the end of the report.

A monthly summary of each Unit's heat rate for operation above 450 MW is shown in Fig. 1. Sioux plant heat rate for May increased 124 Btu/kwh from May. Unit 1 and Unit 2 month average heat rates increased 89Btu/kwh and 158Btu/kwh respectively in June.

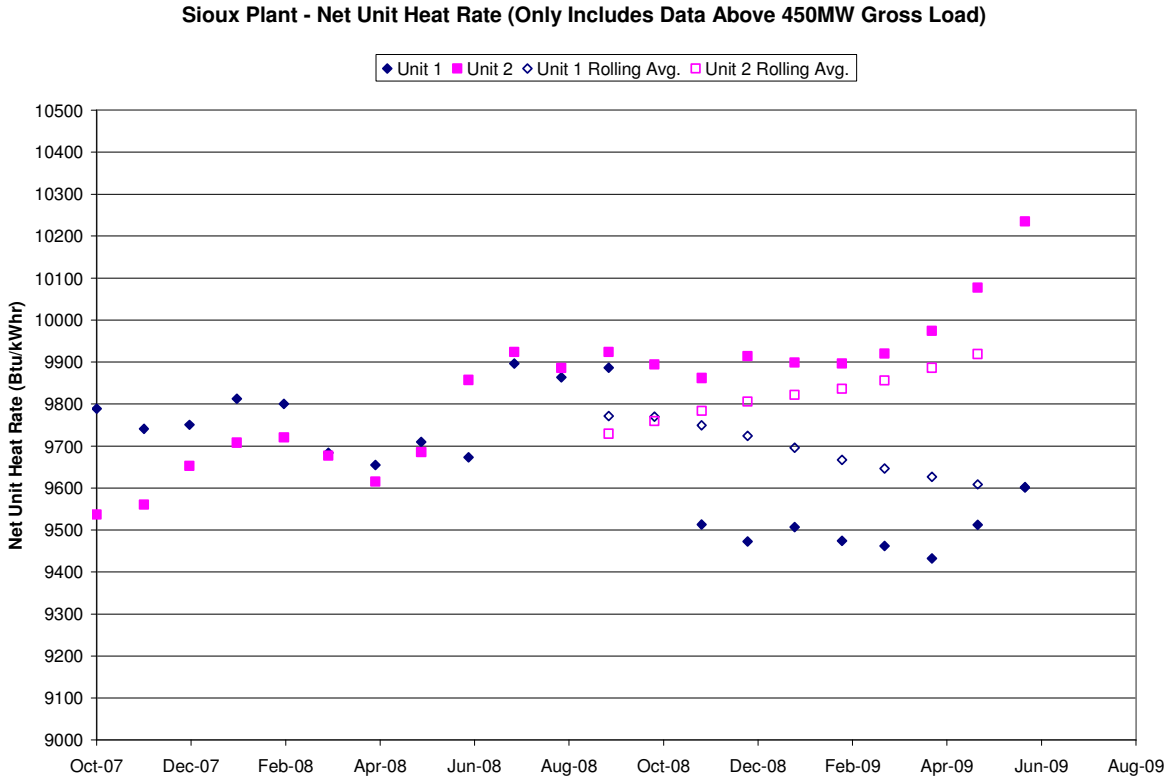


Fig. 1 Individual Unit Heat Rates

Plant total heat rate has remained increased 124 Btu/kwh from May to June.

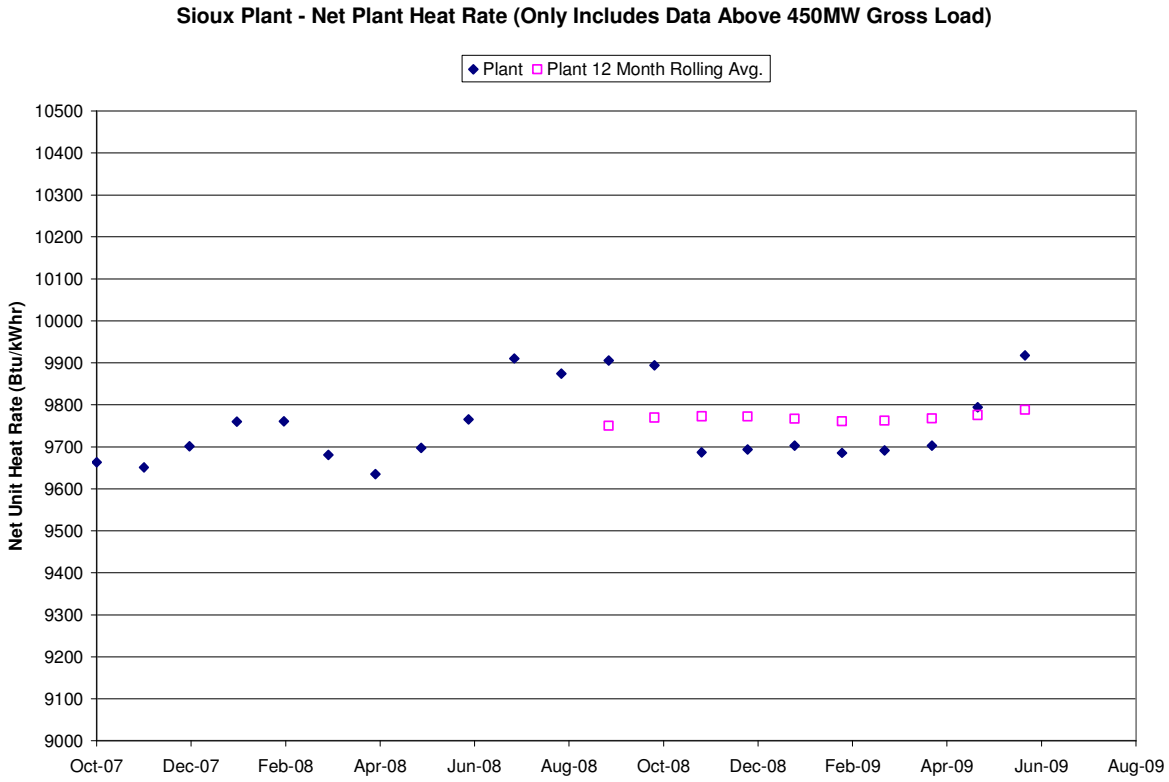


Fig 2. Plant Heat Rate

Heat Rate KPI

A trend only heat rate KPI has been created for 2009 with the intent of having a pay heat rate KPI in 2010. Table 1 shows the actual performance of the plant through June.

Table 1. Heat Rate KPI

Plant	2009 Actual	Threshold	Target	Stretch
Sioux	9749	9705	9624	9591

Action Items

- Performance Engineering to further investigate Unit 2 condenser performance and cir water flow.
- Performance Engineering to provide heat rate reports weekly (or possibly daily) for the plant.
- Performance Engineering will develop unit heat rate estimates based on coal HHV and coal feed rate.
- Performance Engineering will develop and execute a plan to collect and analyze turbine performance data.

Unit 1

The following observations were made regarding Unit 1 operation and performance:

- The heat rate for Unit 1 is down 72 Btu/kwhr from June 2008
    - The increase in IP turbine efficiency is a tribute to instrument error.
    - Boiler efficiency increased 0.7%, causing a 67 Btu/kwhr decrease in heat rate
    - Condenser pressure increased 0.2", causing an increase of 38 Btu/kwhr
    - Average Gas outlet temperature increased 16°F

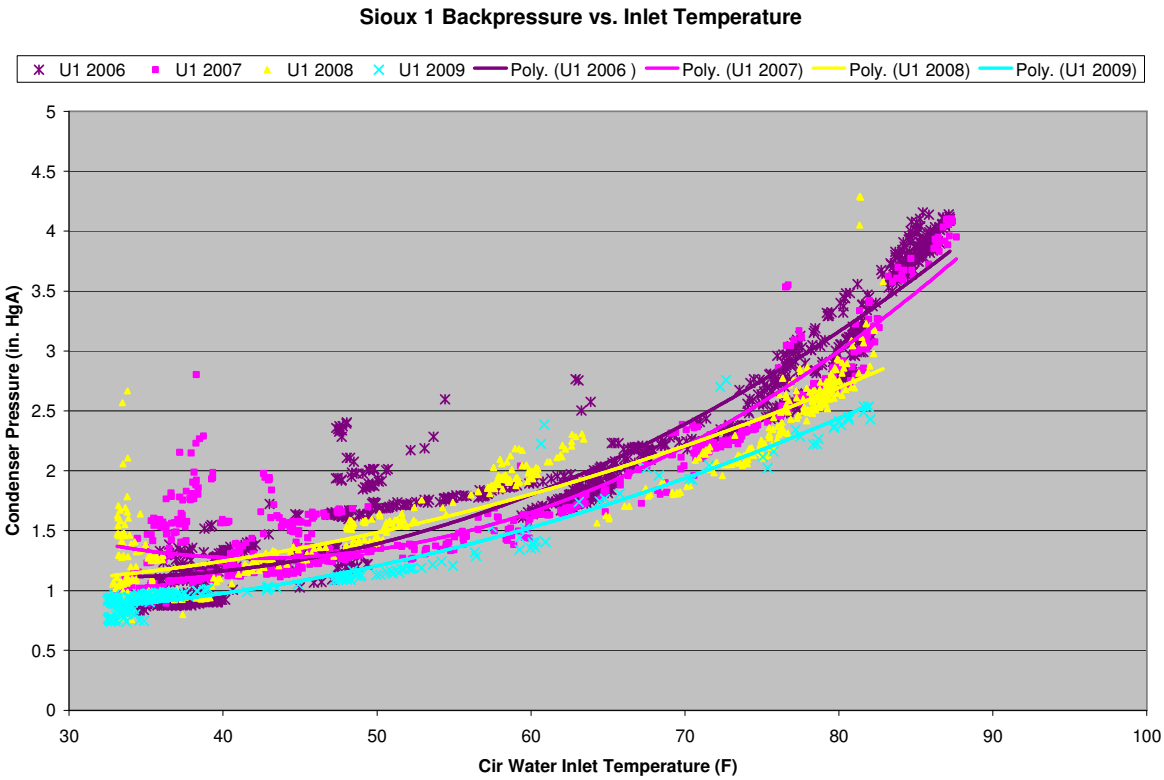
Summary of Performance Report for:

Plant Sioux
Unit 1
Period 6/1/09 to 6/30/09

Full Load Performance		Jun-09	May-09	Jun-08
Hours of Data (Gross load>450 MW)		103	65	339
		Averages	Averages	Averages
GENERATOR MEGAWATTS	MW	459.0	458.1	470.6
AUX POWER	MW	27.0	26.1	27.4
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9601.1	9512.0	9673.1
Boiler Efficiency Actual	%	87.4	87.1	86.7
CONTROL VALVE POSITION LVDT	%	27.7	26.9	31.5
FEEDWATER TEMP TO ECON	degF	469.8	468.1	471.5
FEEDWATER TEMP TO HTR 1	degF	402.6	400.8	404.7
HP Turbine Efficiency Actual	%	82.1	81.9	82.8
IP Turbine Efficiency Corrected	%	96.0	96.2	93.1
Condenser Pressure	inHga	2.3	1.8	2.1
AIRHTR-A GAS OUTLET TEMP	degF	319.1	312.6	300.9
AIRHTR-B GAS OUTLET TEMP	degF	321.7	312.8	308.0
AMBIENT AIR TEMP	degF	90.7	78.0	82.4
River Temperature	degF	78.3	65.8	73.8
FWH 1 Temperature Rise	degF	67.2	67.4	66.8
Net Load	MW	431.9	432.0	443.2
Average Exit Gas Temperature	degF	320.4	312.7	304.5
Aux Power	%	5.9	5.7	5.8
Gross Unit Heat Rate	BTU/KW-HR	9035.5	8970.3	9109.9
Gross Turbine Heat Rate	BTU/KW-HR	7892.8	7814.0	7901.3
Feedwater Flow	KPPH	2934.0	2894.0	

The plot below shows condenser pressure and cir water inlet temperatures from January 2006 to July 2009. Notice the drop in winter minimum condenser pressure after the '08 MBO.

The next plot shows the relationship between circulating water temperatures and condenser pressure when gross load is 450-480MW. The better performance for 2009 can be attributed larger circulation water pumps and condenser cleanliness.



Unit 2

The following observations were made regarding Unit 2 operation and performance:

- The heat rate for Unit 2 is up 377.9 Btu/kWhr from the prior year.
    - Condenser pressure is a major contributor to this, approximately a 194.5 Btu/kWhr increase in heat rate due to the increased backpressure.
    - A portion of this increase can be attributed to higher Aux load, approximately 46 Btu/kWhr.

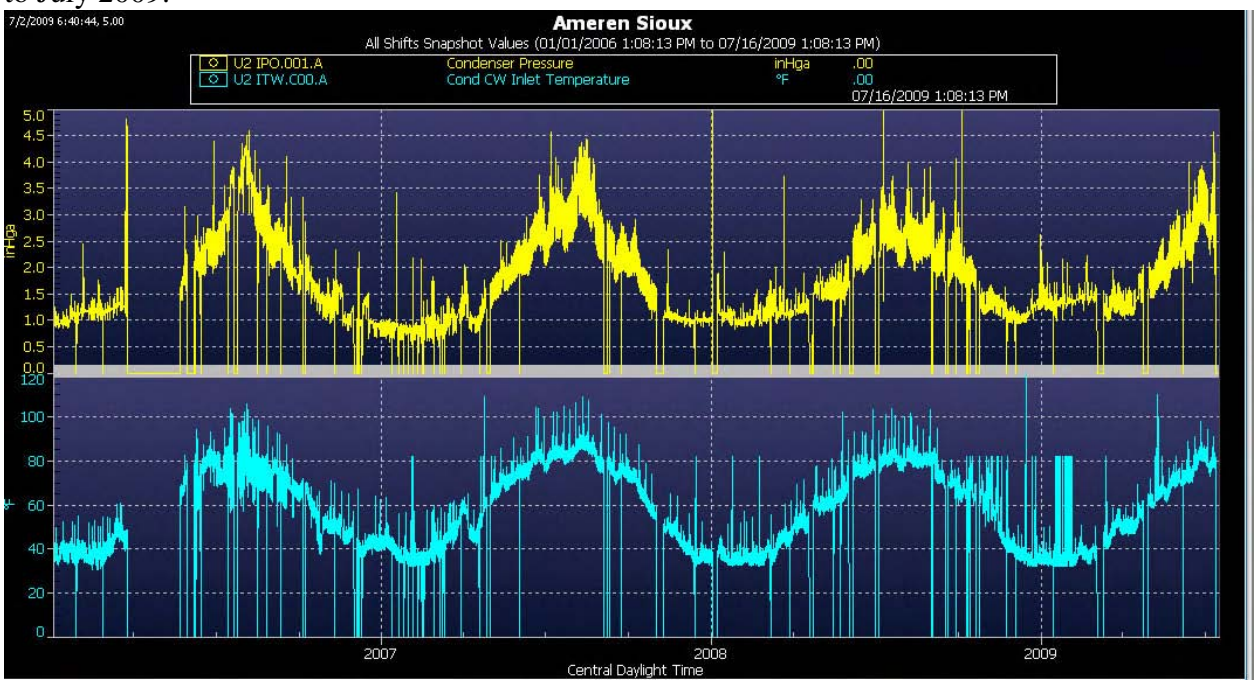
After the Quarterly Performance Meeting, Performance Engineering re-inspected the feed water recirculation valves FIC 2-1418-V1, FIC 2-1418-V2 using a temperature gun. Temperature measurements indicate that the valves are not leaking.

Summary of Performance Report for:

Plant Sioux
Unit 2
Period 6/1/09 to 6/30/09

Full Load Performance		Jun-09	May-09	Jun-08
Hours of Data (Gross load>450 MW)		52	175	317
		Averages	Averages	Averages
GENERATOR MEGAWATTS	MW	454.2	459.5	471.7
AUX POWER	MW	27.2	26.7	25.3
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	10235.3	10077.3	9857.4
Boiler Efficiency Actual	%	87.1	87.0	87.0
CONTROL VALVE POSITION LVDT	%	27.3	27.0	28.5
FEEDWATER TEMP TO ECON	degF	471.9	470.8	473.6
FEEDWATER TEMP TO HTR 1	degF	406.3	405.1	407.1
HP Turbine Efficiency Actual	%	82.8	82.3	83.9
IP Turbine Efficiency Corrected	%	92.1	92.3	92.5
Condenser Pressure	inHga	3.4	2.3	2.6
AIRHTR-A GAS OUTLET TEMP	degF	304.7	314.7	323.4
AIRHTR-B GAS OUTLET TEMP	degF	332.0	344.7	332.1
AMBIENT AIR TEMP	degF	90.5	74.4	82.1
River Temperature	degF	84.8	72.7	74.5
FWH 1 Temperature Rise	degF	65.7	65.7	66.5
Net Load	MW	427.0	432.8	446.4
Average Exit Gas Temperature	degF	318.3	329.7	327.7
Aux Power	%	6.0	5.8	5.4
Gross Unit Heat Rate	BTU/KW-HR	9622.3	9492.5	9328.4
Gross Turbine Heat Rate	BTU/KW-HR	8381.5	8258.4	8111.7

The plot below shows condenser pressure and cir water inlet temperatures from January 2006 to July 2009.



The next plot shows the relationship between circulating water temperatures and condenser pressure when gross load is 450-480MW. Condenser performance is the worst since 2006.

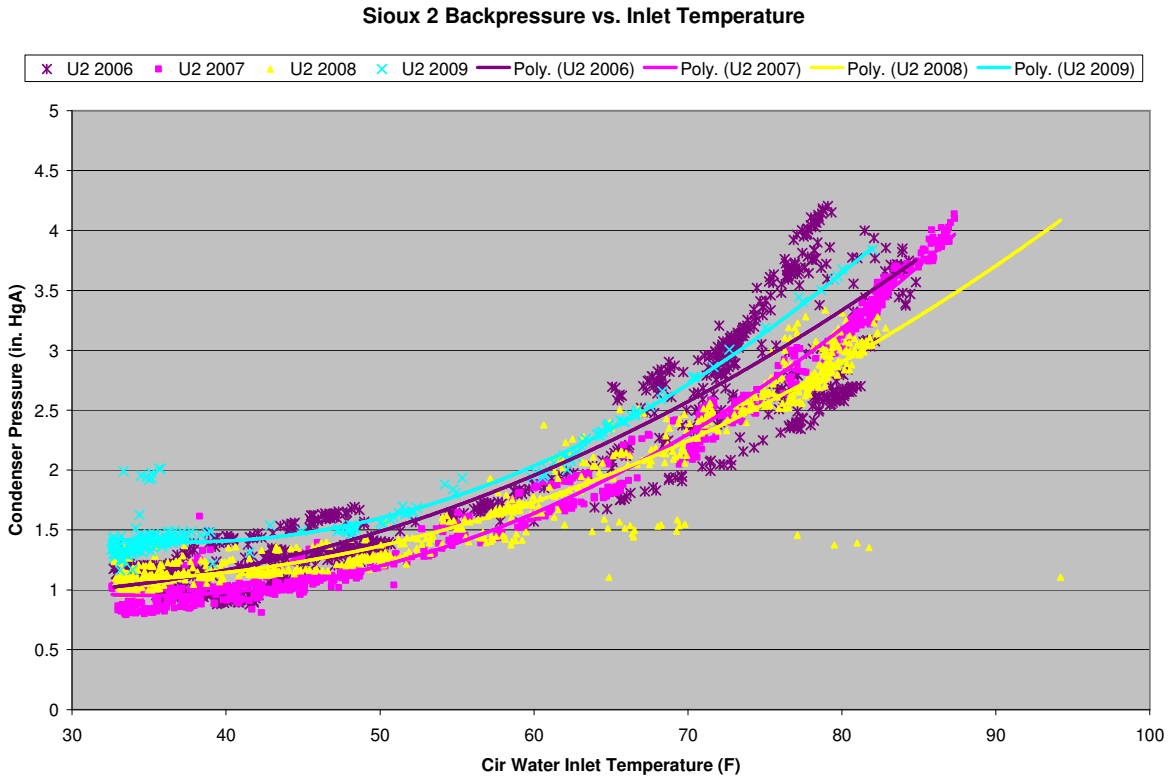
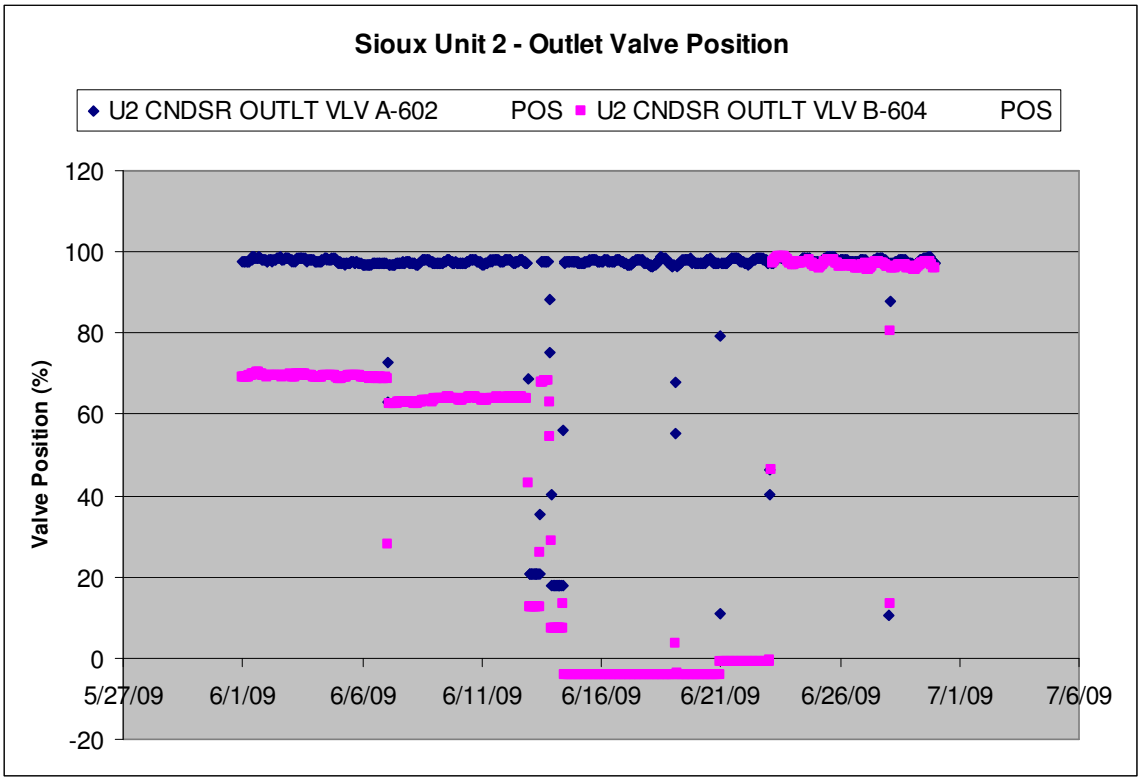


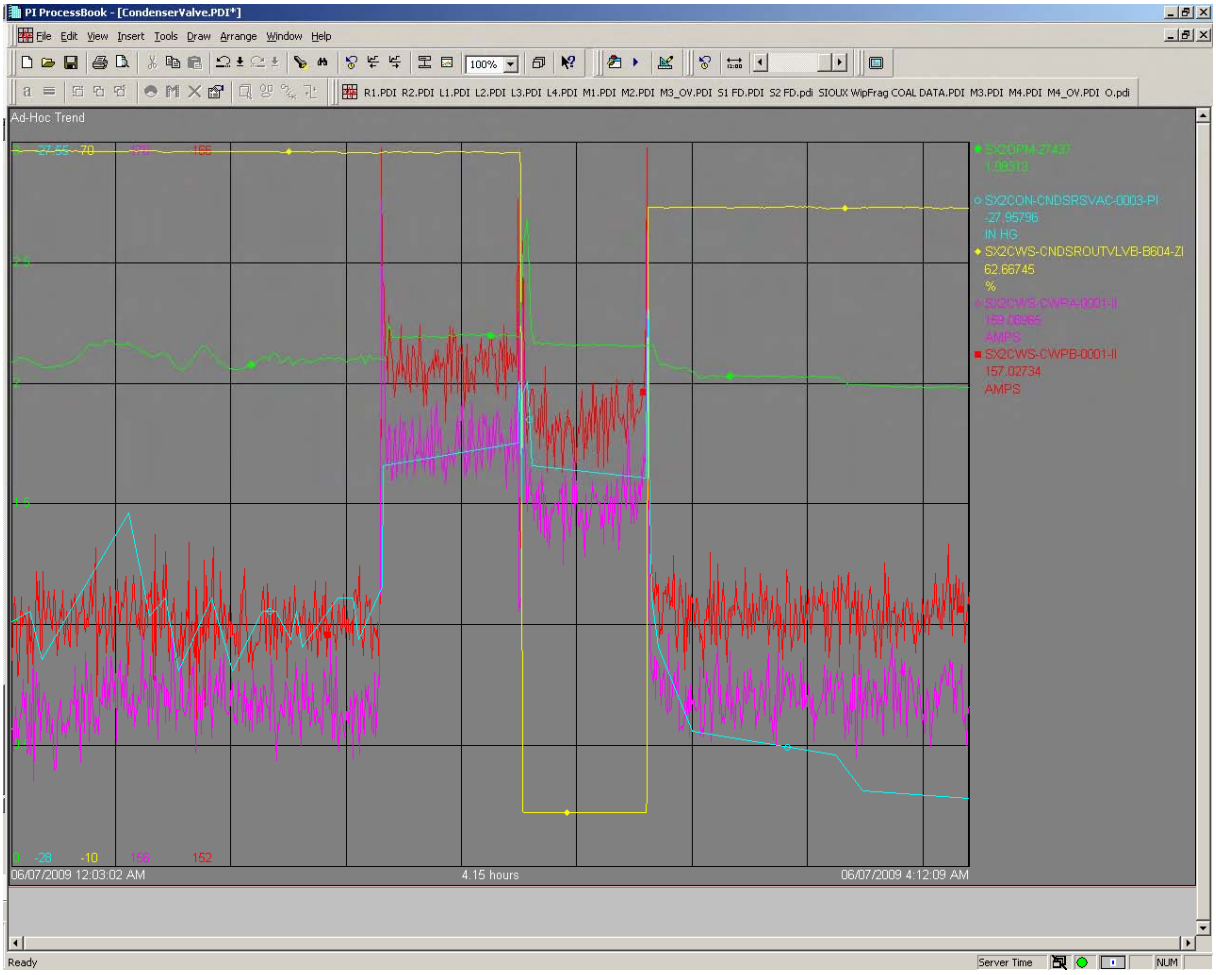
Table 4 shows the known instrument deficiencies for both units.

Table 4. Instrumentation Issues

Tag	Unit	Issue	Resolution	Carryover or New
SX2CWS-CNDSROUTVLVB-B604-ZI (U2 CNDSR OUTLT VLV B-604 POS)	2	Signal Quality	To Be JR'd	New
SX1CWS-RIVERTEMP-001-TI	1	Signal Quality	To Be JR'd	New
SX2CWS-RIVERTEMP-001-TI	2	Signal Quality	To Be JR'd	New

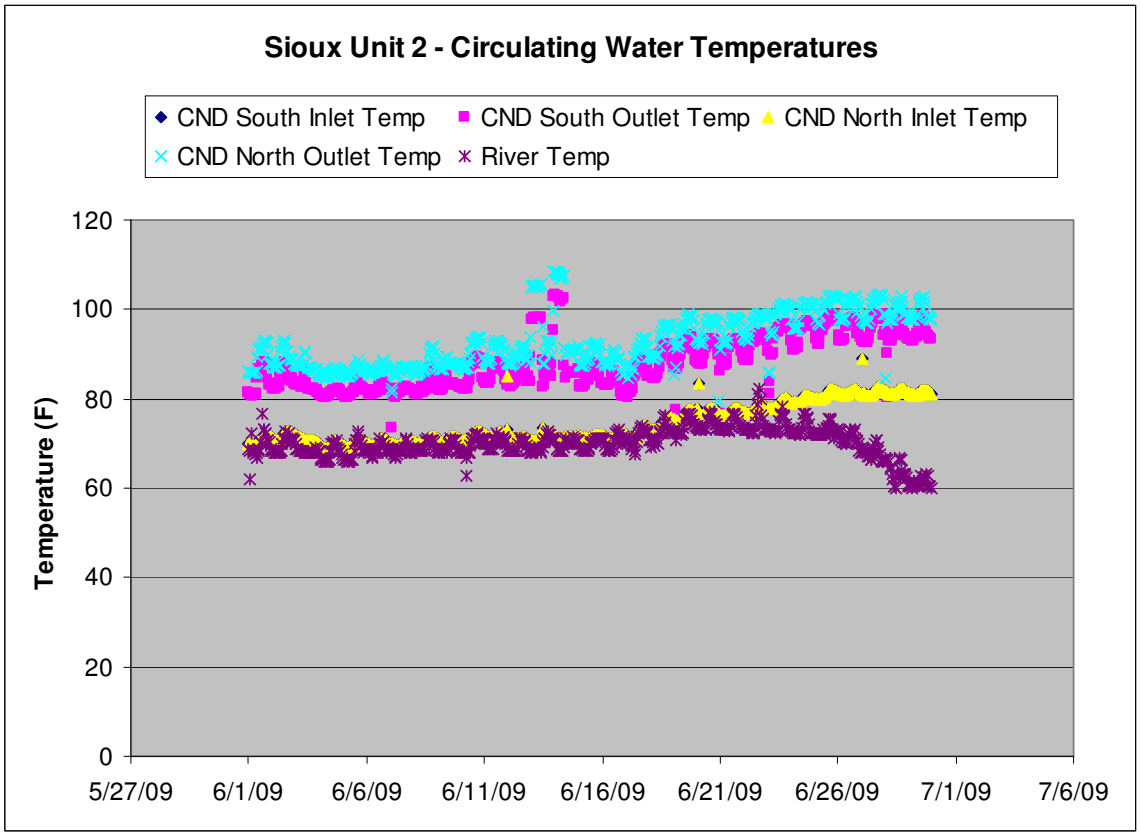


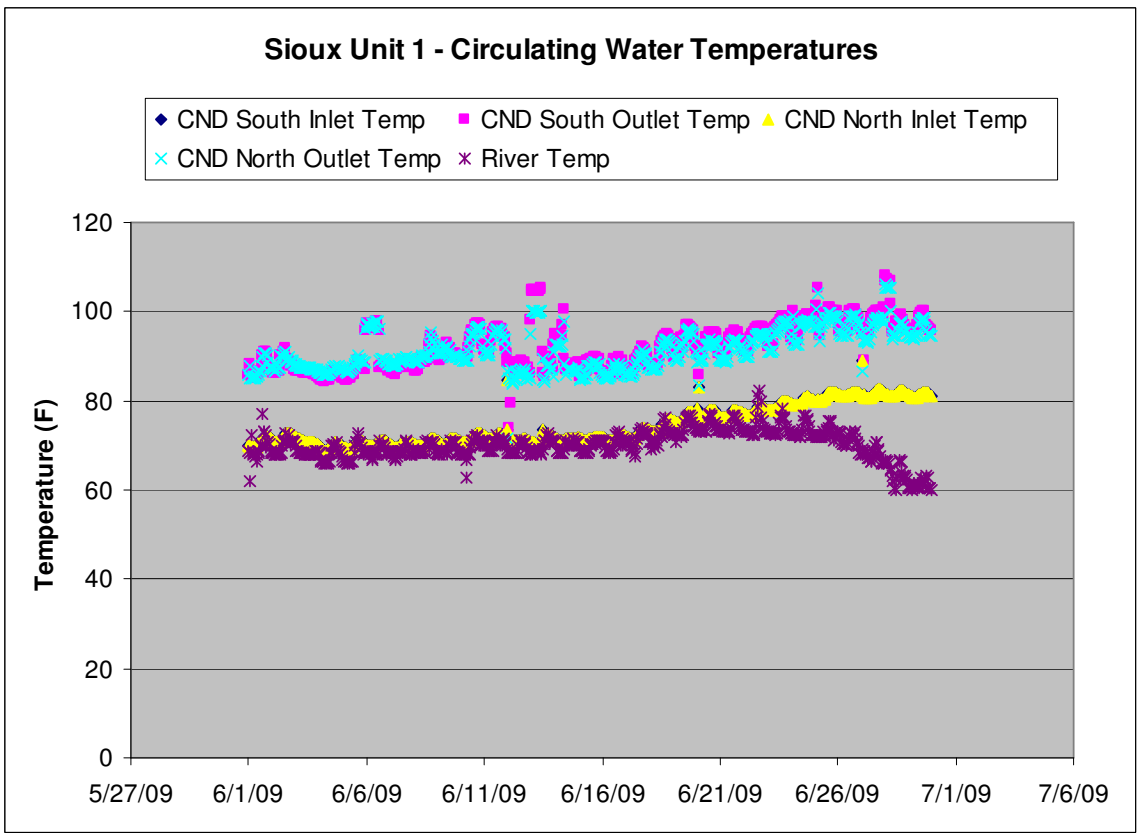
SX2CWS-CNDSROUTVLVB-B604-ZI is indicated step changes after condenser backwashes on 5/31/09 and 6/7/09. No changes in Cir pump amps were seen at these times after the backwashes.



The sensor then showed the -4 after the Cir Water pumps zebra muscle treatment on 6/14/09. The sensor did not return until the condenser back wash on 6/23/09.

The plots below shows condenser cir water inlet and outlet temperatures for the June. Note the inlet temps hold, while the inlet water temperature drifts down.


Sioux Unit 2 - Circulating Water Temperatures
CND South Inlet Temp
CND South Outlet Temp
CND North Inlet Temp
CND North Outlet Temp
River Temp
Temperature (F)
120
100
80
60
40
20
0
5/27/09
6/1/09
6/6/09
6/11/09
6/16/09
6/21/09
6/26/09
7/1/09
7/6/09


Sioux Unit 1 - Circulating Water Temperatures
CND South Inlet Temp
CND South Outlet Temp
CND North Inlet Temp
CND North Outlet Temp
River Temp
Temperature (F)
120
100
80
60
40
20
0
5/27/09
6/1/09
6/6/09
6/11/09
6/16/09
6/21/09
6/26/09
7/1/09
7/6/09

June 24, 2009

To: Karl Blank
From: Scott Hixson
Cc: Bob Meiners, Keith Stuckmeyer, Harry Benhardt, John Romano, Pat Weir, Greg Gilbertsen, David Azar, Mark Selvog, Steve Garner, Scott McCormack, Lisa Meyer, Ken Stuckmeyer, Don Clayton, Joe Sind, Jim Barnett, Glenn Tiffin, Matt Wallace, Jeff Shelton

Subject: Sioux May 2009 Performance Report

Executive Summary

The most notable items regarding Sioux unit performance were:

- Total plant heat rate increased 92 Btu/kwh from April to May. This increase in heat rate can be primarily attributed to increased condenser pressure due to higher river temperatures.
- Performance Engineering inspected feed water recirculation valves FIC 2-1418-V1, FIC 2-1418-V2. No significant leakage was found.
- Total plant aux load was added to Unit 1 and Unit 2 EtaPro Target CP view screens.

Table 1 shows the known instrument deficiencies for both units.

Table 1. Instrumentation Issues

Tag	Unit	Issue	Resolution	Carryover or New
SX1BFW-FWHTR7A-0001-PI (7A Extraction Pressure)	Unit 1	Bad since the outage	JR to be submitted by G.J.G.	Carryover
SX1BFW-FWHTR7A-0001-TI (7A Extraction Temperature)	Unit 1	Long term issue		Carryover
SX1BFW-FWHTR6A-0001-TI (6A Extraction Temperature)	Unit 1	Long term issue		Carryover
SX1BFW-FWHTR4B-0001-PI (4B Extraction Pressure)	Unit 1	Bad since mid-December		Carryover
SX2BFW-FWHTR7B-0001-PI (7B Extraction Pressure)	Unit 2	7B Extraction pressure - Not reading since Aug. 9, 2008		Carryover
SX2BFW-FWHTR7ADRN-0001-TI (7A Drain Temperature)	Unit 2	7A Drain temp - Not reading		Carryover

A monthly summary of each Unit's heat rate for operation above 450 MW is shown in Fig. 1. Sioux plant heat rate for May increased 92 Btu/kwh from April. Unit 1 and Unit 2 month average heat rates increased 80Btu/kwh and 105Btu/kwh respectively in May.

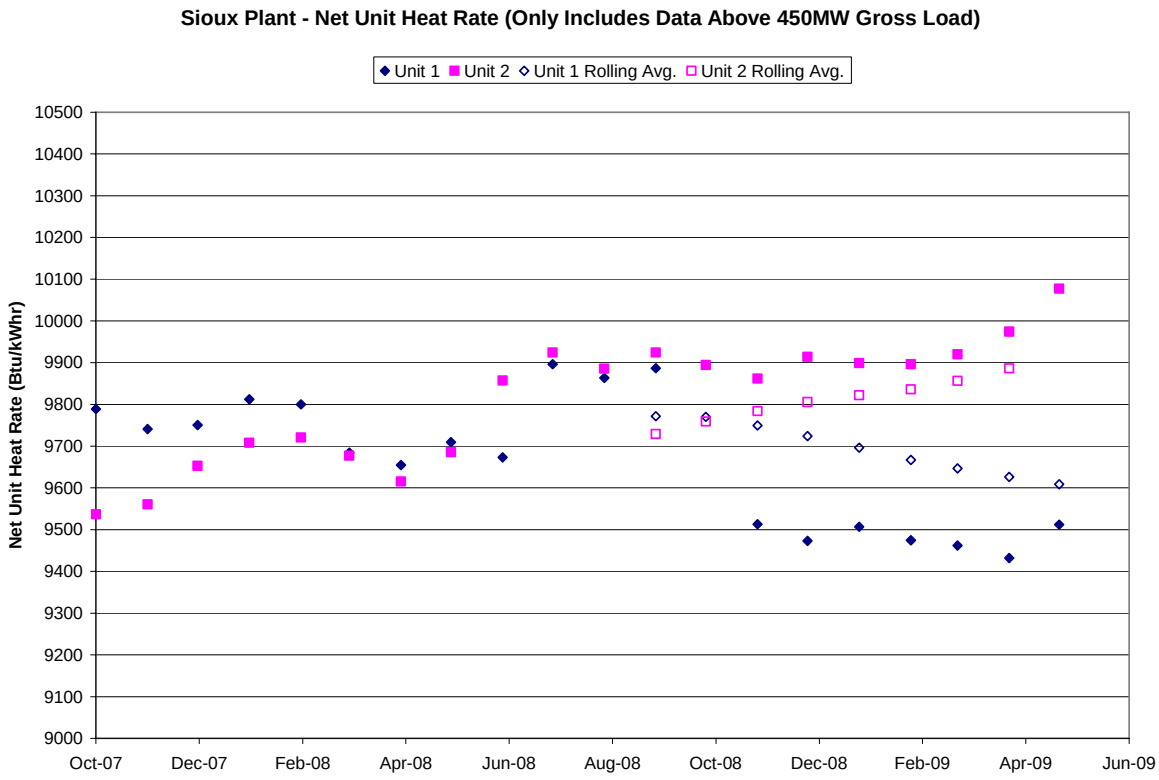


Fig. 1 Individual Unit Heat Rates

Plant total heat rate has remained relatively constant since November 2008.

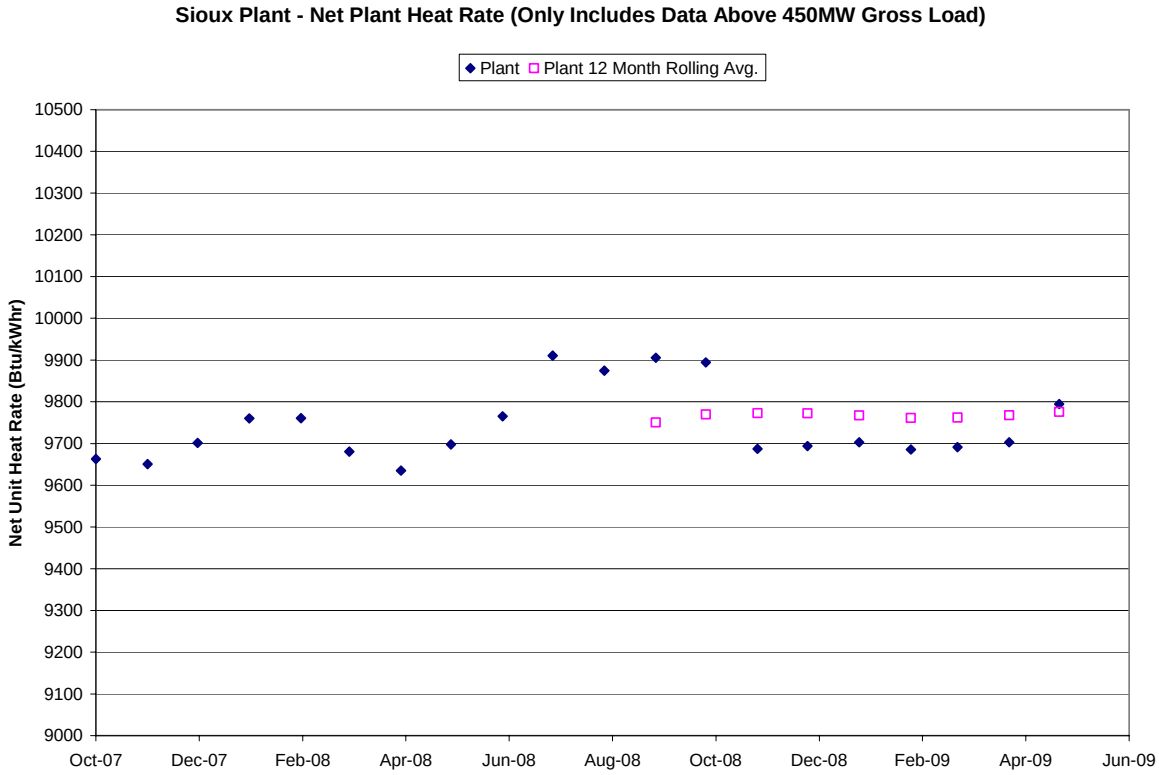


Fig 2. Plant Heat Rate

Heat Rate KPI

A trend only heat rate KPI has been created for 2009 with the intent of having a pay heat rate KPI in 2010. Table 2 shows the actual performance of the plant through April.

Table 2. Heat Rate KPI

Plant	2009 Actual	Threshold	Target	Stretch
Sioux	9715	9705	9624	9591

Action Items

- Performance Engineering to work with the plant to determine the accuracy of the cold end metal temperature and the need of steam air preheaters during the summer.
- Performance Engineering to provide heat rate reports weekly (or possibly daily) for the plant.
- Performance Engineering will develop unit heat rate estimates based on coal HHV and coal feed rate.
- Performance Engineering will develop and execute a plan to collect and analyze turbine performance data.

Unit 1

The following observations were made regarding Unit 1 operation and performance:

- The heat rate for Unit 1 is down 198 Btu/kwhr from May 2008
  - Turbine heat rate was down 104 Btu/kwhr
  - An increase in boiler efficiency resulted in an decrease of 42 Btu/kwhr

The steam coil air heaters running at half capacity provided enough heat for the cold end metal temperature (CEMT) to operate around 222F for May 2009, with steam flows of around 50klb/hr. The table below shows the average temperatures and flow rates for all operational loads (not just full load conditions).

	U1 GEN GROSS MW	Ambient Air	Cold End Metal Temp	Steam Flow	Air Temp Rise Due to Coil
	MW	F	F	klb/hr	F
Dec-08	420.3	31.6	211.3	86.3	67.7
Jan-09	428.3	25.6	212.8	105.8	73.5
Feb-09	424.1	36.4	233.8	111.4	87.3
Mar-09	391.9	46.9	238.3	107.0	89.1
Apr-09	386.1	54.8	217.8	60.4	55.3
May-09	379.9	67.0	222.9	50.7	48.0

Steam flow rates were lower for the prior year. The table below shows the average temperatures and flow rates for the entire month (not just full load conditions). The steam air heater was needed to maintain CEMT of 205F last year.

	U1 GEN GROSS MW	Ambient Air	Cold End Metal Temp	Steam Flow	Air Temp Rise Due to Coil
	MW	F	F	klb/hr	F
Apr-08	434.5	53.9	204.0	55.7	36.8
May-08	403.4	62.8	205.4	46.5	33.9
Jun-08	419.9	76.8	208.1	26.7	23.4
Jul-08	414.9	78.7	207.3	21.5	21.0
Aug-08	418.8	75.2	205.9	26.0	23.5
Sep-08	407.5	69.5	206.1	37.6	30.6

Summary of Performance Report for:

Plant	Sioux		
Unit	1		
Period	5/1/09 to	6/1/09	

Full Load Performance		May-09	Apr-09	May-08
Hours of Data (Gross load>450 MW)		65	139	235
		Averages	Averages	Averages
GENERATOR MEGAWATTS	MW	458.1	464.6	458.1
AUX POWER	MW	26.1	26.6	27.3
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	9512.0	9431.7	9709.7
Boiler Efficiency Actual	%	87.1	87.0	86.7
CONTROL VALVE POSITION LVDT	%	26.9	28.1	29.2
FEEDWATER TEMP TO ECON	degF	468.1	468.3	468.8
FEEDWATER TEMP TO HTR 1	degF	400.8	400.5	402.2
HP Turbine Efficiency Actual	%	81.9	81.9	82.0
IP Turbine Efficiency Corrected	%	96.2	96.0	93.2
Condenser Pressure	inHga	1.8	1.3	2
AIRHTR-A GAS OUTLET TEMP	degF	312.6	309.5	295.7
AIRHTR-B GAS OUTLET TEMP	degF	312.8	309.2	299.3
AMBIENT AIR TEMP	degF	78.0	63.3	67.5
River Temperature	degF	65.8	54.2	61.1
FWH 1 Temperature Rise	degF	67.4	67.8	66.5
Net Load	MW	432.0	438.0	430.8
Average Exit Gas Temperature	degF	312.7	309.3	297.5
Aux Power	%	5.7	5.7	6.0
Gross Unit Heat Rate	BTU/KW-HR	8970.3	8890.9	9130.1
Gross Turbine Heat Rate	BTU/KW-HR	7814.0	7738.8	7918.8
Feedwater Flow	KPPH	2894.0	2922.0	

Unit 2

The following observations were made regarding Unit 2 operation and performance:

- The heat rate for Unit 2 is up 392 Btu/kWhr from the prior year.
  - Increase in total turbine heat rate resulted in a increase of 278 Btu/kWhr
  - Condenser pressure is a major contributor to this, approximately 97 Btu/kWhr increase in heat rate due to the increased backpressure.
  - A portion of this increase can be attributed to higher Aux load, approximately 40 Btu/kWhr.
  - The decrease in boiler efficiency resulted in a 22 Btu/kWhr increase in heat rate.

Performance Engineering inspected feed water recirculation valves FIC 2-1418-V1, FIC 2-1418-V2 using a temperature gun. There was concern that leakage of these valves was causing error in the feed water flow measurement. Valve inlet temperatures, valve outlet temperatures, recirc DA inlet temperatures, recirc line inlet temperatures, air temperatures around the valves were measured. Valve outlet temperatures were well below recirc line temps and within 10F of ambient air temperatures. No significant leakage was found.

The steam coil air heaters running at half capacity provided enough heat for the cold end metal temperature (CEMT) to operate around 219F for May 2009, with steam flows of around 60klb/hr. The table below shows the average temperatures and flow rates for all operational loads (not just full load conditions).

	U2 GEN GROSS MW	Ambient Air	Cold End Metal Temp	Steam Flow	Air Temp Rise Due to Coil
	MW	F	F	klb/hr	F
Dec-08	429.9	34.2	203.8	62.5	40.5
Jan-09	431.4	29.9	204.8	71.7	45.7
Feb-09	423.9	40.0	206.9	66.5	43.2
Mar-09	393.9	49.4	210.6	66.9	46.2
Apr-09	378.1	55.8	209.9	59.0	42.9
May-09	386.1	69.0	219.8	60.2	42.4

Steam flow rates were lower for the prior year. The table below shows the average temperatures and flow rates for the entire month (not just full load conditions). The steam air heater was needed to maintain CEMT of 205F last year.

	U2 GEN GROSS MW	Ambient Air	Cold End Metal Temp	Steam Flow	Air Temp Rise Due to Coil
	MW	F	F	klb/hr	F
Apr-08	440.8	55.1	205.4	53.3	34.6
May-08	406.3	64.9	207.7	37.8	25.1
Jun-08	419.5	78.4	219.8	32.9	20.5
Jul-08	421.5	81.1	219.9	32.0	19.3
Aug-08	422.5	78.6	214.8	29.0	17.5
Sep-08	404.6	72.1	212.5	37.6	25.9

Summary of Performance Report for:

Plant	Sioux		
Unit	2		
Period	5/1/09	to	6/1/09

Full Load Performance		May-09	Apr-09	May-08
Hours of Data (Gross load>450 MW)		175	96	260
		Averages	Averages	Averages
GENERATOR MEGAWATTS	MW	459.5	461.1	458.0
AUX POWER	MW	26.7	27.2	25.0
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	10077.3	9974.4	9685.6
Boiler Efficiency Actual	%	87.0	86.7	87.2
CONTROL VALVE POSITION LVDT	%	27.0	26.5	26.5
FEEDWATER TEMP TO ECON	degF	470.8	469.9	467.2
FEEDWATER TEMP TO HTR 1	degF	405.1	404.2	400.6
HP Turbine Efficiency Actual	%	82.3	81.7	82.1
IP Turbine Efficiency Corrected	%	92.3	92.3	92.5
Condenser Pressure	inHga	2.3	1.7	1.8
AIRHTR-A GAS OUTLET TEMP	degF	314.7	307.0	303.1
AIRHTR-B GAS OUTLET TEMP	degF	344.7	332.1	306.6
AMBIENT AIR TEMP	degF	74.4	54.9	66.3
River Temperature	degF	72.7	58.7	60.4
FWH 1 Temperature Rise	degF	65.7	65.8	66.7
Net Load	MW	432.8	433.9	433.0
Average Exit Gas Temperature	degF	329.7	319.6	304.9
Aux Power	%	5.8	5.9	5.5
Gross Unit Heat Rate	BTU/KW-HR	9492.5	9386.5	9156.8
Gross Turbine Heat Rate	BTU/KW-HR	8258.4	8140.4	7980.5

May 9, 2009

To: Karl Blank
From: Scott Hixson
Cc: Bob Meiners, Keith Stuckmeyer, Harry Benhardt, John Romano, Pat Weir, Greg Gilbertsen, David Azar, Mark Selvog, Steve Garner, Scott McCormack, Lisa Meyer, Ken Stuckmeyer, Don Clayton, Joe Sind, Jim Barnett, Glenn Tiffin, Matt Wallace, Jeff Shelton

Subject: Sioux April 2009 Performance Report

Executive Summary

The most notable items regarding Sioux unit performance were:

- Total plant heat rate for 2009 has remained nearly constant.
- Feed water flow indicators are showing internal unit differences of 1.2% and 3.3% for Unit 1 and Unit 2 respectively. Differences in feedwater flow are directly proportional to heat rate. The larger percent difference on Unit 2 could be attributable to a leaking main boiler feedpump recirculation valve.
- Two spikes in Unit 1 condenser pressure occurred.

Table 1 shows the known instrument deficiencies for both units.

Table 1. Instrumentation Issues

Tag	Unit	Issue	Resolution	Carryover or New
SX1BFW-FWHTR7A-0001-PI (7A Extraction Pressure)	Unit 1	Bad since the outage	JR to be submitted by G.J.G.	Carryover
SX1BFW-FWHTR7A-0001-TI (7A Extraction Temperature)	Unit 1	Long term issue		Carryover
SX1BFW-FWHTR6A-0001-TI (6A Extraction Temperature)	Unit 1	Long term issue		Carryover
SX1BFW-FWHTR4B-0001-PI (4B Extraction Pressure)	Unit 1	Bad since mid-December		Carryover
SX1BFW-FWHTR2-0001-PI (2 Extraction Pressure)	Unit 1	Bad since the outage		Carryover
SX1AHS-AHNGASIN-0002-PI (Air Heater Gas In Pressure)	Unit 1	Bad since the outage		Carryover
SX2BFW-FWHTR7B-0001-PI (7B Extraction Pressure)	Unit 2	7B Extraction pressure - Not reading since Aug. 9, 2008		Carryover
SX2BFW-FWHTR7ADRN-0001-TI (7A Drain Temperature)	Unit 2	7A Drain temp - Not reading		Carryover
SX2AHS-STMCOILAHADRN5-278-TI (Unit 2 Stm Coil Line Temp 5)	Unit 2	Reads -4500F consistently		Carryover
SX2TRB-LPBACKPRESSNW-0001-PI (LP Back Press North West)	Unit 2	Reads lower than the other 3 LP backpressure indications		New

A monthly summary of each Unit's heat rate for operation above 450 MW is shown in Fig. 1. Note that the rolling average for Unit 1 continues to decrease while the rolling average for Unit 2 continues to climb. Unit 1 verse Unit 2 heat rates are showing some mirror qualities, since Unit 1's outage. As Unit 1 heat rate decreases Unit 2's will increase by a similar amount. It is also suspicious that Unit 1's heat rate has decrease as ambient/river temperatures have risen.

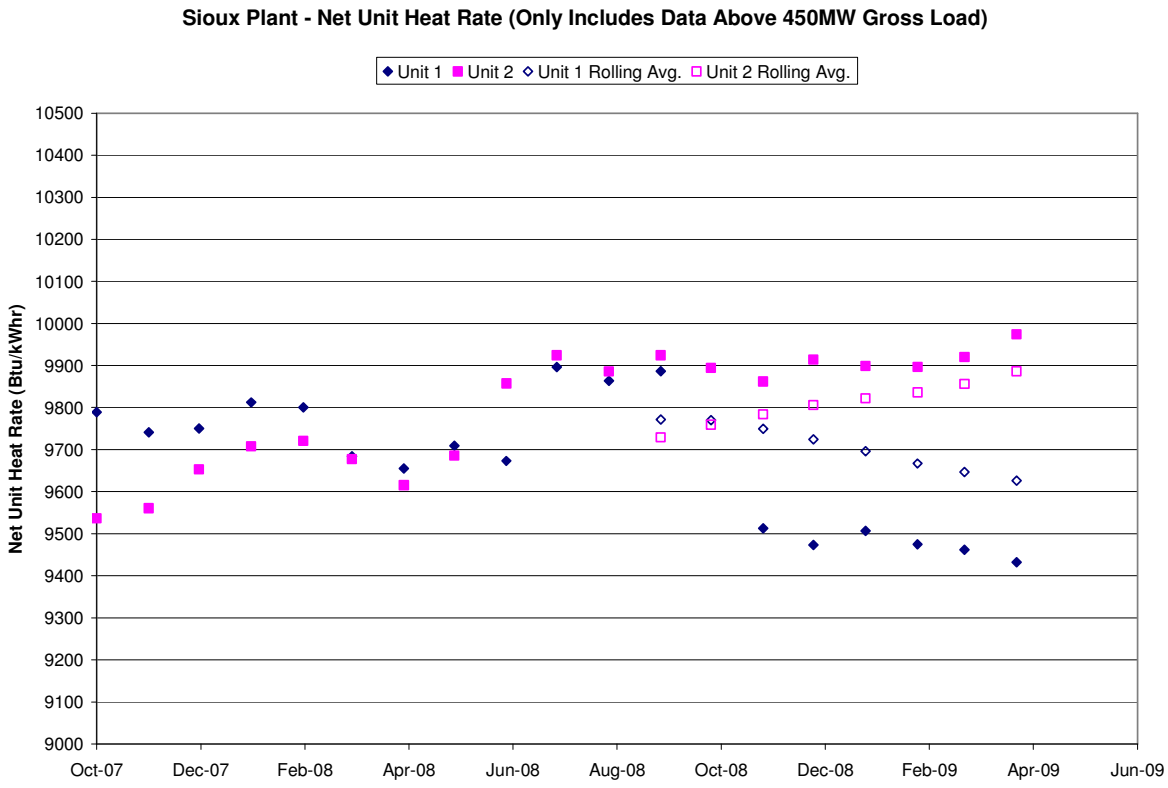


Fig. 1 Individual Unit Heat Rates

Plant total heat rate has remained relatively constant since November 2008.

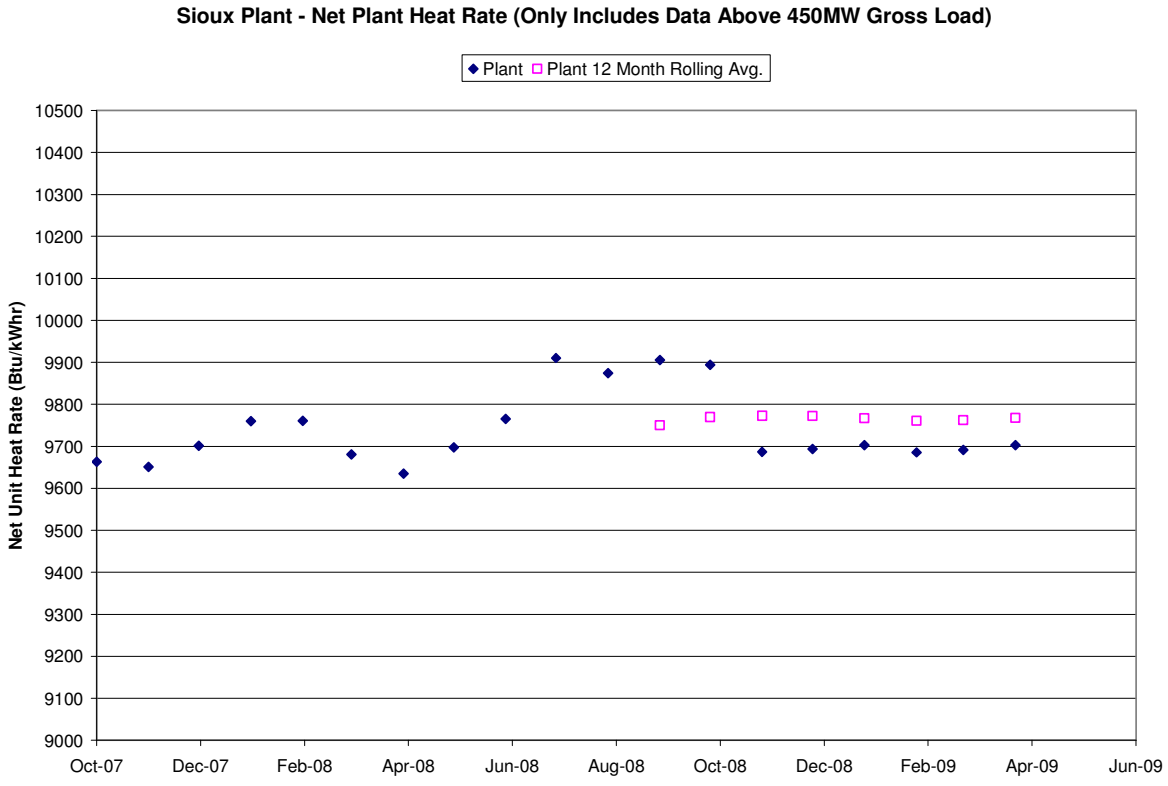


Fig 2. Plant Heat Rate

Heat Rate KPI

A trend only heat rate KPI has been created for 2009 with the intent of having a pay heat rate KPI in 2010. Table 2 shows the actual performance of the plant through April.

Table 2. Heat Rate KPI

Plant	2009 Actual	Threshold	Target	Stretch
Sioux	9696	9705	9624	9591

Action Items

- Performance Engineering will check the EtaPro heat rate calculations to ensure they are as accurate as possible. This will include a review of the available feedwater flow indications on each unit. Also the mirror trending of U1 verse U2 heat rates, ie as U1 increases U2 decrease, will be closely examined.
- Performance Engineering will inspect feed water recirculation valves FIC 2-1418-V1, FIC 2-1418-V2 to verify they are not leaking and affecting feed water flow rate measurements.
- Performance Engineering will develop and execute a plan to collect and analyze turbine performance data.

Unit 1

The following observations were made regarding Unit 1 operation and performance:

- The heat rate for Unit 1 is generally down from the prior year. For example, Unit 1's heat rate in April 2008 was almost 220 Btu/kWhr higher than in April 2009. This can be partial attributed to shifting of aux. loads from Unit 1 to Unit 2. Performance engineering will develop a method to conduct periodic turbine performance tests, for evaluation of HP/IP efficiencies.
- The steam coil air heaters running at half capacity provided enough heat for the cold end metal temperature (CEMT) to operate around 220F for April 2009, with steam flows of around 50klb/hr.
- There was a pair of spikes in condenser pressure. The second spike was due to clogged basket strainer on vacuum pump C, condenser pressure quickly dropped once D pump was engaged. No change in vacuum pump operation or air in leakage was seen near the time of the first spike.

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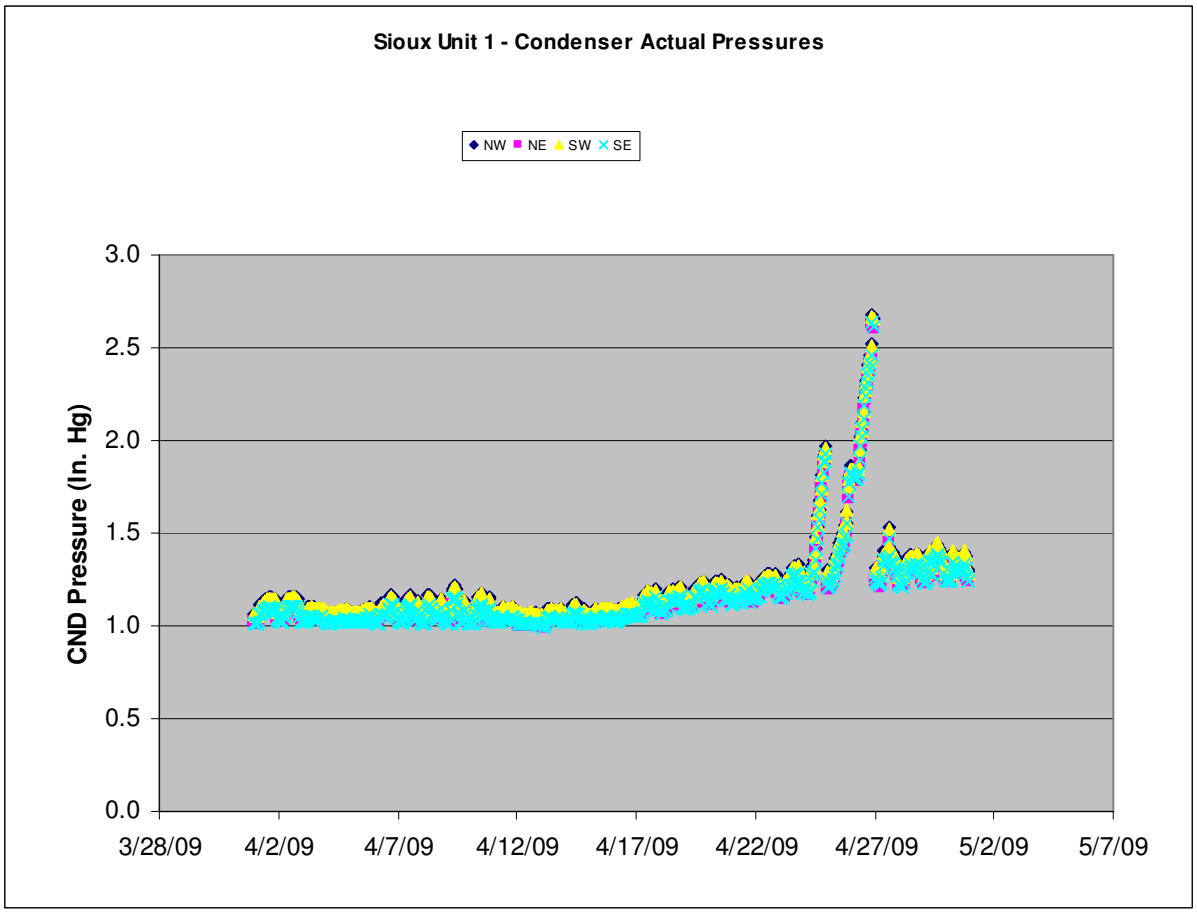
Summary of Performance Report for:						
Plant	Sioux					
Unit	1					
Period	4/1/09	to	5/1/09			
Full Load Performance			Apr-09		Mar-09	Apr-08
Hours of Data (Gross load>450 MW)			139		187	365
			Averages			
GENERATOR MEGAWATTS	MW		464.6		467.5	467.5
AUX POWER	MW		26.6		26.9	27.8
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9431.7		9461.8	9654.9
Boiler Efficiency Actual	%		87.0		87.3	86.5
CONTROL VALVE POSITION LVDT	%		28.1		28.5	29.7
FEEDWATER TEMP TO ECON	degF		468.3		468.5	469.5
FEEDWATER TEMP TO HTR 1	degF		400.5		401.6	402.9
HP Turbine Efficiency Actual	%		81.9		82.2	82.4
IP Turbine Efficiency Corrected	%		96.0		96.0	93.3
Condenser Pressure	inHga		1.3		1.1	0.8
AIRHTR-A GAS OUTLET TEMP	degF		309.5		316.9	296.7
AIRHTR-B GAS OUTLET TEMP	degF		309.2		320.0	302.2
AMBIENT AIR TEMP	degF		63.3		45.6	56.6
River Temperature	degF		54.2		44.6	52.4
FWH 1 Temperature Rise	degF		67.8		67.0	66.6
Net Load	MW		438.0		440.7	439.7
Average Exit Gas Temperature	degF		309.3		318.4	299.4
Aux Power	%		5.7		5.7	6.0
Gross Unit Heat Rate	BTU/KW-HR		8890.9		8918.3	9080.4
Gross Turbine Heat Rate	BTU/KW-HR		7738.8		7785.6	7854.8
Feedwater Flow	KPPH		2922.0		2941.1	



The second spike is a result of clogging of the 1C strainer basket, see JR072791. The pressure dropped quickly once the 1D pump was engaged.

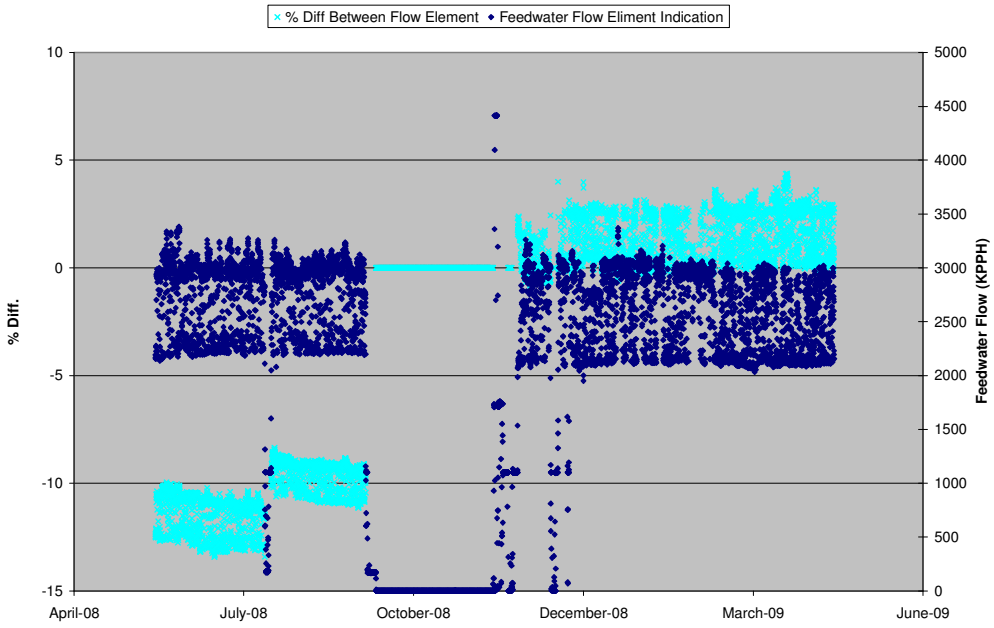
Unit 2

The following observations were made regarding Unit 2 operation and performance:

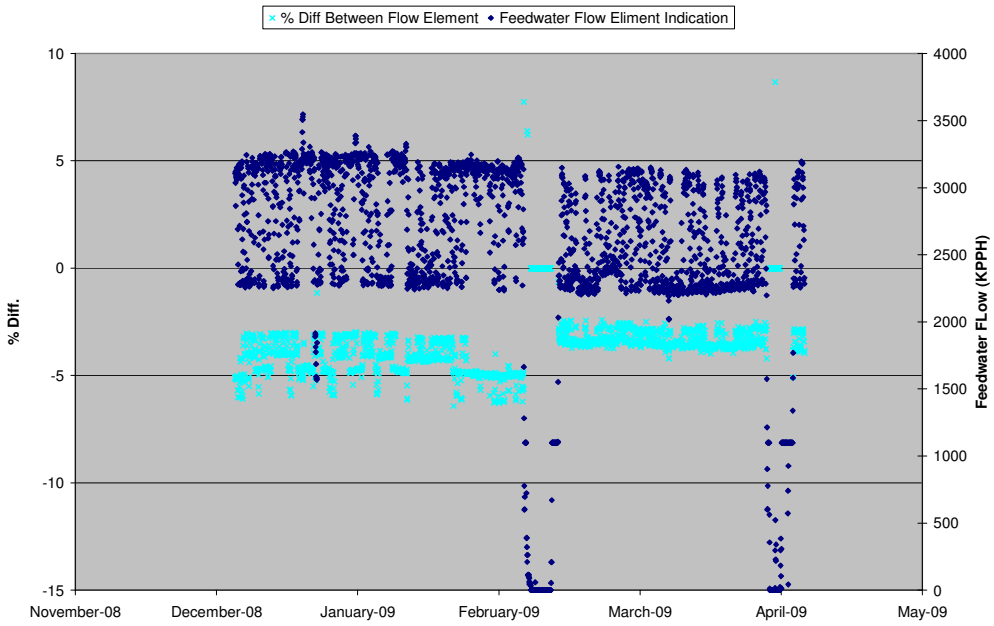
- The heat rate for Unit 2 is generally up from the prior year. For example, Unit 2's heat rate in April 2009 was almost 360 Btu/kWhr higher than in April 2008. Performance engineering has action to investigate further and determine the cause of the increasing trend in heat rate on the unit. In comparing the parameters from the table below, one can note some differences that would lead to a higher heat rate (Boiler efficiency is down 0.7%, AH gas outlet temperature is up by 24F, and Aux. load is up 0.5%). Performance engineering will investigate these changes and determine if there are any actionable items. The investigation into this will also include the development of a method to conduct periodic turbine performance tests.
- The two plots below show the percent difference between the feed water flow elements upstream and down stream of the MBFP. The work performed on Unit 1's BFP system during its MBO, is also scheduled to be performed on Unit 2 during its 2010 outage. This work should reduce the percent difference from the current 3.3% to near 1%. Performance engineering will work with plant engineering to identify the cause of the 3.3% difference and determine which flow indication to use for heat rate calculations.

Summary of Performance Report for:						
Plant	Sioux					
Unit	2					
Period	4/1/09	to	5/1/09			
Full Load Performance			Apr-09		Mar-09	Apr-08
Hours of Data (Gross load>450 MW)			96		148	369
			Averages		Averages	Averages
GENERATOR MEGAWATTS	MW		461.1		467.1	466.7
AUX POWER	MW		27.2		27.2	25.2
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9974.4		9920.3	9615.4
Boiler Efficiency Actual	%		86.7		86.7	87.4
CONTROL VALVE POSITION LVDT	%		26.5		27.0	27.2
FEEDWATER TEMP TO ECON	degF		469.9		470.1	469.4
FEEDWATER TEMP TO HTR 1	degF		404.2		402.2	403.7
HP Turbine Efficiency Actual	%		81.7		82.4	82.9
IP Turbine Efficiency Corrected	%		92.3		92.3	92.5
Condenser Pressure	inHga		1.7		1.5	0.7
AIRHTR-A GAS OUTLET TEMP	degF		307.0		307.4	296.7
AIRHTR-B GAS OUTLET TEMP	degF		332.1		316.3	293.5
AMBIENT AIR TEMP	degF		54.9		44.7	54.7
River Temperature	degF		58.7		27.9	50.2
FWH 1 Temperature Rise	degF		65.8		67.8	65.6
Net Load	MW		433.9		439.9	441.5
Average Exit Gas Temperature	degF		319.6		311.8	295.1
Aux Power	%		5.9		5.8	5.4
Gross Unit Heat Rate	BTU/KW-HR		9386.5		9343.2	9096.0
Gross Turbine Heat Rate	BTU/KW-HR		8140.4		8104.2	7949.5

Sioux Unit 1 - % Diff. between feedwater flow element and MBFP suction element



Sioux Unit 2 - % Diff. between feedwater flow element and MBFP suction element



April 9, 2009

To: Karl Blank
From: Jeff Shelton
Cc: Bob Meiners, Keith Stuckmeyer, Harry Benhardt, John Romano, Pat Weir, Greg Gilbertsen, David Azar, Mark Selvog, Steve Garner, Scott McCormack, Lisa Meyer, Ken Stuckmeyer, Don Clayton, Joe Sind, Jim Barnett, Glenn Tiffin, Matt Wallace, Scott Hixson

Subject: Sioux March 2009 Performance Report

Executive Summary

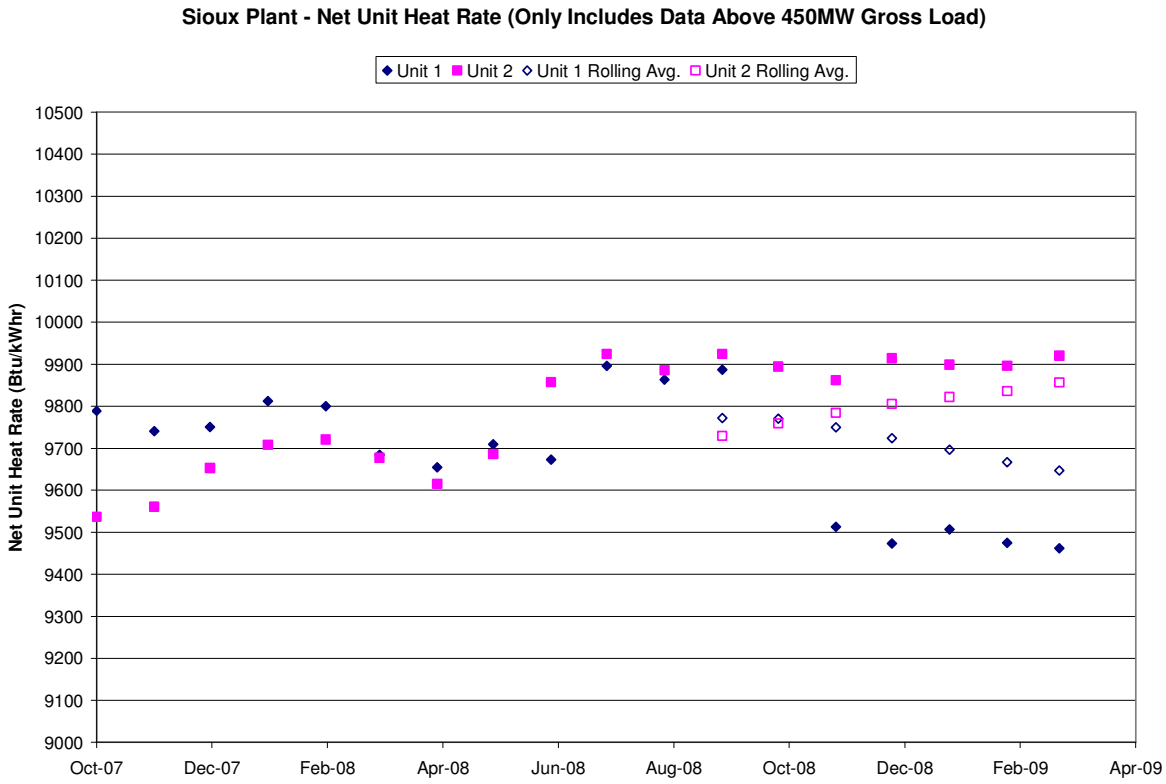
The most notable items regarding Sioux unit performance were:

- There is a large difference in feedwater flow between the available flow indications on both units. Performance Engineering will work with the plant to determine the most accurate estimate of feedwater flow. On Unit 2, the difference could be attributable to a leaking main boiler feedpump recirculation valve.
- A meeting on feedwater heater venting was held on April 7 at the plant. The plant will investigate and vent the minimum amount in order to maintain adequate feedwater heater performance.
- A performance test on the new steam coil air heater on Unit 1 shows that the coils are providing the outlet air temperatures guaranteed by the vendor. A final performance report will be issued in a separate letter. The plant is currently operating with only one of two rows in service and this operation has cut the heat rate impact due to excessive air heater inlet air temperature by over half.

The following table shows the known instrument deficiencies for both units. It appears numerous instruments on the LP heaters on Unit 1 went bad at the same time on Unit 1 (around 11:30 pm on April 6, 2009).

Tag	Unit	Issue	Resolution	Carryover or New
SX1BFW-FWHTR7A-0001-PI (7A Extraction Pressure)	Unit 1	Bad since the outage	?	Carryover
SX1BFW-FWHTR7A-0001-TI (7A Extraction Temperature)	Unit 1	Long term issue	?	Carryover
SX1BFW-FWHTR7ADRN-0001-TI (7A Drain Temperature)	Unit 1	Long term issue	?	Carryover
SX1BFW-FWHTR6A-0001-TI (6A Extraction Temperature)	Unit 1	Long term issue	?	Carryover
SX1BFW-FWHTR4B-0001-PI (4B Extraction Pressure)	Unit 1	Bad since mid-December	?	Carryover
SX1BFW-FWHTR2-0001-PI (2 Extraction Pressure)	Unit 1	Bad since the outage	?	Carryover
SX1BFW-FWHTR5B-0001-PI (5B Extraction Pressure)	Unit 1	Bad since April 6, 2009	?	New
SX1BFW-FWHTR5B-0001-TI (5B Extraction Temperature)	Unit1	Bad since April 6, 2009	?	New
SX1BFW-FWHTR4B-0001-TI (4B Extraction Temperature)	Unit 1	Bad since April 6, 2009	?	New
SX1BFW-FWHTR4BLVLCTRL-505V1-ZI (4B Level control valve 505V1 pos)	Unit 1	Bad since April 6, 2009	?	New
SX1AHS-AHNGASIN-0002-PI (Air Heater Gas In Pressure)	Unit 1	Bad since the outage	?	New
SX2BFW-FWHTR7B-0001-PI (7B Extraction Pressure)	Unit 2	7B Extraction pressure - Not reading since Aug. 9, 2008	?	Carryover
SX2BFW-FWHTR7ADRN-0001-TI (7A Drain Temperature)	Unit 2	7A Drain temp - Not reading	?	Carryover
SX2AHS-STMCOILAHADRN5-278-TI (Unit 2 Stm Coil Line Temp 5)	Unit 2	Long-term issue – reads -4500F at various times over the last year	?	Carryover
SX2TRB-LPBACKPRESSNW-0001-PI (LP Back Press North West)	Unit 2	Reads lower than the other 3 LP backpressure indications	?	New

A monthly summary of each Unit's heat rate for operation above 450 MW is included on the following plot. Note that the rolling average for Unit 1 continues to decrease while the rolling average for Unit 2 continues to climb.



Heat Rate KPI

A trend only heat rate KPI has been created for 2009 with the intent of having a pay heat rate KPI in 2010. Below is a table showing the actual performance of the plant through March.

Plant	2009 Actual	Threshold	Target	Stretch
Sioux	9693	9705	9624	9591

A separate e-mail was sent to the plant describing how the trend only KPI targets were derived for 2009. Performance engineering intends to do more work in this area and present the proposed methodology for the heat rate KPI at our quarterly heat rate meeting in the summer (to be scheduled).

Action Items

- Performance Engineering will JR the above noted instrument deficiencies.
- Performance Engineering needs to develop and execute a plan to collect and analyze turbine performance data.
- Performance Engineering will check the EtaPro heat rate calculations to ensure they are as accurate as possible. This will include a review of the available feedwater flow indications on each unit

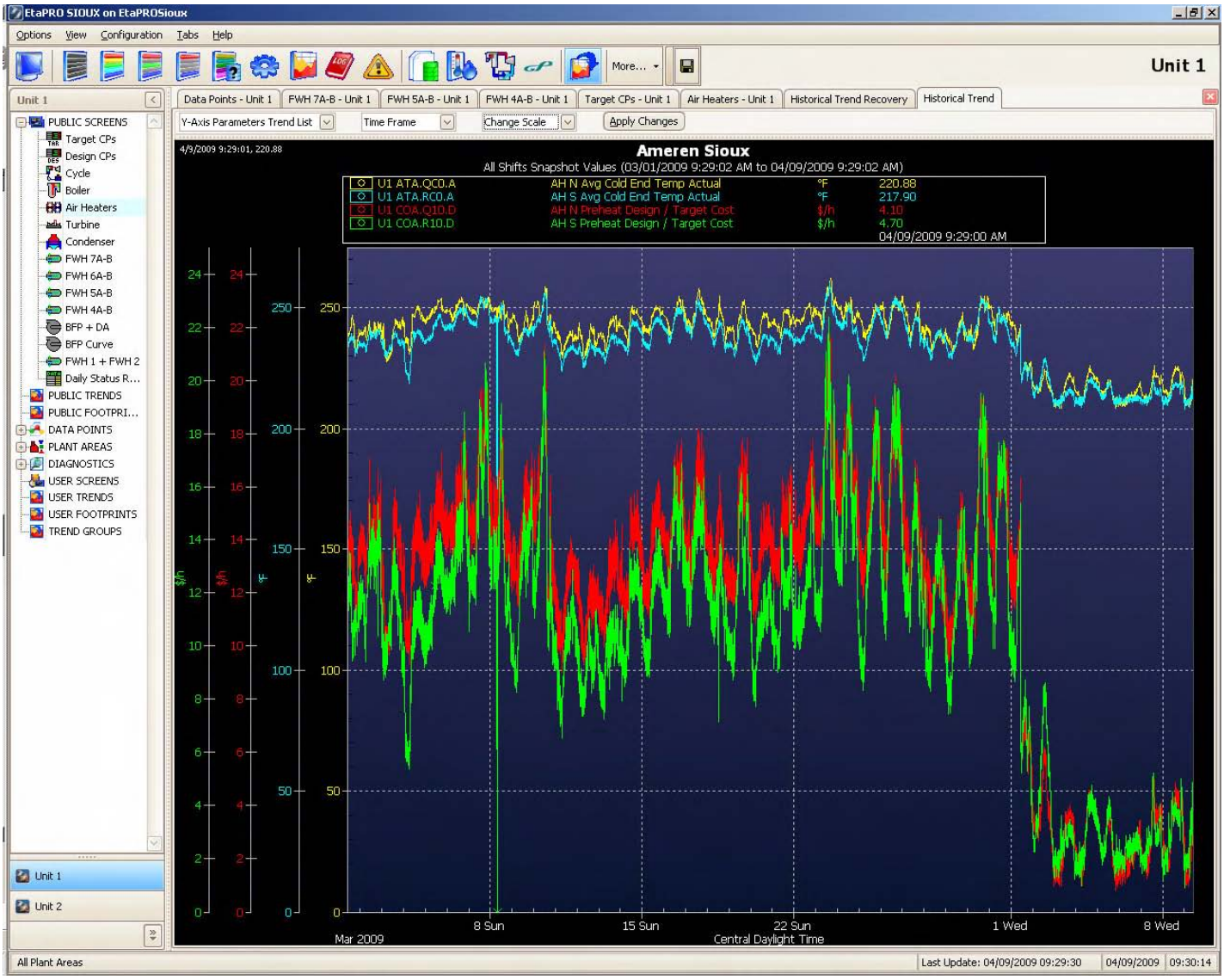
Unit 1

The following observations were made regarding Unit 1 operation and performance:

- A performance test on the new steam coil air heater was performed on 2/20/09. The results show that new coils are meeting outlet temperature guarantee provided by the vendor. A detailed report has been issued that provides the full results of the test.
- Due to the minimum required pressure of the steam inlet header to these coils, the coil outlet air temperature is much higher than that required to meet the desired cold end metal temperature (CEMT). A plot of the CEMT for March shows that the unit is operating with a CEMT much above the 205F setpoint. With the ambient temperature on the rise, this problem will only grow during the spring months. As part of the February performance test, a one-row configuration was tested on the unit (the system has 12 coils total on the unit, 2 rows of 3 coils in each duct). In other words, half of the coils were removed from service to determine if one row of coils would provide adequate outlet air temperature to satisfy the CEMT requirements. The preliminary results show that this configuration could provide a 205 CEMT down to an ambient temperature of approximately 20F. Operation in this mode was commenced on April 1. As shown in the plot on page 5, reducing the number of coils has cut the heat rate cost of the excess air heater inlet air temperature by more than half. It is recommended that this strategy be used in the spring and fall to minimize the loss associated with excessive inlet air inlet temperatures. Another means of lowering the inlet air temperature even further would be to lower the inlet header pressure from the current setting of 25 psig down to 15 psig (the vendor recommended minimum). If this is attempted, it is recommended that the pressure be lowered manually by slowly closing the control valves in the system. Once the desired inlet pressure has been reached and is stable, the pegging pressure setpoint can be changed to the new value and the system can be put in automatic control. This method is recommended due to some control problems observed during the performance test in February. Further detail on these issues will be provided in the detailed SCAH performance test. Finally, as summer approaches, thought should also be given to shutting down the air preheat system entirely.

Summary of Performance Report for:						
Plant	Sioux					
Unit	1					
Period	3/1/09	to	4/1/09			
Full Load Performance			Mar-09		Feb-09	Mar-08
Hours of Data (Gross load>450 MW)			187		375	238
			Averages		Averages	Averages
GENERATOR MEGAWATTS	MW		467.5		471.9	460.8
AUX POWER	MW		26.9		27.1	28.0
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9461.8		9474.7	9684.1
Boiler Efficiency Actual	%		87.3		87.1	86.6
CONTROL VALVE POSITION LVDT	%		28.5		29.0	28.3
FEEDWATER TEMP TO ECON	degF		468.5		469.3	468.1
FEEDWATER TEMP TO HTR 1	degF		401.6		402.2	401.6
HP Turbine Efficiency Actual	%		82.2		82.6	81.8
IP Turbine Efficiency Corrected	%		96.0		96.0	93.3
Condenser Pressure	inHga		1.1		1.0	0.6
AIRHTR-A GAS OUTLET TEMP	degF		316.9		314.1	297.5
AIRHTR-B GAS OUTLET TEMP	degF		320.0		315.9	296.8
AMBIENT AIR TEMP	degF		45.6		35.6	46.3
River Temperature	degF		44.6		35.5	42.4
FWH 1 Temperature Rise	degF		67.0		67.1	66.5
Net Load	MW		440.7		444.8	432.8
Average Exit Gas Temperature	degF		318.4		315.0	297.1
Aux Power	%		5.7		5.7	6.1
Gross Unit Heat Rate	BTU/KW-HR		8918.3		8930.5	9095.6
Gross Turbine Heat Rate	BTU/KW-HR		7785.6		7780.382	7872.7
Feedwater Flow	KPPH		2941.1			

Net unit heat rate is about 220 Btu/kWhr lower than last year.



As shown above, the average CEMT for the month of March was approximately 240F (yellow and blue lines). The excess inlet air heater air temperature was costing approximately $14/hr/side (red and green lines). Following the change to one row operation, the CEMT has dropped to around 220F and the cost associated with the excess inlet air heater air temperature is below $5/hr/side.

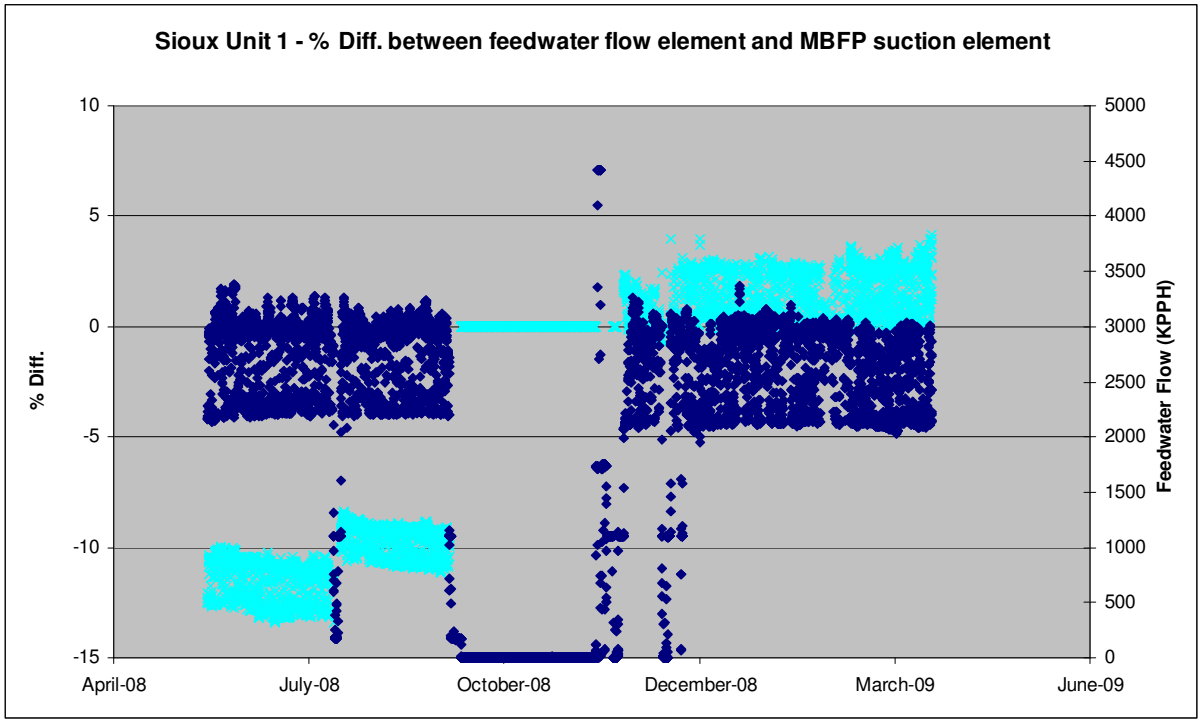
Unit 2

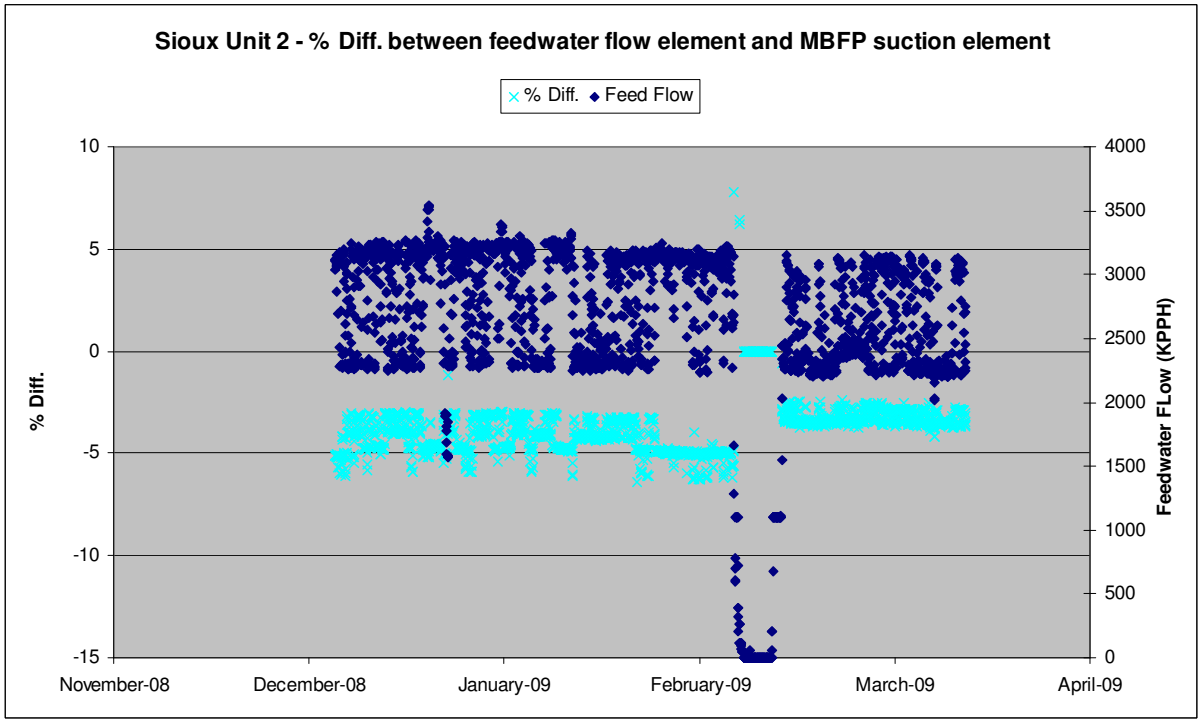
The following observations were made regarding Unit 2 operation and performance:

- The heat rate for Unit 2 is generally up from the prior year. For example, Unit 2's heat rate in January 2009 was almost 250 Btu/kWhr higher than in March 2008. Performance engineering has action to investigate further and determine the cause of the increasing trend in heat rate on the units. In comparing the parameters from the table below, one can note some differences that would lead to a higher heat rate (Boiler efficiency is down, AH gas outlet temperature is up, and Aux. load is up). Performance engineering will investigate these changes and determine if there are any actionable items. The investigation into this will also include the development of a method to conduct periodic turbine performance tests.
- To review the calculated heat rate in EtaPro, the available feedwater flow indications were compared on the unit. The main comparison was between the feedwater flow element and the main boiler feed pump suction flow element. From the beginning of the year, the flow indicated by the suction element (after subtracting off reheat spray flow) was 4 to 5% higher than that indicated by the feedwater flow element downstream of the pump. After an SBO in March in which it is believed some boiler feedpump recirculation valve work was performed, this difference has decreased by about one percent. It is noted that on Unit 1, the feedwater element typically indicates higher than the suction element by 0-3%. Prior to the MBO on Unit 1, the feedwater element indicated between 10-15% lower than the suction element. Performance Engineering has action to review these flow indications and determine which element provides the most accurate indication of flow. In addition, the potential for leaking recirculation valves will be investigated, specifically on Unit 2, in which the suction flow element indicates higher flow than the element downstream of the pump.
- There was a period of about 5 days in March in which the #2 feedwater heater was taken out of service as indicated by no extraction flow and no temperature rise across the heater. The plant was contacted to determine the reason for this operation as no log entry was found regarding the heater during the time period of interest. The plant indicated that the extraction valve was found closed but did know the reason for why. For future reference, operation in this lineup costs about 30 Btu/kWhr in heat rate (or about $25/hour assuming a fuel cost of $2/hr and an average load of 400MWs) and about 1.5 MWs in gross generation.

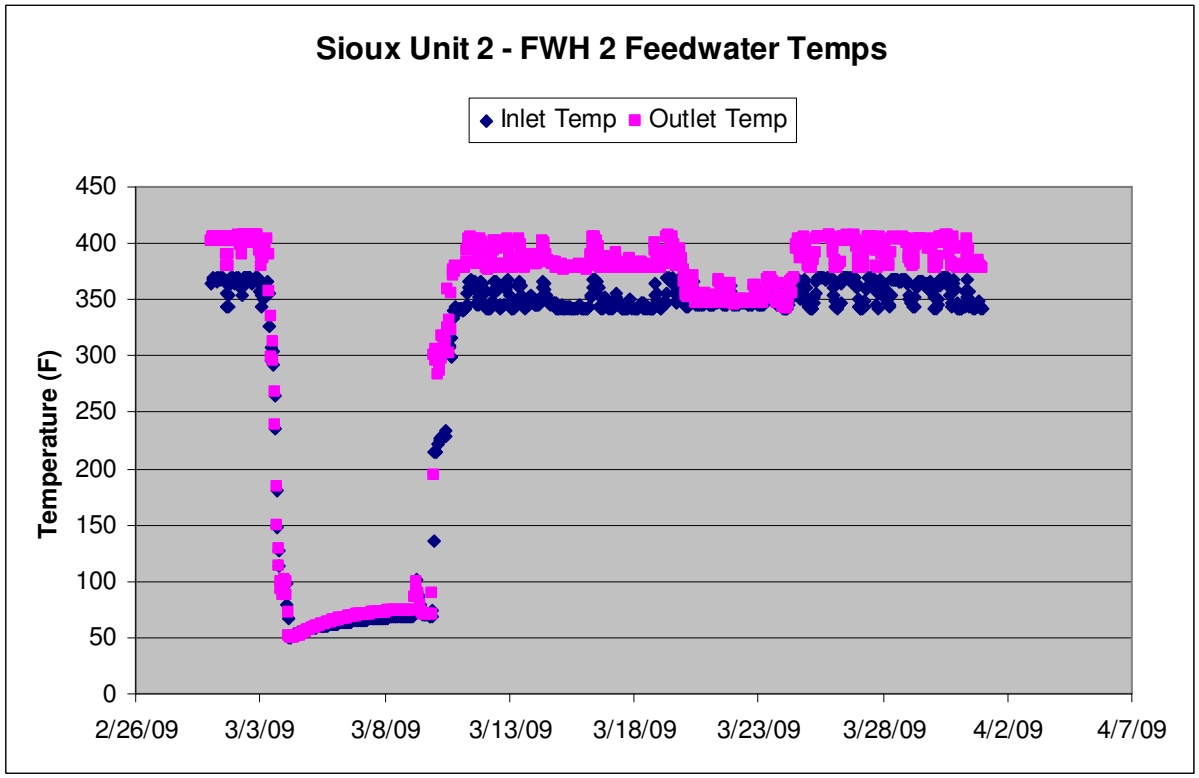
Summary of Performance Report for:						
Plant	Sioux					
Unit	2					
Period	3/1/09	to	4/1/09			
Full Load Performance			Mar-09		Feb-09	Mar-08
Hours of Data (Gross load>450 MW)			148		370	386
			Averages		Averages	Averages
GENERATOR MEGAWATTS	MW		467.1		472.5	459.1
AUX POWER	MW		27.2		27.2	25.2
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9920.3		9896.4	9677.2
Boiler Efficiency Actual	%		86.7		86.6	87.1
CONTROL VALVE POSITION LVDT	%		27.0		27.9	26.5
FEEDWATER TEMP TO ECON	degF		470.1		471.0	468.8
FEEDWATER TEMP TO HTR 1	degF		402.2		405.2	402.8
HP Turbine Efficiency Actual	%		82.4		83.3	82.3
IP Turbine Efficiency Corrected	%		92.3		92.2	92.5
Condenser Pressure	inHga		1.5		1.4	0.6
AIRHTR-A GAS OUTLET TEMP	degF		307.4		305.1	299.6
AIRHTR-B GAS OUTLET TEMP	degF		316.3		306.1	298.4
AMBIENT AIR TEMP	degF		44.7		35.3	46.8
River Temperature	degF		27.9		33.7	37.4
FWH 1 Temperature Rise	degF		67.8		65.9	65.9
Net Load	MW		439.9		445.3	433.9
Average Exit Gas Temperature	degF		311.8		305.6	299.0
Aux Power	%		5.8		5.8	5.5
Gross Unit Heat Rate	BTU/KW-HR		9343.2		9326.4	9146.3
Gross Turbine Heat Rate	BTU/KW-HR		8104.2		8080.8	7969.5
Feedwater Flow	KPPH		3092.314			

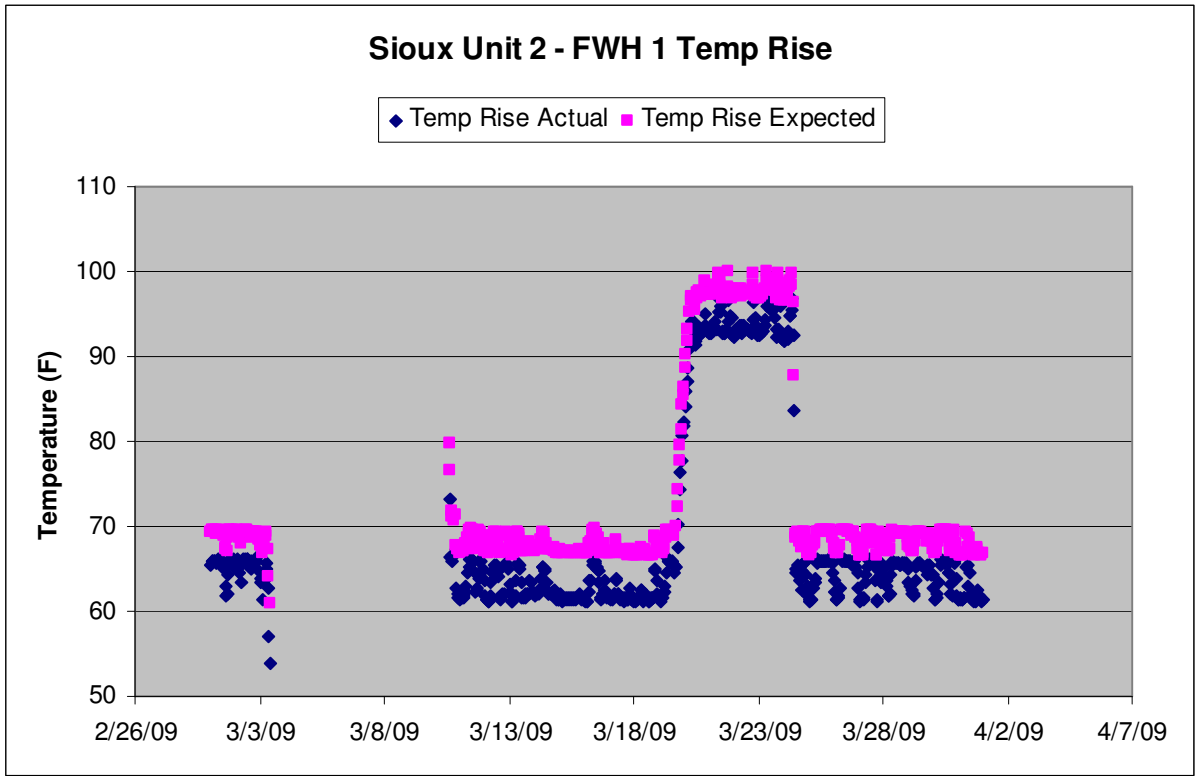
Most parameters in March were very consistent with the values from February.





These two plots show the difference between the feedwater flow as estimated by flow elements upstream and downstream of the MBFP. Unit 1 agreement has improved greatly following the MBO. The unit 2 suction element indicates more flow than the element downstream of the pump. This could be an indication of a leaking recirculation valve or valves.





These two plots show the time period in March in which the #2 heater was OOS (no temperature rise for the #2 heater with a corresponding large temperature rise over the #1 heater).

March 19, 2009

To: Karl Blank
From: Jeff Shelton
Cc: Bob Meiners, Keith Stuckmeyer, Harry Benhardt, John Romano, Pat Weir, Greg Gilbertsen, David Azar, Mark Selvog, Steve Garner, Scott McCormack, Lisa Meyer, Ken Stuckmeyer, Don Clayton, Joe Sind, Jim Barnett, Glenn Tiffin, Matt Wallace, Scott Hixson

Subject: Sioux February 2009 Performance Report

Executive Summary

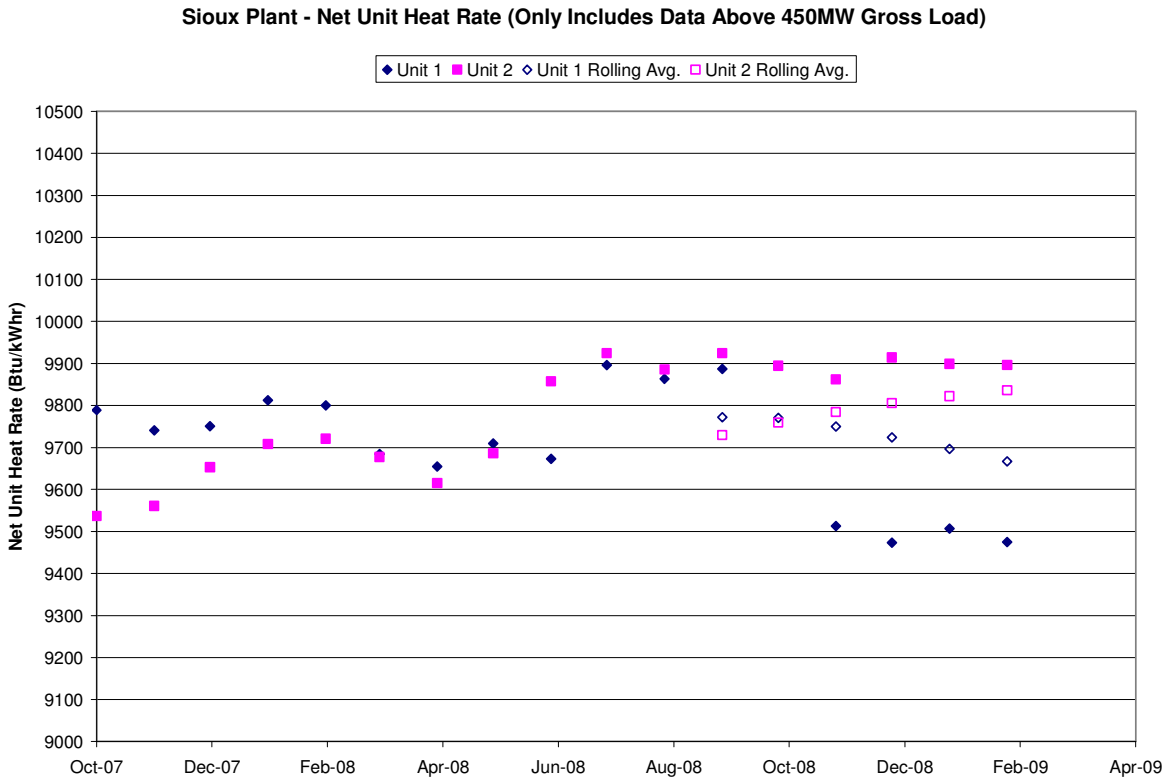
The most notable items regarding Sioux unit performance were:

- The performance of the 6B FWH on both units has improved and stabilized since continuous venting was initiated at the end of February. A meeting in April will be held at the plant to discuss the chemical ramifications of this continuous venting.
- There appears to be high air inleakage or an underperforming condenser vacuum pump on Unit 2.
- A performance test on the new steam coil air heater on Unit 1 shows that the coils are providing the outlet air temperatures guaranteed by the vendor.

The following table shows the known instrument deficiencies for both units:

Tag	Unit	Issue	Resolution	Carryover or New
SX1BFW-FWHTR7A-0001-PI (7A Extraction Pressure)	Unit 1	Bad since the outage	?	Carryover
SX1BFW-FWHTR7A-0001-TI (7A Extraction Temperature)	Unit 1	Long term issue	?	Carryover
SX1BFW-FWHTR7ADRN-0001-TI (7A Drain Temperature)	Unit 1	Long term issue –read higher than extraction steam temperature	?	Carryover
SX1BFW-FWHTR6A-0001-TI (6A Extraction Temperature)	Unit 1	Long term issue	?	Carryover
SX1BFW-FWHTR4B-0001-PI (4B Extraction Pressure)	Unit 1	Bad since mid-December	?	Carryover
SX1BFW-FWHTR2-0001-PI (2 Extraction Pressure)	Unit 1	Bad since the outage	?	Carryover
SX2BFW-FWHTR7B-0001-PI (7B Extraction Pressure)	Unit 2	7B Extraction pressure - Not reading since Aug. 9, 2008	?	Carryover
SX2BFW-FWHTR7ADRN-0001-TI (7A Drain Temperature)	Unit 2	7A Drain temp - Not reading	?	Carryover
SX2AHS-STMCOILAHADRN5-278-TI (Unit 2 Stm Coil Line Temp 5)	Unit 2	Long-term issue – reads -4500F at various times over the last year	?	New

A monthly summary of each Unit's heat rate for operation above 450 MW is included on the following plot.



Note the increase in heat rate in both units around the May/June time frame of last year. This corresponds to the increase in river temperature and condenser backpressure. However, the heat rate did not come back down in the winter on Unit 2 as the river temperature and condenser backpressure dropped.

Heat Rate KPI

A trend only heat rate KPI has been created for 2009 with the intent of having a pay heat rate KPI in 2010. Below is a table showing the actual performance of the plant through February.

Plant	2009 Actual	Threshold	Target	Stretch
Sioux	9694	9705	9624	9591

A separate e-mail was sent to the plant describing how the trend only KPI targets were derived for 2009. Performance engineering intends to do more work in this area and present the proposed methodology for the heat rate KPI at our quarterly heat rate meeting in the summer (to be scheduled).

Action Items:

- Sioux should JR the above instrument deficiencies if they are not currently in the system.
- Sioux should test the performance of each vacuum pump on Unit 2 by running them one at a time. If the test results indicate high air inleakage, a search for the source(s) should be conducted. In addition, the air removal rate of the vacuum pumps should be brought online as currently available on Unit 1.
- Performance Engineering needs to develop and execute a plan to collect and analyze turbine performance data.
- Performance Engineering will check the EtaPro heat rate calculations to ensure they are as accurate as possible.
- Performance Engineering will develop a “best-achievable” heat rate for each unit to determine the potential improvement available on each unit. This will also be used in the determination of the heat rate KPI for the plant.
- Performance Engineering will develop plans and help conduct a cycle isolation check on all four units in 2009/2010. The intent is to have a Coop student in Performance Engineering perform this task on the entire UE fleet. To start this process, Performance engineering requests that the plant provide any current cycle isolation checklists that are performed on the units (Post-startup valve lineup checklists, etc).
- Performance Engineering will be phasing out the use of OPM.

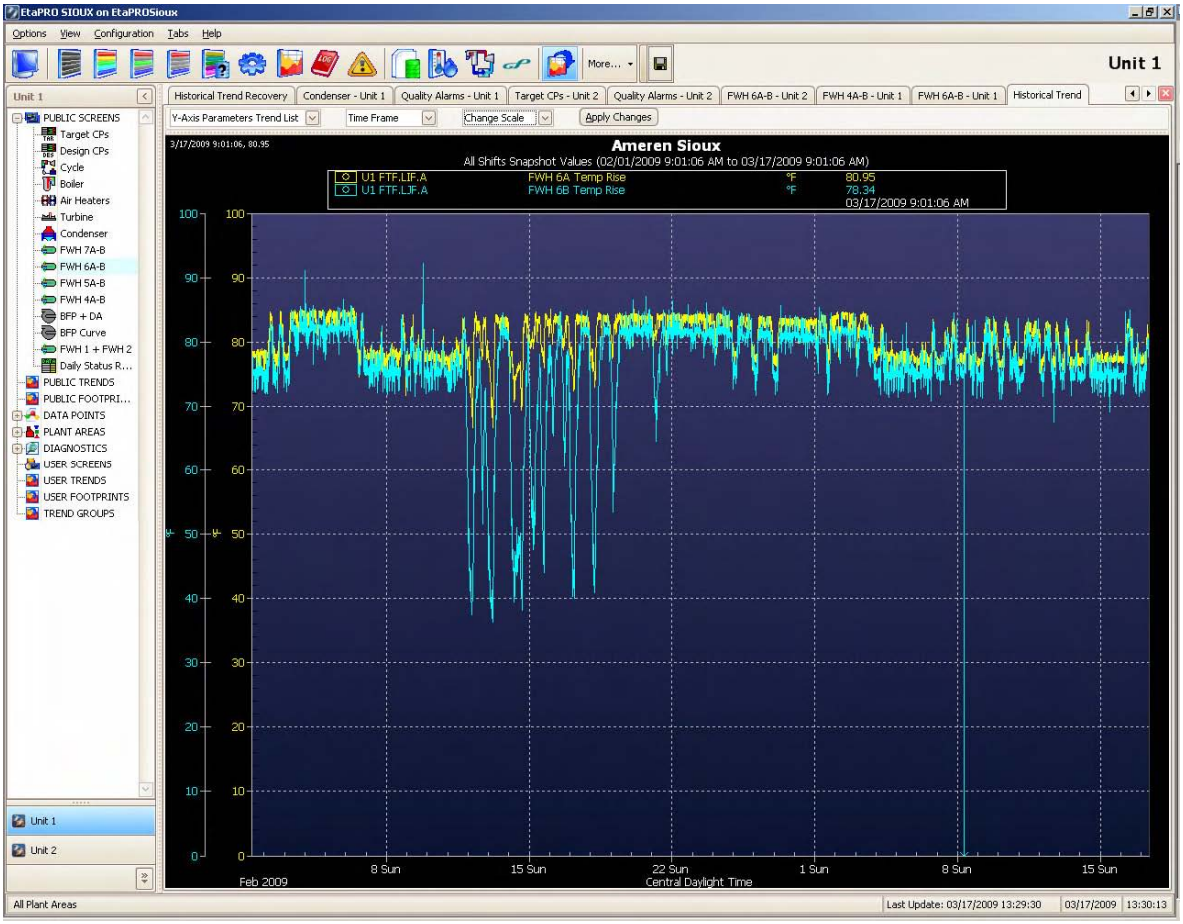
Unit 1

The following observations were made regarding Unit 1 operation and performance:

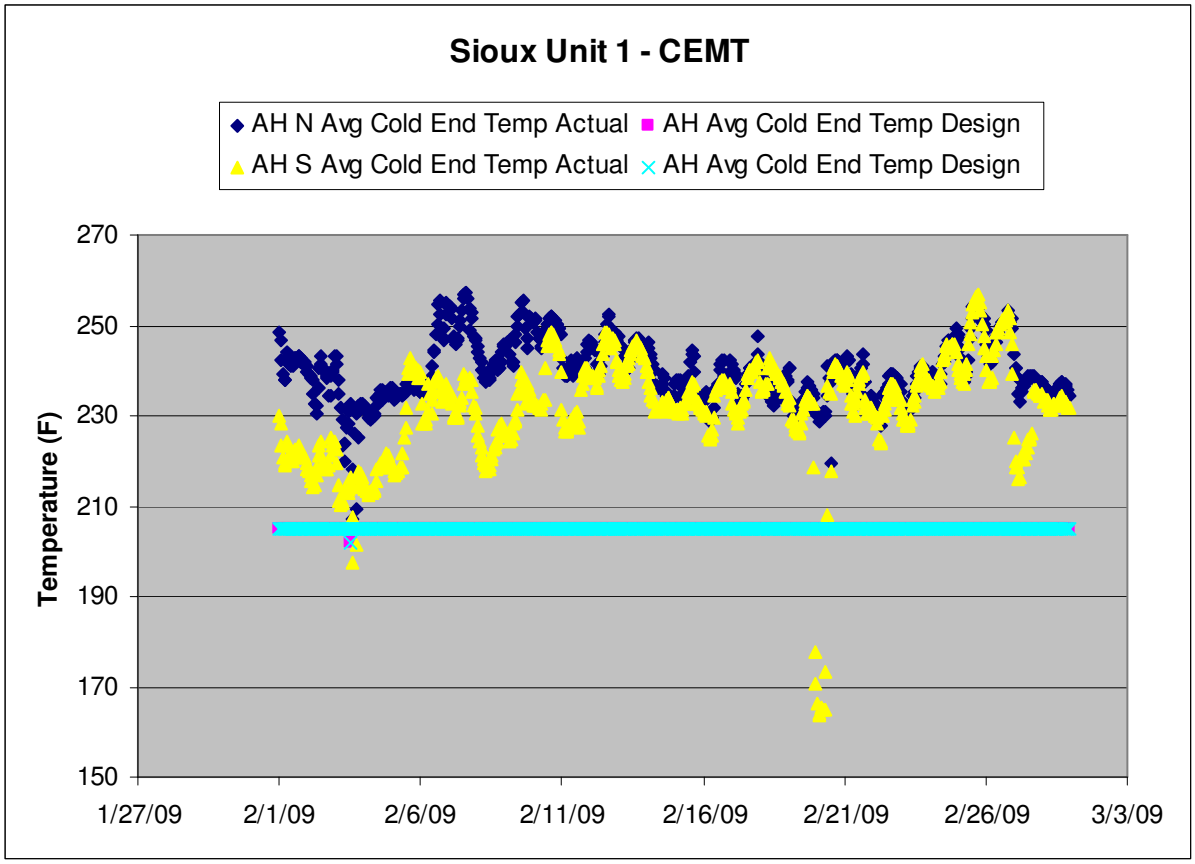
- Performance of the 6B heater looks much improved now that the heater is being vented to the condenser. A plot below shows the temperature rise of the 6A and 6B heater on Unit 1 since Feb. 1, 2009. As shown, the temperature rise of the 6B was at times very low. Since cracking open the vent to the condenser on the #6 heaters, the performance of the A and B side has been good. It is noted that this could pose a chemistry concern. The plant has setup a meeting in April to discuss the ramifications of operating with these vents open.
- A performance test on the new steam coil air heater was performed on 2/20/09. The preliminary results show that new coils are meeting outlet temperature guarantee provided by the vendor. A detailed report will be issued that provides the full results of the test.
- Due to the minimum required pressure of the steam inlet header to these coils, the coil outlet air temperature is much higher than that required to meet the desired cold end metal temperature (CEMT). A plot of the CEMT for February shows that the Unit is operating with a CEMT much above the 205F setpoint. With the ambient temperature on the rise, this problem will only grow during the spring months. As part of the February performance test, a one-row configuration was tested on the unit (the system has 12 coils total on the unit, 2 rows of 3 coils in each duct). In other words, half of the coils were removed from service to determine if one row of coils would provide adequate outlet air temperature to satisfy the CEMT requirements. The preliminary results show that this configuration could provide a 205 CEMT down to an ambient temperature of approximately 20F. Operation in this configuration will be discussed with the plant at the heat rate meeting next week. The plant has raised some concerns with operation in this configuration and in shutting the system down the system entirely in the summer (pressure control concerns on the 150 lb aux steam header).

Summary of Performance Report for:						
Plant	Sioux					
Unit	1					
Period	2/1/09	to	3/1/09			
Full Load Performance			Feb-09		Jan-09	Feb-08
Hours of Data (Gross load>450 MW)			375		350	290
			Averages		Averages	Averages
GENERATOR MEGAWATTS	MW		471.9		476.1	467.2
AUX POWER	MW		27.1		27.2	29.2
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9474.7		9507.0	9800.2
Boiler Efficiency Actual	%		87.1		86.6	86.4
CONTROL VALVE POSITION LVDT	%		29.0		30.1	28.7
FEEDWATER TEMP TO ECON	degF		469.3		469.4	469.6
FEEDWATER TEMP TO HTR 1	degF		402.2		402.3	402.4
HP Turbine Efficiency Actual	%		82.6		83.3	82.6
IP Turbine Efficiency Corrected	%		96.0		96.1	93.1
Condenser Pressure	inHga		1.0		0.8	0.5
AIRHTR-A GAS OUTLET TEMP	degF		314.1		306.9	298.0
AIRHTR-B GAS OUTLET TEMP	degF		315.9		308.9	294.7
AMBIENT AIR TEMP	degF		35.6		25.5	32.7
River Temperature	degF		35.5		33.2	34.4
FWH 1 Temperature Rise	degF		67.1		67.1	67.2
Net Load	MW		444.8		448.9	438.0
Average Exit Gas Temperature	degF		315.0		307.9	296.4
Aux Power	%		5.7		5.7	6.3
Gross Unit Heat Rate	BTU/KW-HR		8930.5		8964.2	9187.4
Gross Turbine Heat Rate	BTU/KW-HR		7780.4		7759.6	7940.4

Net unit heat rate is about 300 Btu/kWhr lower than last year. IP efficiency took a step change up following the outage. This is most likely an instrumentation issue and will be investigated as part of the turbine performance monitoring effort.



This plot shows the temperature rise across the 6A (yellow line) and 6B (blue line) FWHs. As shown, the temperature rise of the 6A heater no longer has periods in which it drops off significantly in comparison to the 6A FWH.



At the end of February, the typical CEMT of the unit was above 230F. The unit is using more steam than required to meet the minimum CEMT setpoint. The performance test did not indicate any issues with operating in a one-row configuration and it is recommended that the coils be transferred into a one-row configuration.

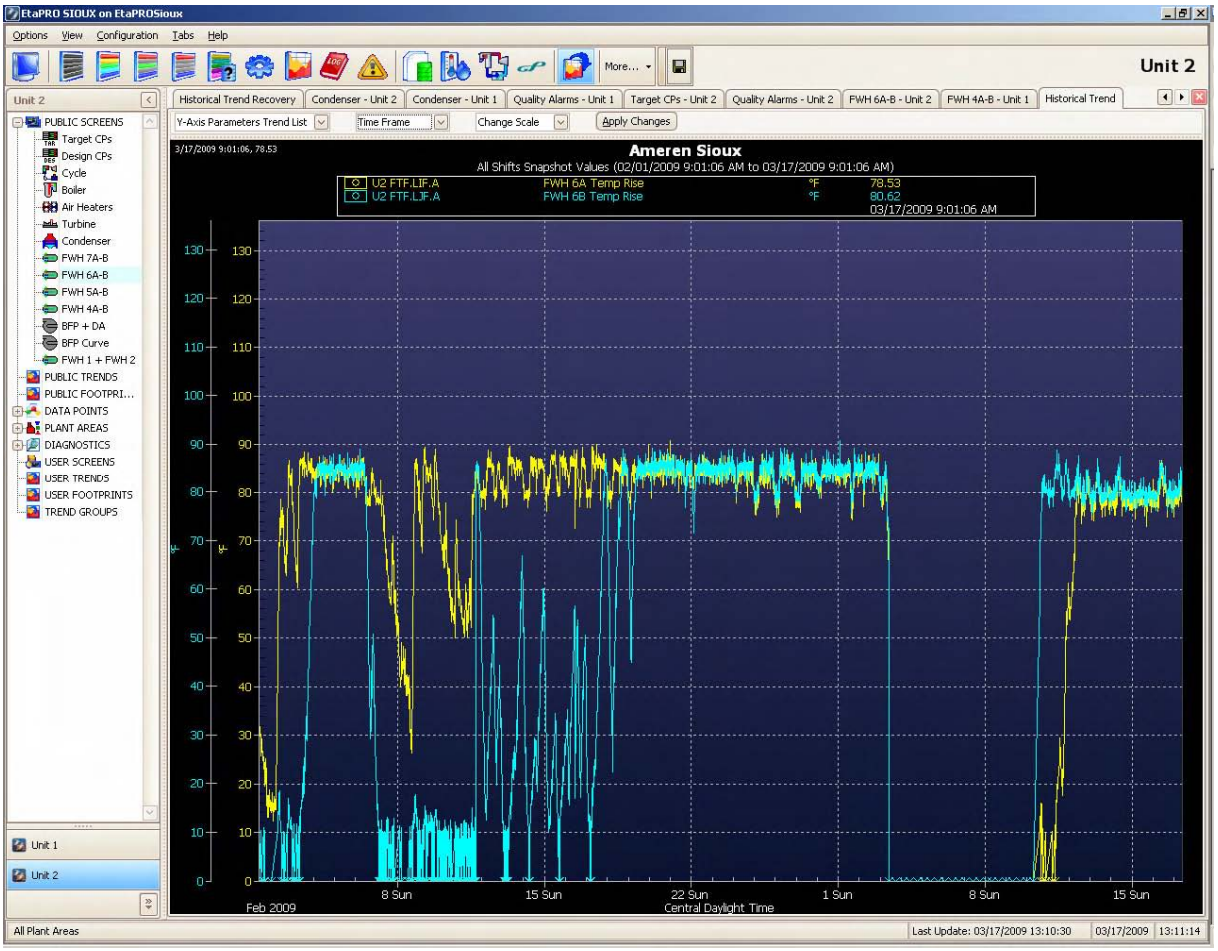
Unit 2

The following observations were made regarding Unit 2 operation and performance:

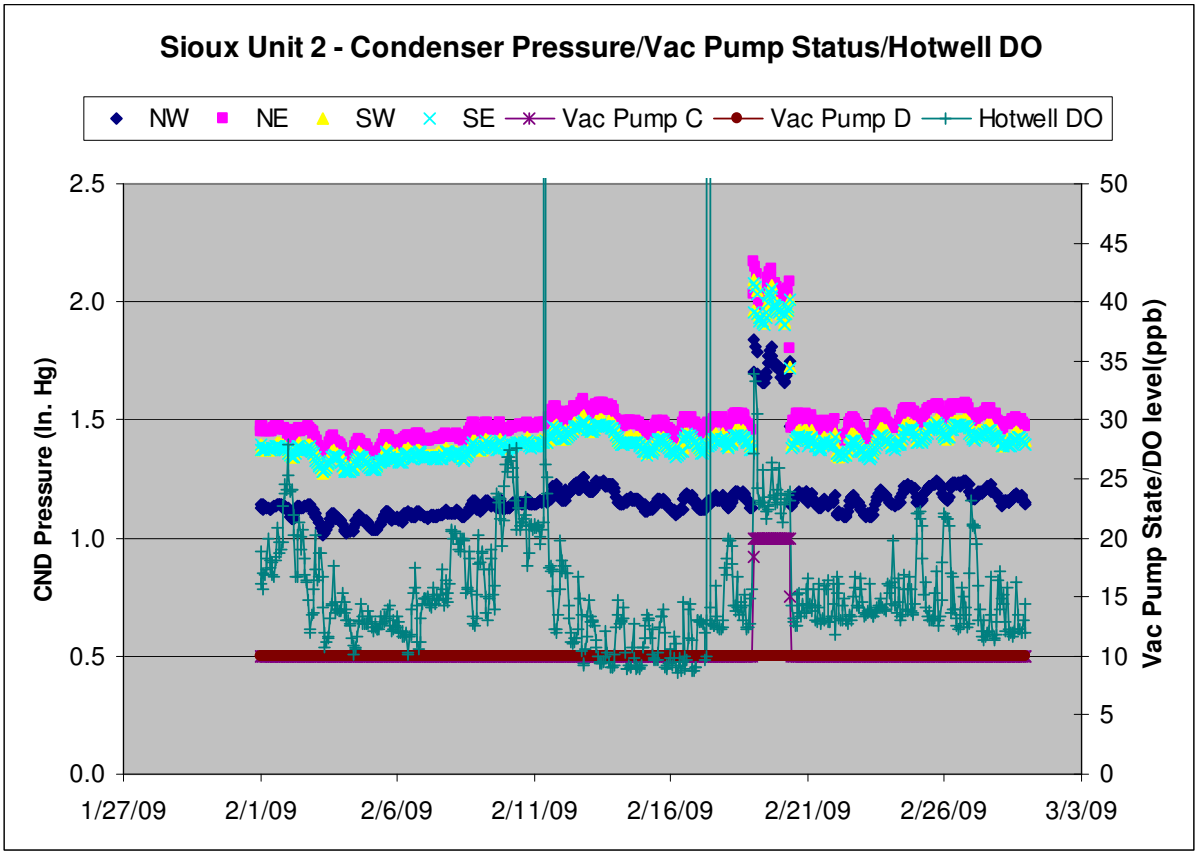
- The heat rate for Unit 2 is generally up from the prior year. For example, Unit 2's heat rate in January 2009 was almost 170 Btu/kWhr higher than in January 2008. Performance engineering has action to investigate further and determine the cause of the increasing trend in heat rate on the units. In comparing the parameters from the table below, one can note some differences that would lead to a higher heat rate (Boiler efficiency is down, IP efficiency is down, AH gas outlet temperature is up, and Aux. load is up). Performance engineering will investigate these changes and determine if there are any actionable items. The investigation into this will also include the development of a method to conduct periodic turbine performance tests.
- At first glance, it appeared that the condenser backpressure was up by about 0.9 in Hg from the prior year. Further investigation showed that the units for PI tag S2.Q.IPO.001.A and S2.Q.IPO.000.A are reversed. The February 2008 report was generated using the S2.Q.IPO.000.A tag which is incorrectly labeled with in. HgA units (in reality, the pressure is in psia for this tag). The February 2009 report was generated using the S2.Q.IPO.001.A tag which provides the condenser pressure in in. HgA (although the Pi tag gives the units as psia). The process to make corrections of this nature (including who should make the changes and who will be notified of changes) will be discussed with the plant at the next quarterly meeting. This same issue exists on Unit 1. The change in tags was made last June.
- The performance of the 6B heater has improved and stabilized since continuous venting was initiated at the end of February. A plot below shows the performance of the 6B heater to be consistent with the 6A heater since the end of February. As discussed under Unit 1, a meeting will be held at the plant to discuss the ramifications of operating with a continuous vent on the #6 FWHs.
- Near the end of February, condenser pressure took a step change up (from about 1.5 in. HgA to about 2.0 in. HgA) and stayed elevated for approximately 2 days. The cause for the increased backpressure was the removal of a vacuum pump from service (see plot below). Note that the heat rate on the unit went up about 100 Btu/kWhr during this time period. Hotwell DO also had a step increase upon turning off the C vacuum pump and a step decrease upon turning the C vacuum pump back on. Due to no online indication of air leakage, the actual level of inleakage cannot be monitored easily on this unit. It would appear that either the leakage is above the level at which one pump can handle or the D vacuum pump is underperforming. This could be tested by removing one vacuum pump from service at a time and watching the condenser backpressure. If the condenser backpressure climbs in both cases, air inleakage is the likely problem. If the condenser backpressure only climbs when the C pump is off, the D vacuum pump has a problem. In either event, it is recommended that the online air removal indication be made functional on Unit 2. If high inleakage is found, a leakage survey should be conducted on the unit 2 condenser.

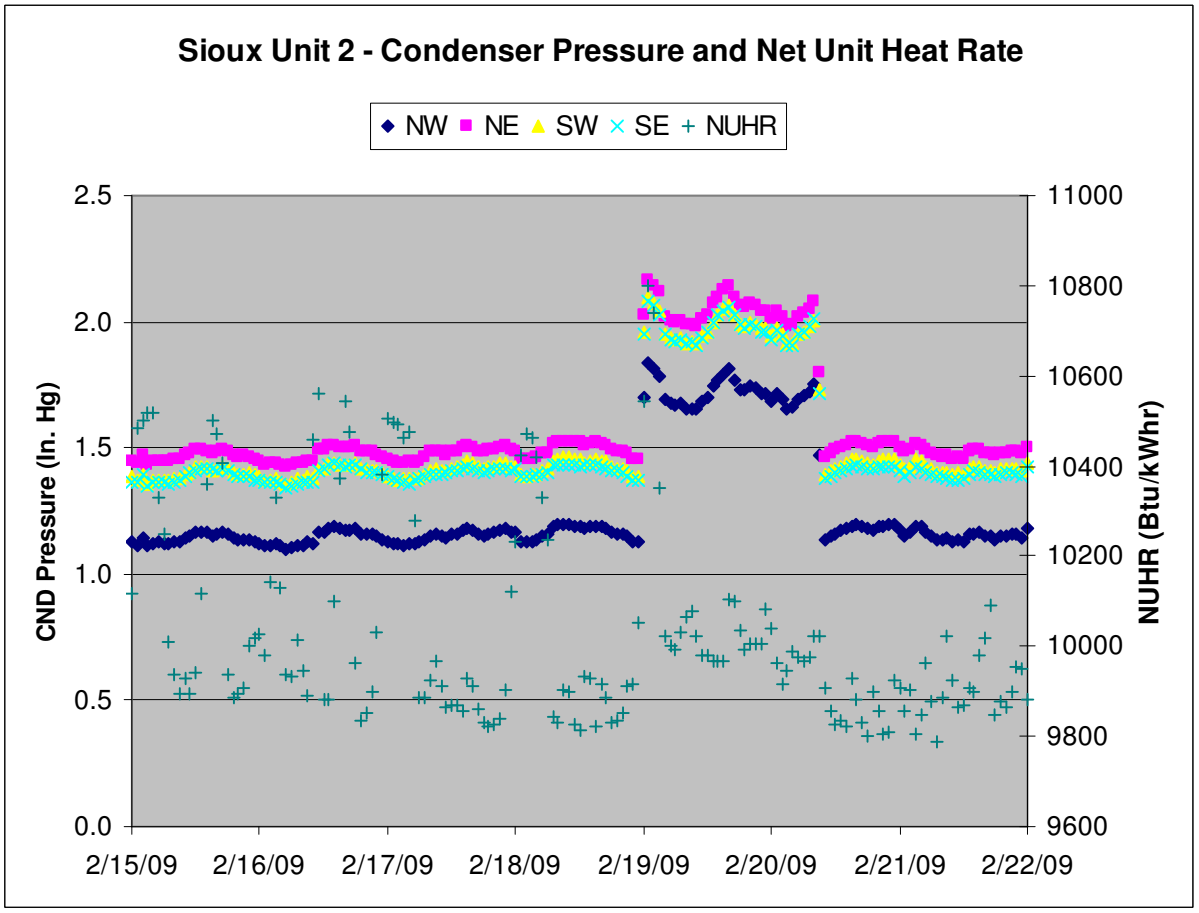
Summary of Performance Report for:						
Plant	Sioux					
Unit	2					
Period	2/1/09	to	3/1/09			
Full Load Performance			Feb-09		Jan-09	Feb-08
Hours of Data (Gross load>450 MW)			370		410	323
			Averages		Averages	Averages
GENERATOR MEGAWATTS	MW		472.5		477.6	468.6
AUX POWER	MW		27.2		27.2	25.6
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9896.4		9899.1	9720.8
Boiler Efficiency Actual	%		86.6		86.4	87.1
CONTROL VALVE POSITION LVDT	%		27.9		28.7	27.1
FEEDWATER TEMP TO ECON	degF		471.0		471.7	470.7
FEEDWATER TEMP TO HTR 1	degF		405.2		405.7	404.4
HP Turbine Efficiency Actual	%		83.3		83.8	82.8
IP Turbine Efficiency Corrected	%		92.2		92.3	92.6
Condenser Pressure	inHga		1.4		1.3	0.5
AIRHTR-A GAS OUTLET TEMP	degF		305.1		308.7	296.9
AIRHTR-B GAS OUTLET TEMP	degF		306.1		309.6	301.1
AMBIENT AIR TEMP	degF		35.3		26.8	32.1
River Temperature	degF		33.7		32.0	32.0
FWH 1 Temperature Rise	degF		65.9		66.1	66.3
Net Load	MW		445.3		450.3	443.0
Average Exit Gas Temperature	degF		305.6		309.2	299.0
Aux Power	%		5.8		5.7	5.5
Gross Unit Heat Rate	BTU/KW-HR		9326.4		9335.0	9190.7
Gross Turbine Heat Rate	BTU/KW-HR		8080.8		8061.7	8003.9

Most parameters in February were very consistent with the values from January.



This plot shows the temperature rise across the 6A (yellow line) and 6B (blue line) FWHs. As shown, the temperature rise of the 6A no longer has periods in which it drops off significantly in comparison to the 6A FWH.





The top plot shows condenser pressure over the month of February along with the status of the condenser vacuum pumps (a state of 10 is on and a state of 20 is off). As shown, the condenser pressure took a step change up upon turning off the C vacuum pump. The top plot also shows DO taking a step change up when the vacuum pump was removed. The bottom plot shows the heat rate of the unit along with the condenser pressure. As shown, the heat rate was impacted by this operation at elevated backpressure.

February 26, 2009

To: Karl Blank
From: Jeff Shelton
Cc: Bob Meiners, Keith Stuckmeyer, Harry Benhardt, John Romano, Pat Weir, Greg Gilbertsen, David Azar, Mark Selvog, Steve Garner, Scott McCormack, Lisa Meyer, Ken Stuckmeyer, Don Clayton, Joe Sind, Jim Barnett, Glenn Tiffin, Matt Wallace, Scott Hixson

Subject: Sioux January 2009 Performance Report

Executive Summary

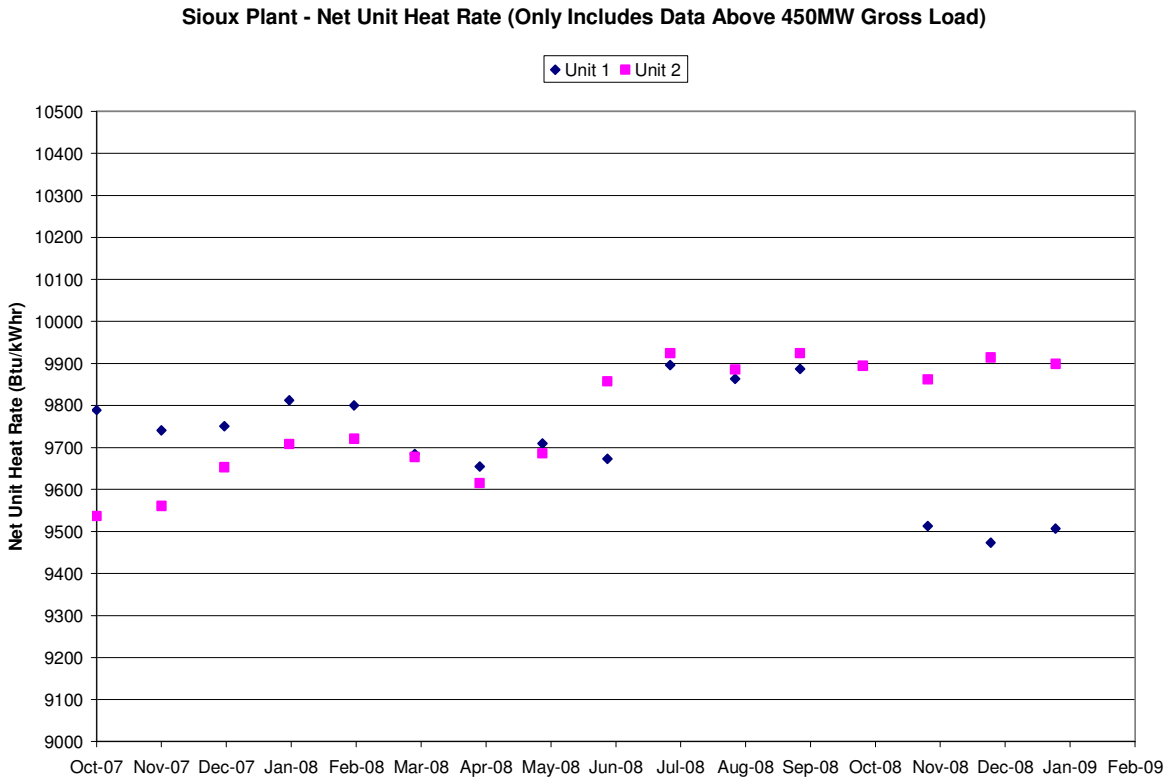
The most notable items regarding Sioux unit performance were:

- Unit 1 heat rate appears to be about 250-300 Btu/kWhr better than last year following the 2008 MBO
- Unit 2 heat rate is about 190 Btu/kWhr higher in January 2009 than in January 2008
- Unit 2 6B FWH may have air in-leakage issues

The following table shows the known instrument deficiencies for both units:

Tag	Unit	Issue	Resolution	Carryover or New
SX1BFW-FWHTR7A-0001-PI (7A Extraction Pressure)	Unit 1	Bad since the outage	?	Carryover
SX1BFW-FWHTR7A-0001-TI (7A Extraction Temperature)	Unit 1	Long term issue	?	Carryover
SX1BFW-FWHTR7ADRN-0001-TI (7A Drain Temperature)	Unit 1	Long term issue –read higher than extraction steam temperature	?	Carryover
SX1BFW-FWHTR6A-0001-TI (6A Extraction Temperature)	Unit 1	Long term issue	?	Carryover
SX1BFW-FWHTR4B-0001-PI (4B Extraction Pressure)	Unit 1	Bad since mid-December	?	Carryover
SX1BFW-FWHTR2-0001-PI (2 Extraction Pressure)	Unit 1	Bad since the outage	?	Carryover
SX2BFW-FWHTR7B-0001-PI (7B Extraction Pressure)	Unit 2	7B Extraction pressure - Not reading since Aug. 9, 2008	?	Carryover
SX2BFW-FWHTR7ADRN-0001-TI (7A Drain Temperature)	Unit 2	7A Drain temp - Not reading	?	Carryover

A monthly summary of each Unit's heat rate for operation above 450 MW is included on the following plot.



Note the increase in heat rate in both units around the May/June time frame of last year. This corresponds to the increase in river temperature and condenser backpressure. However, the heat rate did not come back down in the winter on Unit 2 as the river temperature and condenser backpressure dropped.

Action Items:

- JR the above instrument deficiencies
- Investigate air leakage sources for Unit 2 6B feedwater heater
- Check air inleakage amount on Unit 2 and get online indication of air removal rate functioning on the unit
- Performance Engineering needs to develop and execute a plan to collect and analyze turbine performance data and determine causes of increased heat rate on Unit 2
- Performance Engineering will check the EtaPro heat rate calculations to ensure they are as accurate as possible.
- Performance Engineering will develop a "best-achievable" heat rate for each unit to determine the potential improvement in heat rate available on each unit.
- Performance Engineering will develop plans and help conduct a cycle isolation check on both units in 2009. The intent is to have a Coop student in Performance Engineering perform this task on the entire UE fleet.

Unit 1

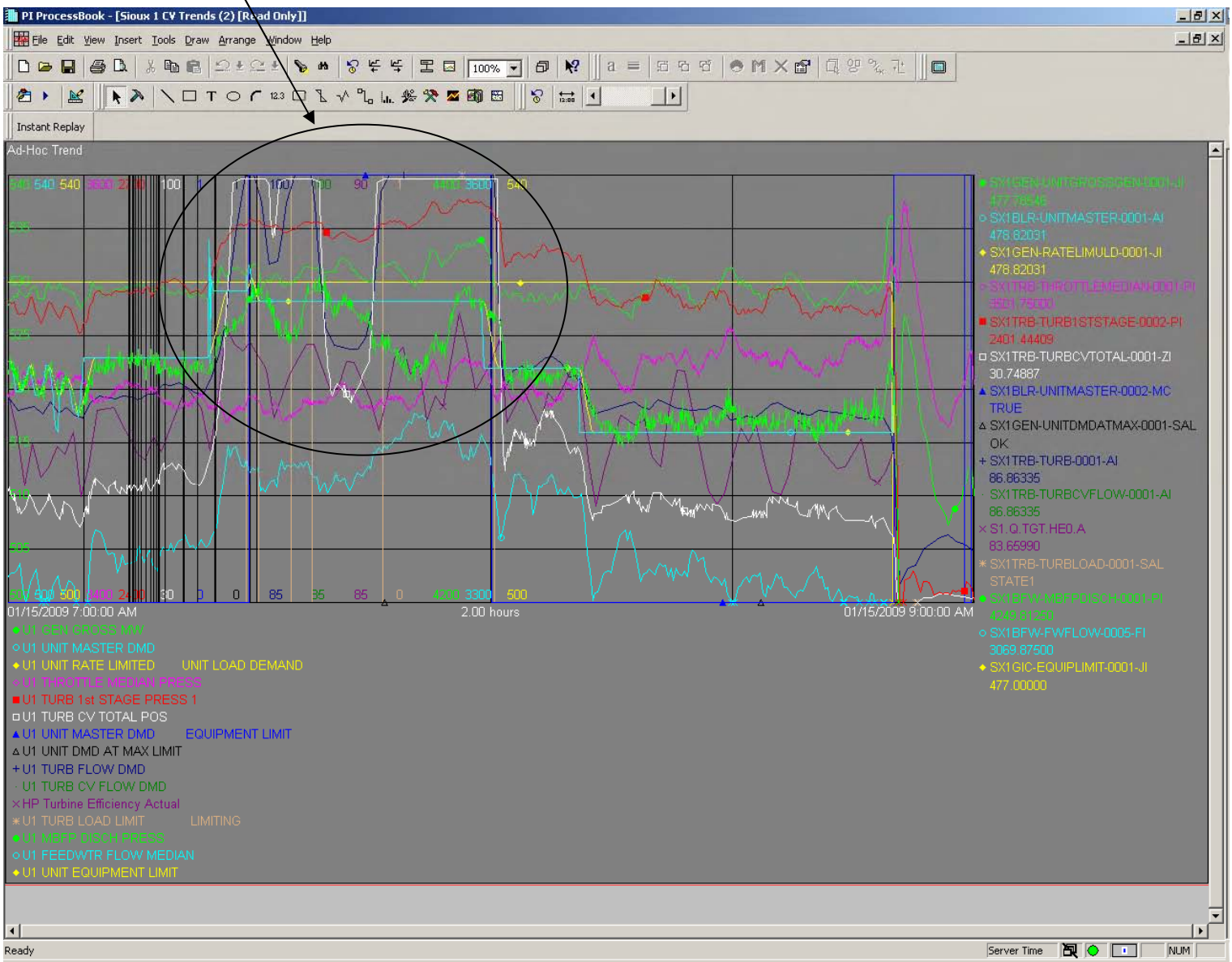
The following observations were made regarding Unit 1 operation and performance:

- The condenser air in-leakage monitor was restored in mid-December. Air in-leakage was first observed to be about 80 SCFM and has drifted down to just above 60 scfm at the end of January. Does Sioux have a value to which they try to maintain condenser air in-leakage? HEI recommends a value of less than 2 SCFM per 100MWs.
- A full load run was made on both units on January 15. During this test run, the control valves on Unit 1 indicate going fully open 3 separate times. HP efficiency as well as first stage pressure both increased at the same time indicating that the valves did indeed go more open. Further data, along with several questions, was sent to the plant regarding the behavior of the control valves on Unit 1 during this full load test. This operation will be investigated further with the plant.

Summary of Performance Report for:						
Plant	Sioux					
Unit	1					
Period	1/1/09	to	2/1/09			
Full Load Performance			Jan-09		Dec-08	Jan-08
Hours of Data (Gross load>450 MW)			350		277	428
			Averages		Averages	Averages
GENERATOR MEGAWATTS	MW		476.1		474.3	473.3
AUX POWER	MW		27.2		26.9	28.7
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9507.0		9473.2	9812.4
Boiler Efficiency Actual	%		86.6		86.7	86.4
CONTROL VALVE POSITION LVDT	%		30.1		29.5	29.1
FEEDWATER TEMP TO ECON	degF		469.4		469.6	470.8
FEEDWATER TEMP TO HTR 1	degF		402.3		402.4	403.5
HP Turbine Efficiency Actual	%		83.3		83.0	84.0
IP Turbine Efficiency Corrected	%		96.1		96.3	93.2
Condenser Pressure	inHga		0.8		1.0	0.7
AIRHTR-A GAS OUTLET TEMP	degF		306.9		301.6	296.0
AIRHTR-B GAS OUTLET TEMP	degF		308.9		301.1	288.6
AMBIENT AIR TEMP	degF		25.5		33.3	29.2
River Temperature	degF		33.2		35.2	34.5
FWH 1 Temperature Rise	degF		67.1		67.2	67.3
Net Load	MW		448.9		447.4	444.6
Average Exit Gas Temperature	degF		307.9		301.3	292.3
Aux Power	%		5.7		5.7	6.1
Gross Unit Heat Rate	BTU/KW-HR		8964.2		8935.1	9216.4
Gross Turbine Heat Rate	BTU/KW-HR		7759.6		7745.2	7962.2

Net unit heat rate is about 300 Btu/kWhr lower than last year. IP efficiency took a step change up following the outage. This is most likely an instrumentation issue and will be investigated as part of the turbine performance monitoring effort.

- Valves indicate going wide open 3 times (white line) during the test
- 1st stage pressure (red line) increased during this time period
- HP efficiency (purple line) increased during this time period

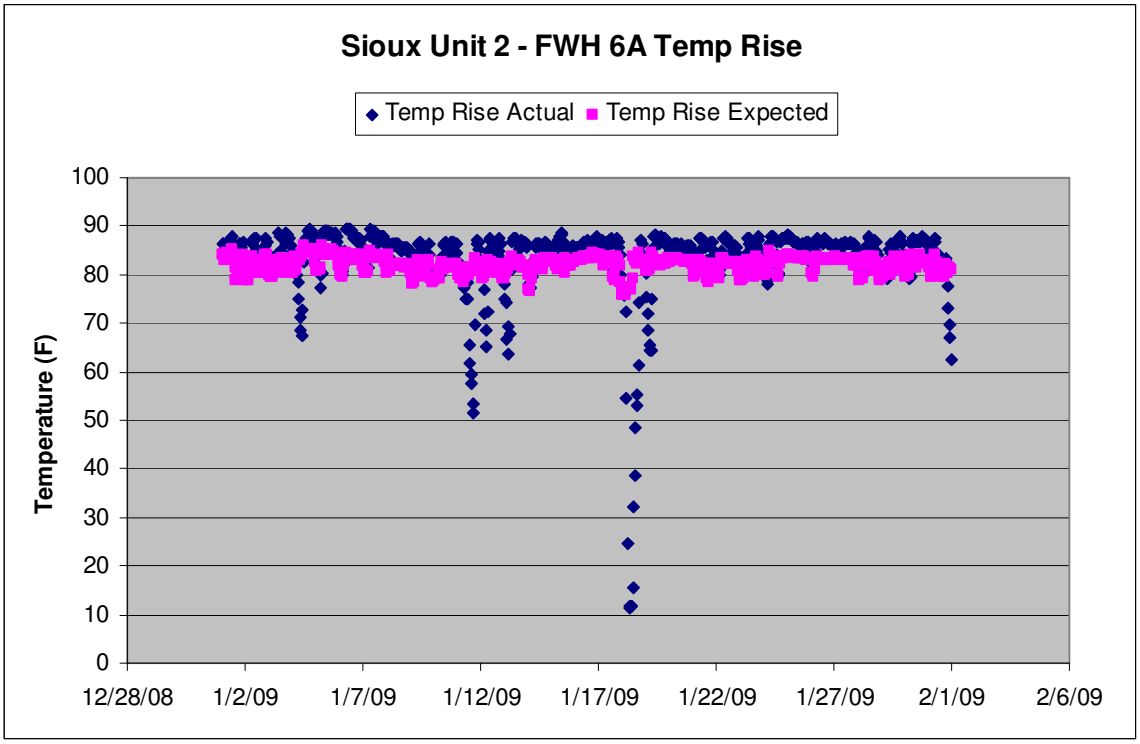


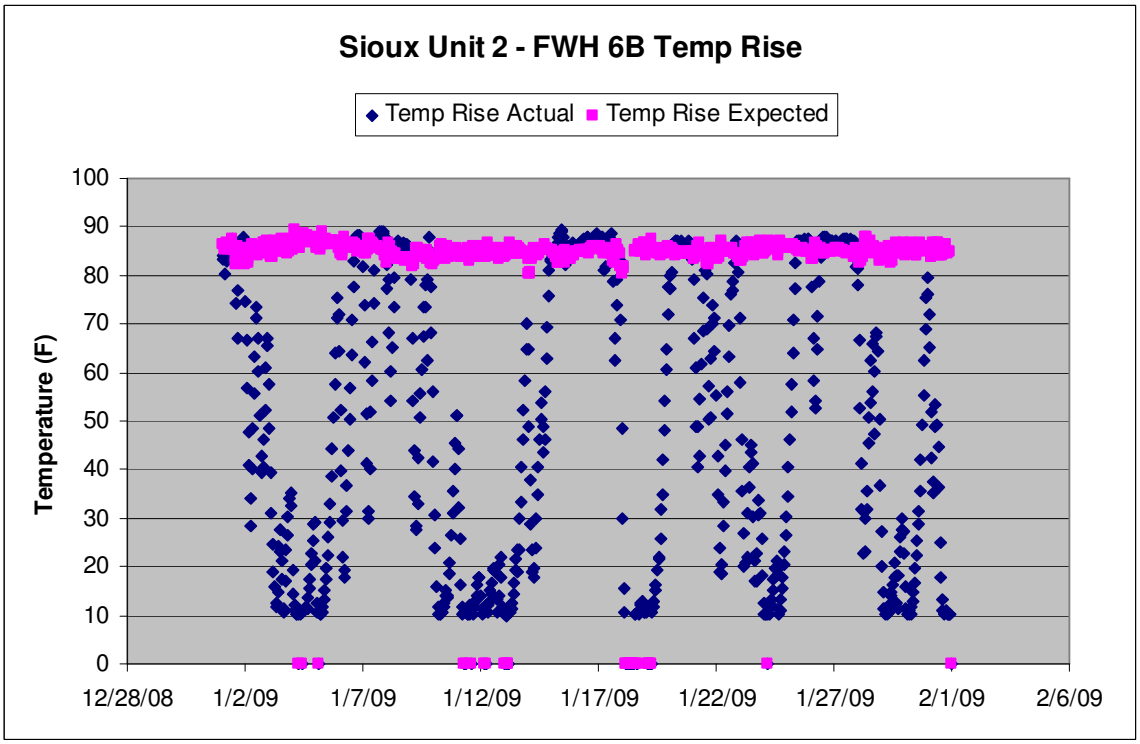
Unit 2

The following observations were made regarding Unit 2 operation and performance:

- The heat rate for Unit 2 is generally up from the prior year. For example, Unit 2's heat rate in January 2009 was almost 190 Btu/kWhr higher than in January 2008. Performance engineering has action to investigate further and determine the cause of the increasing trend in heat rate on the units. In comparing the parameters from the table below, one can note some differences that would lead to a higher heat rate (Boiler efficiency is down, IP efficiency is down, AH gas outlet temperature is up, and Aux. load is up). Performance engineering will investigate these changes and determine if there are any actionable items. The investigation into this will also include the development of a method to conduct periodic turbine performance tests.
- At first glance, it appeared that the condenser backpressure was up by about 0.8 in Hg from the prior year. Further investigation showed that the units for PI tag S2.Q.IPO.001.A and S2.Q.IPO.000.A are reversed. The January 2008 report was generated using the S2.Q.IPO.000.A tag which is incorrectly labeled with in. HgA units (in reality, the pressure is in psia for this tag). The January 2009 report was generated using the S2.Q.IPO.001.A tag which provides the condenser pressure in in. HgA (although the Pi tag gives the units as psia). The process to make corrections of this nature (including who should make the changes and who will be notified of changes) will be discussed with the plant at the next quarterly meeting.
- There is a possible air in-leakage issue with the 6B FWH. During load drops, the temperature rise across the heater significantly decreases and it takes 8-10 hours to recover after coming back up on load. In some cases, the FWH provided no temperature rise for several days in January when the load was held relatively low. The expected cause is air in leakage due to the shell side pressure dropping below atmospheric pressure on load drops. The low temperature rise across the 6B heater causes extraction steam to the 5B heater to almost double in some cases as compared to the 5A. This operation is estimated to cost the unit 1 MW in load and 20 Btu/kWhr ($15,000/month in fuel costs) in heat rate. It is noted that this appears to have been going on for at least a year. A similar issue is seen on the 6A FWH but on a less frequent basis.

Summary of Performance Report for:						
Plant	Sioux					
Unit	2					
Period	1/1/09	to	2/1/09			
Full Load Performance			Jan-09		Dec-08	Jan-08
Hours of Data (Gross load>450 MW)			410		447	489
			Averages		Averages	Averages
GENERATOR MEGAWATTS	MW		477.6		473.5	479.0
AUX POWER	MW		27.2		27.2	25.7
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9899.1		9914.2	9708.1
Boiler Efficiency Actual	%		86.4		86.2	86.9
CONTROL VALVE POSITION LVDT	%		28.7		27.9	27.8
FEEDWATER TEMP TO ECON	degF		471.7		471.3	472.7
FEEDWATER TEMP TO HTR 1	degF		405.7		405.1	406.1
HP Turbine Efficiency Actual	%		83.8		83.3	83.5
IP Turbine Efficiency Corrected	%		92.3		92.2	92.6
Condenser Pressure	inHga		1.3		1.2	0.5
AIRHTR-A GAS OUTLET TEMP	degF		308.7		308.7	299.5
AIRHTR-B GAS OUTLET TEMP	degF		309.6		309.3	303.8
AMBIENT AIR TEMP	degF		26.8		32.3	30.1
River Temperature	degF		32.0		33.5	32.6
FWH 1 Temperature Rise	degF		66.1		66.2	66.6
Net Load	MW		450.3		446.3	453.3
Average Exit Gas Temperature	degF		309.2		309.0	301.6
Aux Power	%		5.7		5.8	5.4
Gross Unit Heat Rate	BTU/KW-HR		9335.0		9344.1	9186.5
Gross Turbine Heat Rate	BTU/KW-HR		8061.7		8057.2	7986.6





The two plots show a comparison of the temperature rise across the 6A and 6B FWH on Unit 2. As shown, the actual temperature rise across the 6B suffers as compared to the performance of the 6A FWH (although the 6A also had periods of reduced temperature rise in January).

As shown, the temperature rise (yellow line) of the 6B heater drops off significantly when the pressure (red line) goes below 0 inHgg. At the end of the December, when load (blue line) was low most of the day, the FWH provided almost no temperature rise.

January 8, 2009

To: Karl Blank
From: Jeff Shelton
Cc: Keith Stuckmeyer, Harry Benhardt, John Romano, Pat Weir, Greg Gilbertsen, David Azar, Mark Selvog, Steve Garner, Scott McCormack, Lisa Meyer, Ken Stuckmeyer, Don Clayton, Joe Sind, Jim Barnett, Glenn Tiffen, Matt Wallace

Subject: Sioux November and December Performance Report

Executive Summary

The most notable items regarding Sioux unit performance were:

- Unit 1 heat rate appears to be about 280 Btu/kWhr better than last year following the 2008 MBO
- Unit 2 heat rate is about 260 Btu/kWhr higher in December 2008 than in December 2007
- Unit 2 6B FWH may have air in-leakage issues

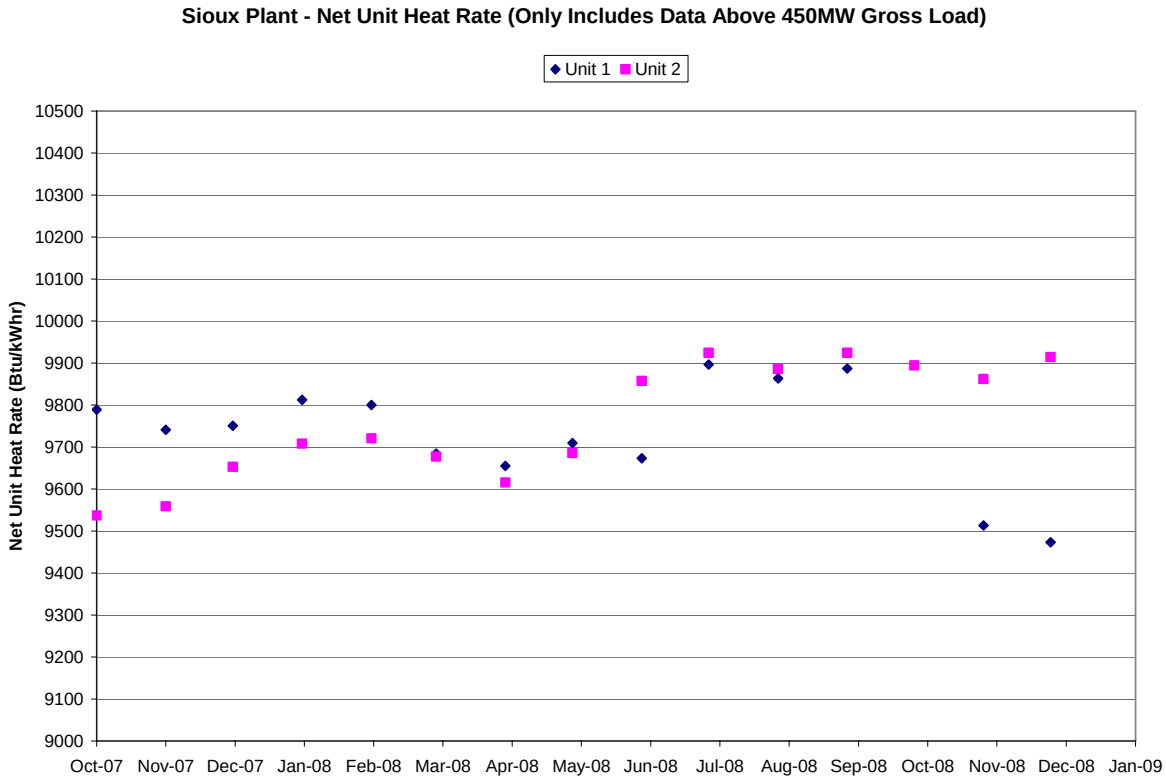
The following table shows the known instrument deficiencies for both units:

Tag	Unit	Issue
SX1BFW-FWHTR7A-0001-PI	Unit 1	Bad since the outage
SX1BFW-FWHTR7A-0001-TI	Unit 1	Long term issue
SX1BFW-FWHTR7ADRN-0001-TI	Unit 1	Long term issue
SX1BFW-FWHTR6A-0001-TI	Unit 1	Long term issue
SX1BFW-FWHTR4B-0001-PI	Unit 1	Bad since mid-December
SX1BFW-FWHTR2-0001-PI	Unit	Bad since the outage
SX2BFW-FWHTR7B-0001-PI	Unit 2	7B Extraction pressure - Not reading since Aug. 9, 2008
SX2BFW-FWHTR7ADRN-0001-TI	Unit 2	7A Drain temp - Not reading

Action Items:

- JR the above instrument deficiencies
- Investigate air leakage sources for Unit 2 6B feedwater heater
- Performance Engineering needs to develop and execute a plan to collect and analyze turbine performance data and determine causes of increased heat rate on Unit 2

A monthly summary of each Unit's heat rate for operation above 450 MW is included on the following plot.



Unit 1

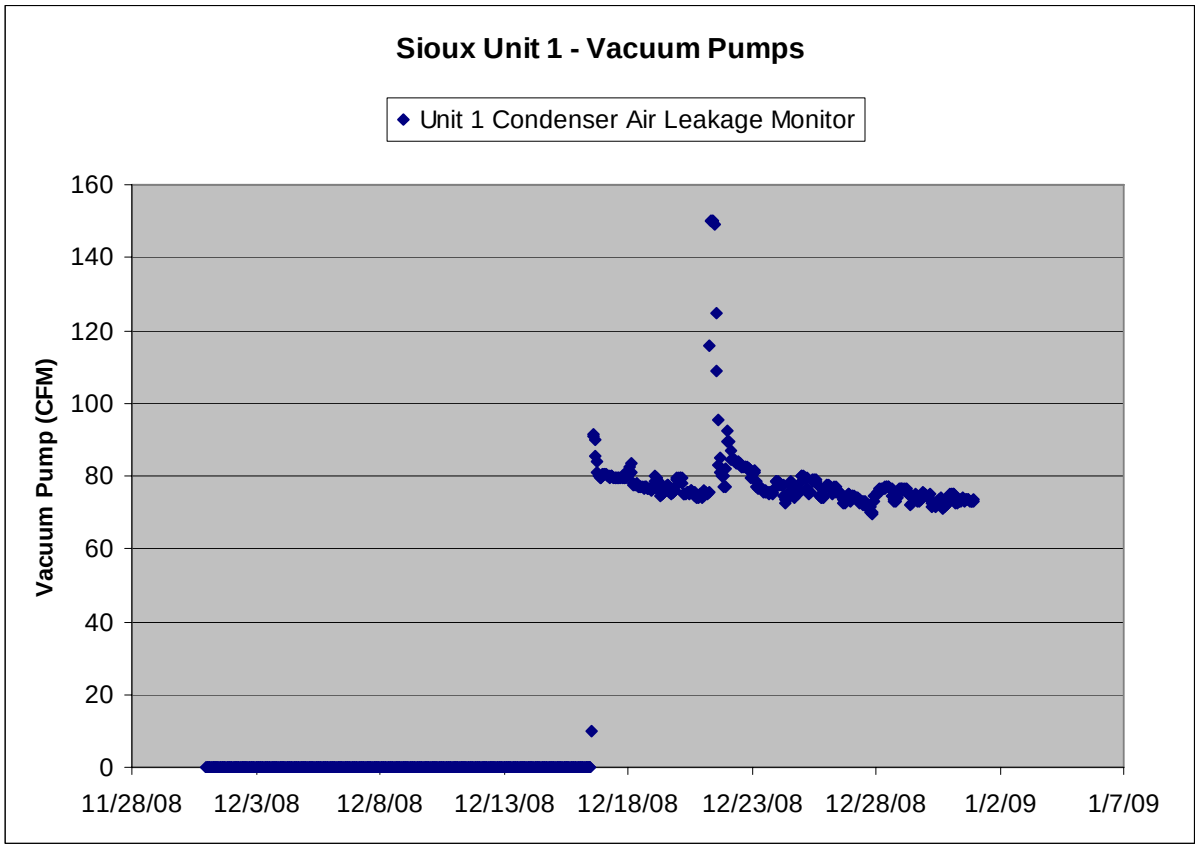
The following observations were made regarding Unit 1 operation and performance:

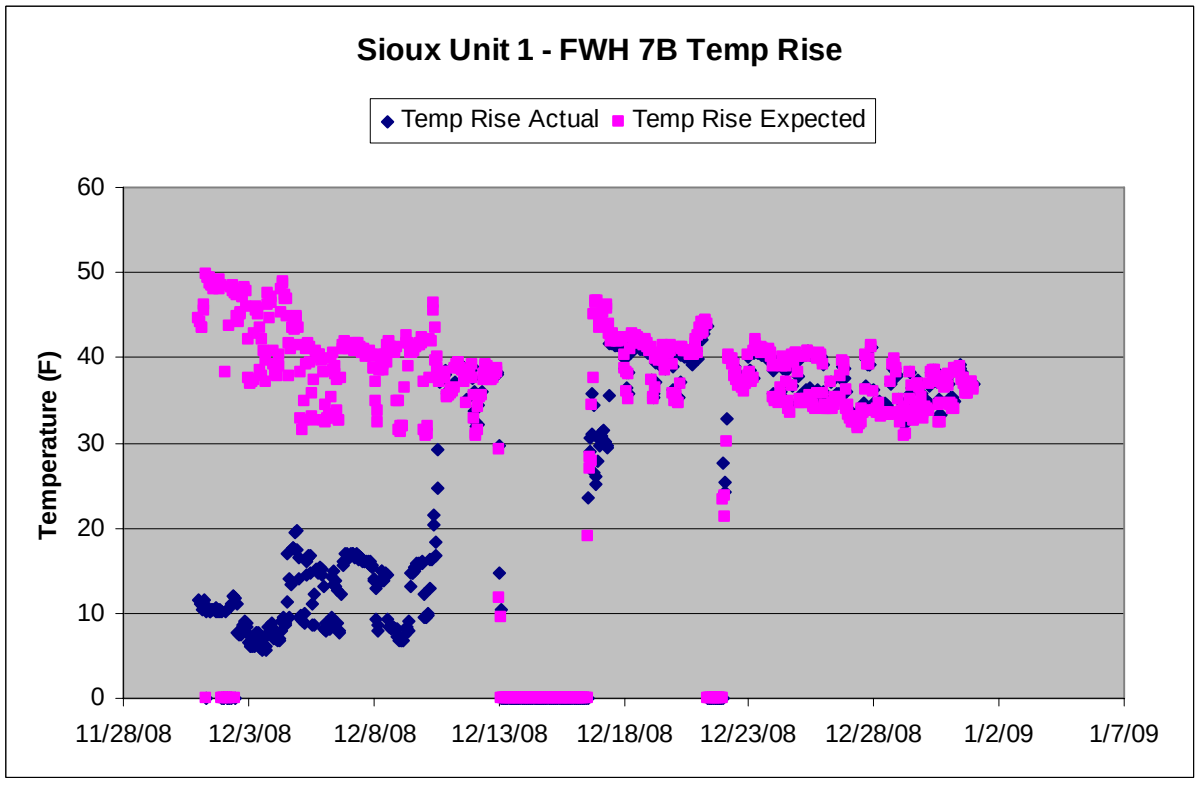
- The condenser air in-leakage monitor was restored in mid-December. Air in-leakage was observed to be about 80 SCFM. Does Sioux have a value to which they try to maintain condenser air in-leakage? HEI recommends a value of less than 2 SCFM per 100MWs.
- After some initial complications, the 7B feedwater heater is currently working (although there are still level indication and control issues?)

Summary of Performance Report for:

Plant	Sioux					
Unit	1					
Period	12/1/08	to	1/1/09			
Full Load Performance			Dec-08		Nov-08	Dec-07
Hours of Data (Gross load>450 MW)			277		18	280
			Averages		Averages	Averages
GENERATOR MEGAWATTS	MW		474.3		476.5	467.7
AUX POWER	MW		26.9		26.7	28.0
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9473.2		9513.1	9750.3
Boiler Efficiency Actual	%		86.7		87.3	86.7
CONTROL VALVE POSITION LVDT	%		29.5		29.3	28.9
FEEDWATER TEMP TO ECON	degF		469.6		469.9	468.0
FEEDWATER TEMP TO HTR 1	degF		402.4		402.7	402.2
HP Turbine Efficiency Actual	%		83.0		83.9	82.9
IP Turbine Efficiency Corrected	%		96.3		96.5	93.2
Condenser Pressure	inHga		1.0		0.9	1.0
AIRHTR-A GAS OUTLET TEMP	degF		301.6		305.3	292.9
AIRHTR-B GAS OUTLET TEMP	degF		301.1		301.6	287.7
AMBIENT AIR TEMP	degF		33.3		39.8	37.3
River Temperature	degF		35.2		39.0	37.2
FWH 1 Temperature Rise	degF		67.2		67.2	65.8
Net Load	MW		447.4		449.7	439.6
Average Exit Gas Temperature	degF		301.3		303.4	290.3
Aux Power	%		5.7		5.6	6.0
Gross Unit Heat Rate	BTU/KW-HR		8935.1		8979.2	9165.6
Gross Turbine Heat Rate	BTU/KW-HR		7745.2		7834.5	7942.5

Net unit heat rate is almost 300 Btu/kWhr lower than last year. IP efficiency took a step change up following the outage. This is most likely an instrumentation issue and will be investigated as part of development the turbine performance monitoring effort.



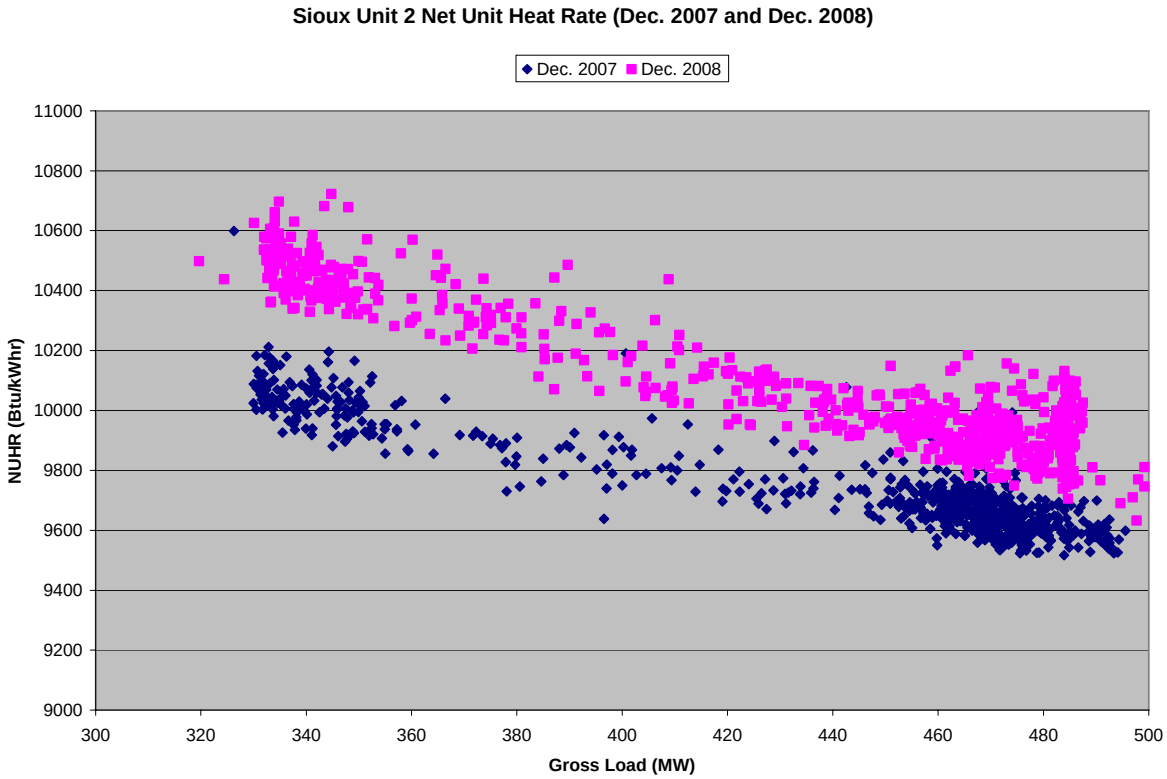


As shown, the temperature rise over the 7B heater went from about 10-20F to the expected range of 30-40F in mid-December.

Unit 2

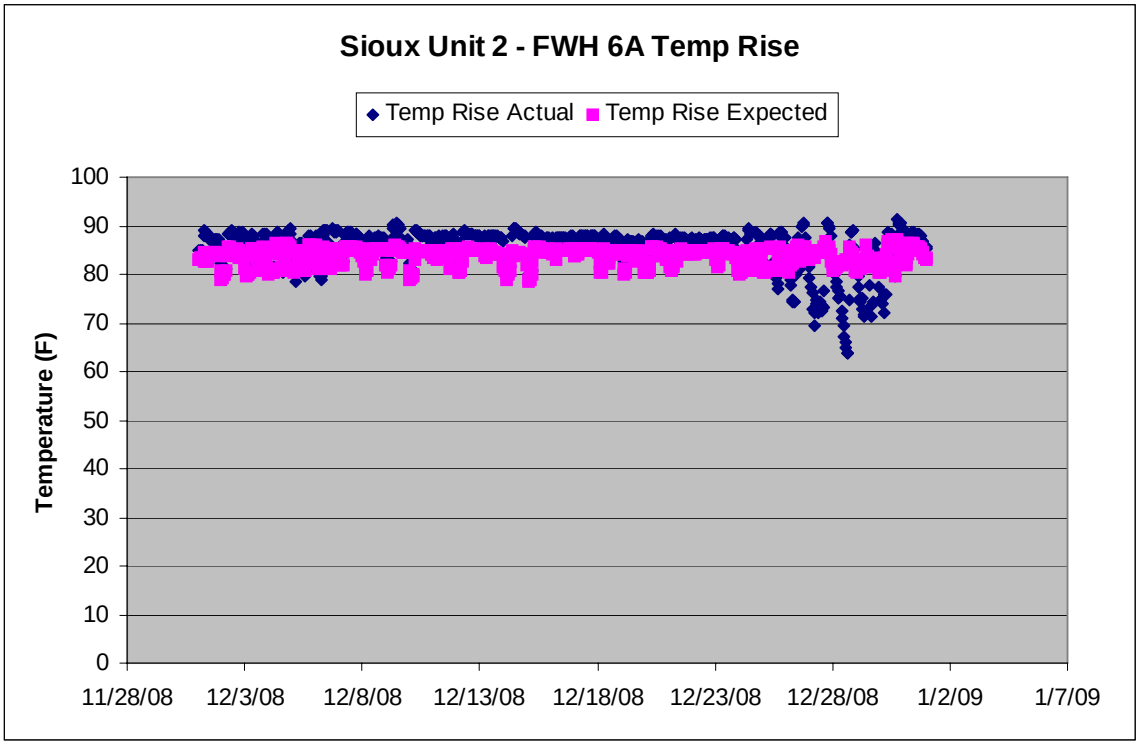
The following observations were made regarding Unit 2 operation and performance:

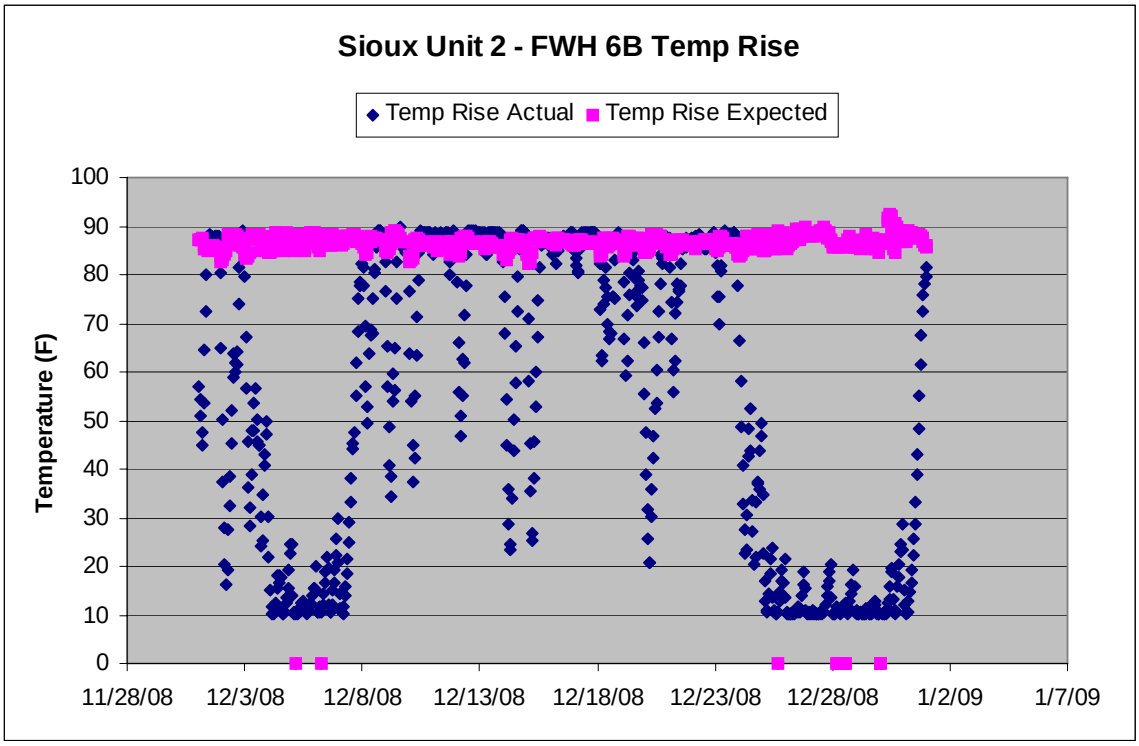
- The heat rate for Unit 2 is generally up from the prior year. For example, Unit 2's heat rate in December 2008 was almost 260 Btu/kWhr higher than in December 2007. Performance engineering has action to investigate further and determine the cause of the increasing trend in heat rate on the units. In comparing the parameters from the table below, one can note some differences that would lead to a higher heat rate (Boiler efficiency is down, IP efficiency is down, AH gas outlet temperature is up, condenser pressure is up, and Aux. load is up). Performance engineering will investigate these changes and determine if there are any actionable items. The investigation into this will also include the development of a method to conduct periodic turbine performance tests.
- There is a possible air in-leakage issue with the 6B FWH. During load drops, the temperature rise across the heater significantly decreases and it takes 8-10 hours to recover after coming back up on load. In some cases, the FWH provided no temperature rise for several days in December when the load was held relatively low. The expected cause is air in leakage due to the shell side pressure dropping below atmospheric pressure on load drops. The low temperature rise across the 6B heater causes extraction steam to the 5B heater to almost double in some cases as compared to the 5A. This operation is estimated to cost the unit 1 MW in load and 20 Btu/kWhr ($15,000/month in fuel costs) in heat rate. It is noted that this appears to have been going on for at least a year.



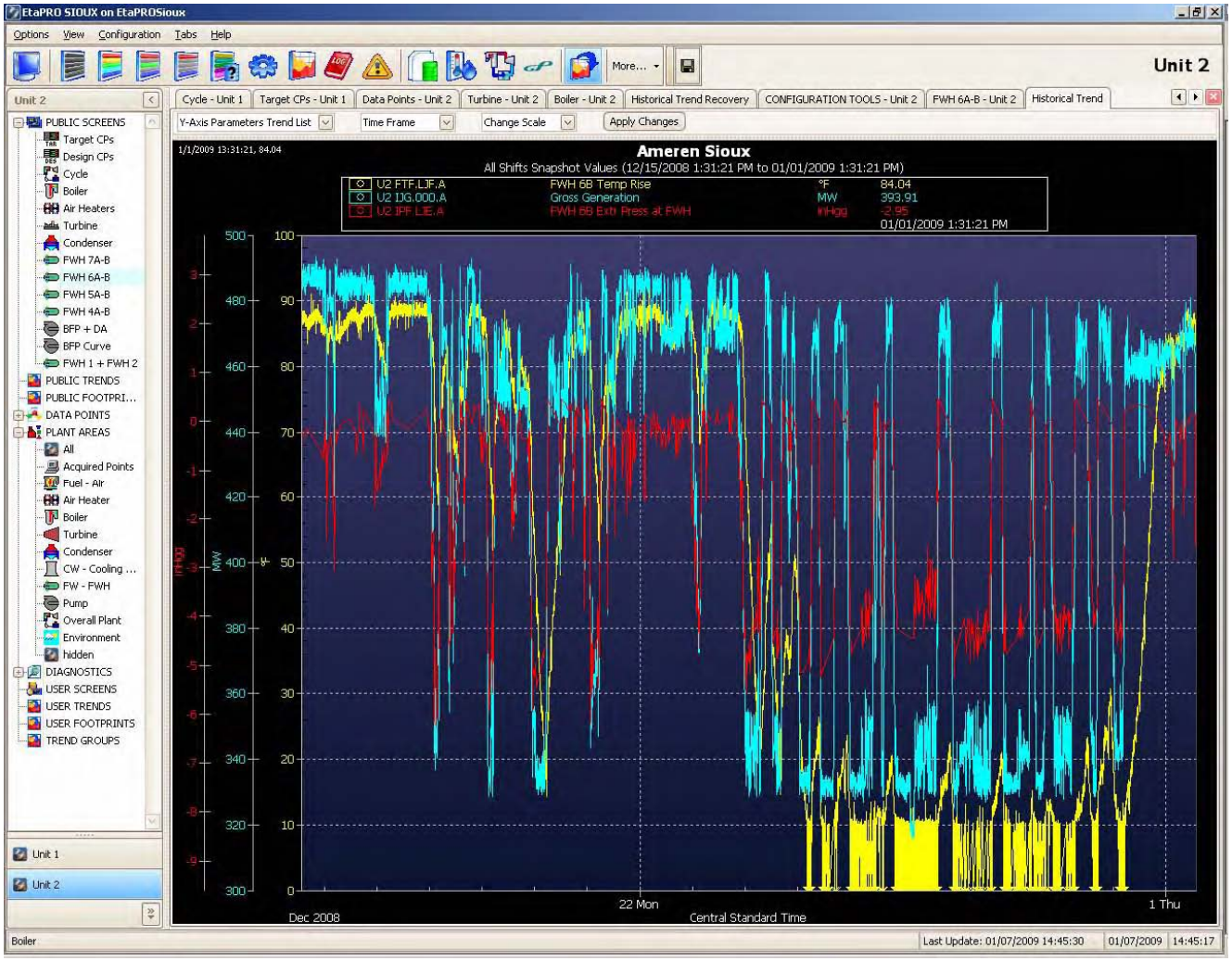
This plot compares the Net Unit Heat Rate on Unit 2 from December 2007 and December 2008. As shown, the heat rate over the entire load range was 2 to 4% higher in 2008 as compared to 2007.

Summary of Performance Report for:						
Plant	Sioux					
Unit	2					
Period	12/1/08	to	1/1/09			
Full Load Performance			Dec-08		Nov-08	Dec-07
Hours of Data (Gross load>450 MW)			408		447	489
			Averages		Averages	Averages
GENERATOR MEGAWATTS	MW		473.5		472.5	470.9
AUX POWER	MW		27.2		26.5	25.9
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9914.2		9861.8	9653.0
Boiler Efficiency Actual	%		86.2		86.1	87.0
CONTROL VALVE POSITION LVDT	%		27.9		27.7	27.2
FEEDWATER TEMP TO ECON	degF		471.3		471.1	470.3
FEEDWATER TEMP TO HTR 1	degF		405.1		405.0	404.0
HP Turbine Efficiency Actual	%		83.3		83.2	83.4
IP Turbine Efficiency Corrected	%		92.2		92.1	92.7
Condenser Pressure	inHga		1.2		1.4	1.0
AIRHTR-A GAS OUTLET TEMP	degF		308.7		319.3	299.7
AIRHTR-B GAS OUTLET TEMP	degF		309.3		320.0	304.4
AMBIENT AIR TEMP	degF		32.3		47.1	36.2
River Temperature	degF		33.5		45.6	34.1
FWH 1 Temperature Rise	degF		66.2		66.1	66.3
Net Load	MW		446.3		446.0	445.0
Average Exit Gas Temperature	degF		309.0		319.7	302.0
Aux Power	%		5.8		5.6	5.5
Gross Unit Heat Rate	BTU/KW-HR		9344.1		9309.1	9122.9
Gross Turbine Heat Rate	BTU/KW-HR		8057.2		8011.2	7933.5





The two plots show a comparison of the temperature rise across the 6A and 6B FWH on Unit 2. As shown, the actual temperature rise across the 6B suffers as compared to the performance of the 6A FWH.



As shown, the temperature rise (yellow line) of the 6B heater drops off significantly when the pressure (red line) goes below 0 inHgg. At the end of the month, when load (blue line) was low most of the day, the FWH provided almost no temperature rise.

November 26, 2008

To: Karl Blank
From: Jeff Shelton
Cc: Keith Stuckmeyer, Harry Benhardt, Pat Weir, Greg Gilbersten, Mark Selvog, Steve Garner, Scott McCormack, Lisa Meyer, Ken Stuckmeyer, Joe Sind, Matt Wallace

Subject: Sioux October Performance Report

This is the first regular report following the initial demonstration in July's performance meeting. The report should not be considered in its final form for regular publication. Please advise on anything you think would be an improvement: presentation, content (additional content needed or content that is of little use), format, etc. Attempts will be made to improve the report until all recipients are satisfied.

Executive Summary

The most notable items regarding Sioux unit performance were:

- Unit 1 offline for MBO
- Unit 2 6B FWH may have air in-leakage issues

The controllable loss parameters were updated per the discussions held at the heat rate performance meeting held in July and will be reviewed again at the beginning of 2009.

The following table shows the known instrument deficiencies for Unit 2:

Tag	Unit	Issue
SX2AHS-STMCOILAHADRN5-278-TI	Unit 2	Steam Coil AH A Drain Line 5 Temp not reading
SX2BFW-FWHTR7B-0001-PI	Unit 2	7B Extraction pressure - Not reading since Aug. 9, 2008
SX2BFW-FWHTR7ADRN-0001-TI	Unit 2	7A Drain temp - Not reading

Action Items:

- JR the above instrument deficiencies
- Investigate air leakage sources for Unit 2 6B feedwater heater

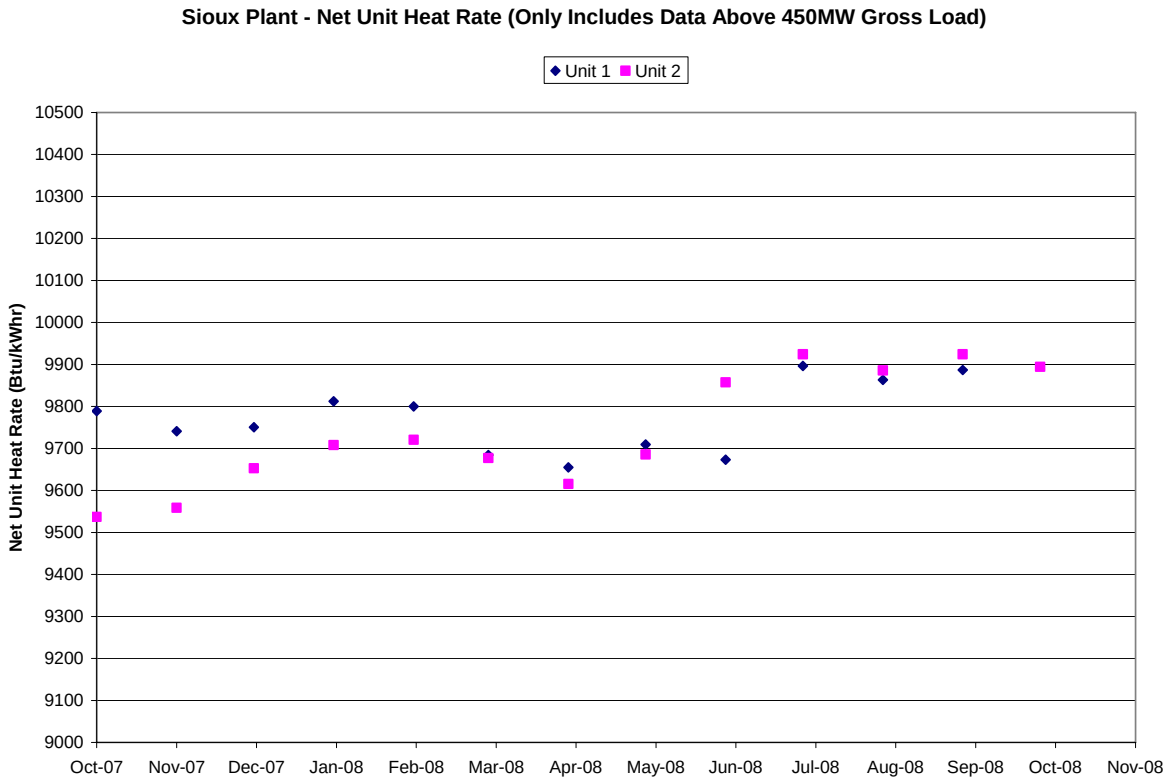
Detailed Observations

Actual data and graphs for the month's performance are at the end of this report. Observations concerning the data, the unit's operation and performance in general are as follows:

- The first general observation is that the heat rate on both units, especially Unit 2, is generally trending up. For example, Unit 2's heat rate in October 2008 was almost 400 Btu/kWhr higher than in October 2007. Some of this difference is attributable to

carrying the entire plant auxiliary load this fall and not in 2007. However, this would account for only about 70 Btu/kWhr of the difference.

- Summary data of unit performance is given in the back of the report. This summary includes the current month's performance, the prior month's performance, and the performance from the same month in the prior year.



Unit 1

The following observations were made regarding Unit 1 operation and performance:

- The unit did not operate in October due to the MBO.

Unit 2

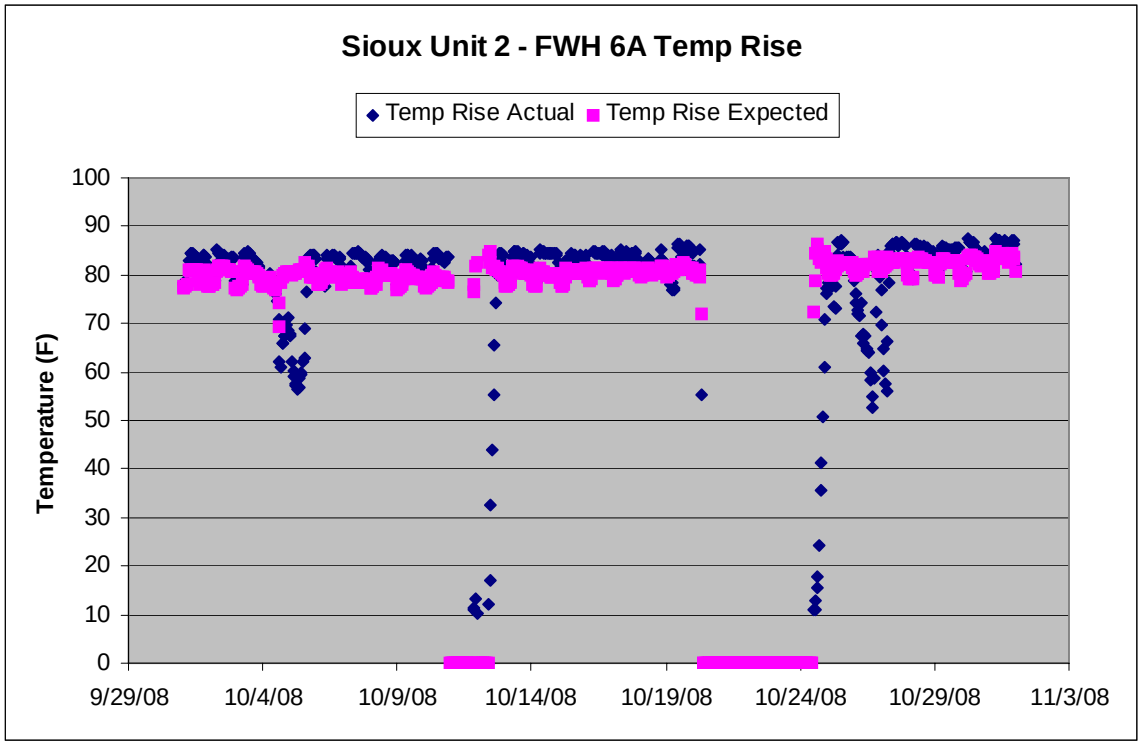
The following observations were made regarding Unit 2 operation and performance:

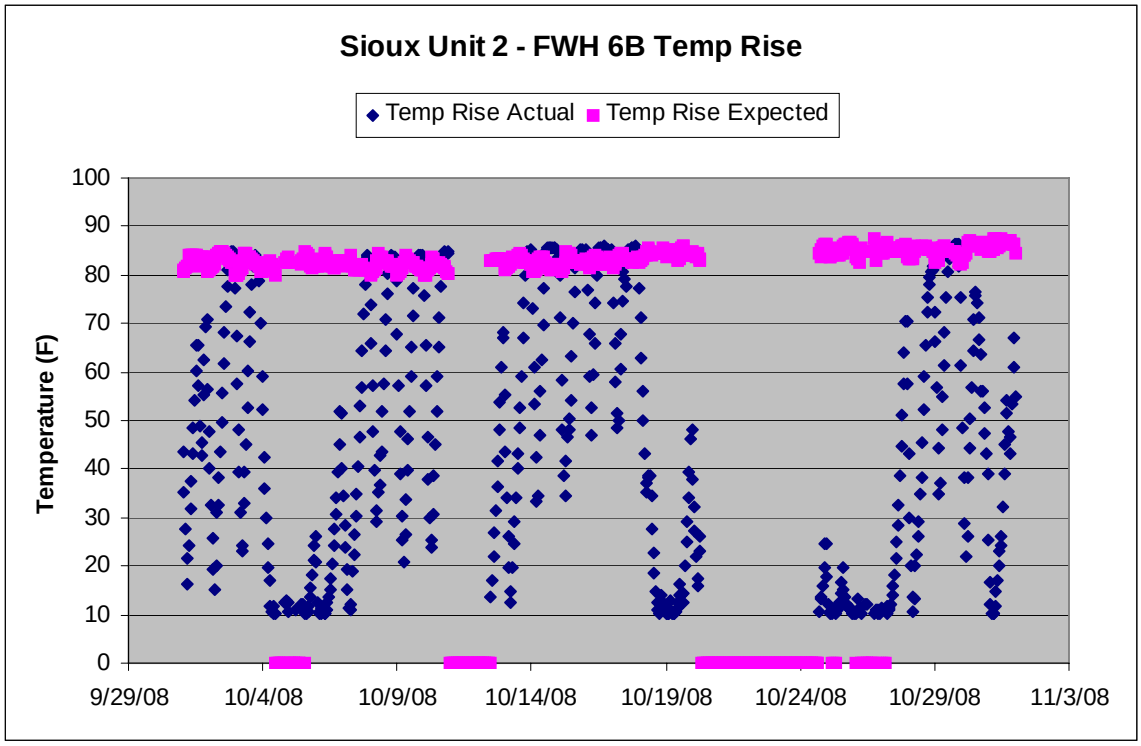
- The heat rate for Unit 2 is generally trending up. For example, Unit 2's heat rate in October 2008 was almost 400 Btu/kWhr higher than in October 2007. Some of this difference is attributable to carrying the entire plant auxiliary load this fall and would account for about 70 Btu/kWhr of the difference. AH gas outlet temperatures were 10F higher this October compared to last October and would attribute about 30 Btu/kWhr to the increased heat rate. I will note that the average load for the unit was about 2% lower this October than last October. In looking at feedwater flow on the

unit, the feedwater flow for these two months for loads above 450 MWs was almost identical which indicates that the difference is due to a performance issue and not lower load demand on the unit. Performance engineering has action to investigate further and determine the cause of the increasing trend in heat rate on the units.

- There is a possible air in-leakage issue with the 6B FWH. During load drops, the temperature rise across the heater significantly decreases and it takes 8-10 hours to recover after coming back up on load. The expected cause is air in leakage due to the shell side pressure dropping below atmospheric pressure on load drops. The low temperature rise across the 6B heater causes extraction steam to the 5B heater to almost double in some cases as compared to the 5A. This operation is estimated to cost the unit 1 MW in load and 20 Btu/kWhr ($15,000/month in fuel costs) in heat rate. It is noted that this appears to have been going on for at least a year.
- Steam coils remained in service on both units throughout the summer. It is judged that the system could be shutdown at least part of the summer while still maintaining cold end metal temperatures. Per the performance monitors, having a high air inlet temperature is costing approximately 40 Btu/kWhr during the summer months. This equates to about $30,000 per month in fuel costs. In addition, the source steam for the steam coils is the aux. steam header which is supplied by cold reheat. In June, the steam flow to Unit 2 was approximately 33,000 lbs/hr. Taking this steam flow from cold reheat will reduce the unit load by approximately 4 MWs. Taking the system out of service each summer would also provide a time to do preventative maintenance on the system, particularly the steam traps, to ensure they maintain acceptable performance. This should be considered for next summer.

Plant	Sioux				
Unit	2				
Period	10/1/08	to	11/1/08		
Full Load Performance			Oct-08	Sep-08	Oct-07
Hours of Data (Gross load>450 MW)			231	213	433
			Averages	Averages	Averages
GENERATOR MEGAWATTS	MW		467.0	462.3	474.8
AUX POWER	MW		26.8	25.1	23.5
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9894.4	9924.2	9536.6
Boiler Efficiency Actual	%		86.5	86.9	87.2
CONTROL VALVE POSITION LVDT	%		27.2	27.5	28.0
FEEDWATER TEMP TO ECON	degF		471.3	471.9	473.2
FEEDWATER TEMP TO HTR 1	degF		405.2	405.8	407.0
HP Turbine Efficiency Actual	%		82.9	82.9	83.7
IP Turbine Efficiency Corrected	%		92.2	92.3	92.4
Condenser Pressure	inHga		1.9	2.5	2.0
AIRHTR-A GAS OUTLET TEMP	degF		315.2	312.3	305.2
AIRHTR-B GAS OUTLET TEMP	degF		315.7	320.9	304.6
AMBIENT AIR TEMP	degF		61.1	76.0	66.8
River Temperature	degF		60.7	71.7	62.5
FWH 1 Temperature Rise	degF		66.0	66.1	66.2
Net Load	MW		440.2	437.2	451.3
Average Exit Gas Temperature	degF		315.5	316.6	304.9
Aux Power	%		5.7	5.4	5.0
Gross Unit Heat Rate	BTU/KW-HR		9326.7	9385.3	9064.3
Gross Turbine Heat Rate	BTU/KW-HR		8067.9	8158.7	7902.8


Sioux Unit 2 - FWH 6A Temp Rise
Temp Rise Actual
Temp Rise Expected
Temperature (F)
100
90
80
70
60
50
40
30
20
10
0
9/29/08
10/4/08
10/9/08
10/14/08
10/19/08
10/24/08
10/29/08
11/3/08

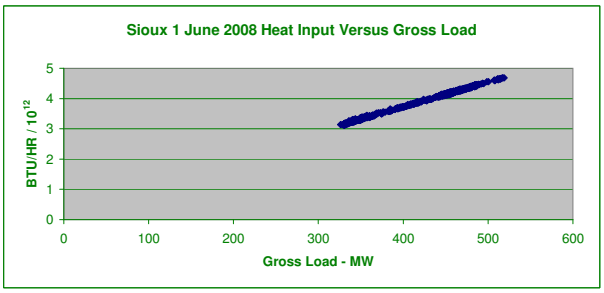

Sioux Unit 2 - FWH 6B Temp Rise
Temp Rise Actual
Temp Rise Expected
Temperature (F)
100
90
80
70
60
50
40
30
20
10
0
9/29/08
10/4/08
10/9/08
10/14/08
10/19/08
10/24/08
10/29/08
11/3/08

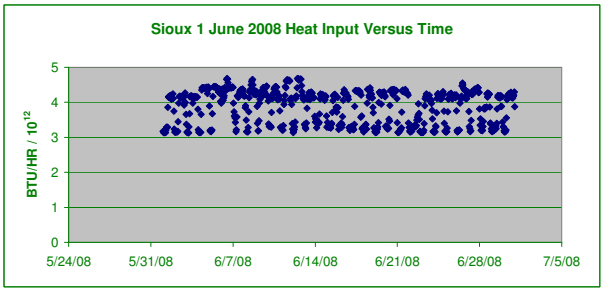
Summary of Performance Report for:

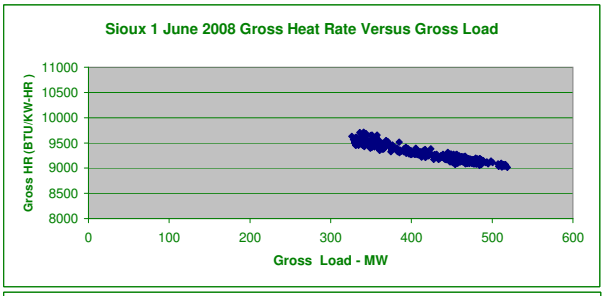
Plant Sioux
Unit 1
Period 6/1/08 to 7/1/08

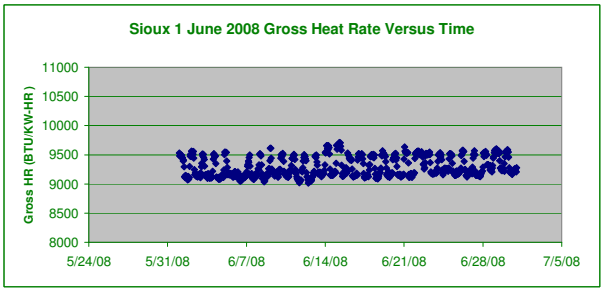
Full Load Performance
Hours of Data (Gross load>450 MW) 339

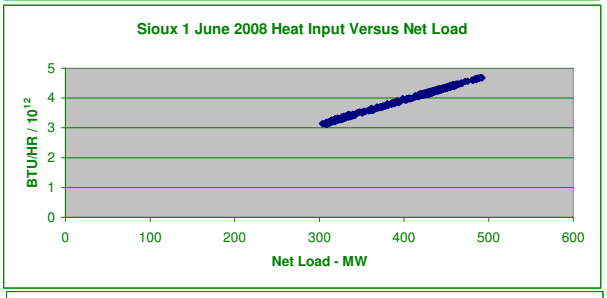
	Averages	
GENERATOR MEGAWATTS	470.6	MW
AUX POWER	27.4	MW
Net Unit Heat Rate Actual (GPHI)	9673.1	BTU/KW-HR
Boiler Efficiency Actual	86.7	%
CONTROL VALVE POSITION LVDT	31.5	%
FEEDWATER TEMP TO ECON	471.5	degF
FEEDWATER TEMP TO HTR 1	404.7	degF
HP Turbine Efficiency Actual	82.8	%
IP Turbine Efficiency Corrected	93.1	%
Condenser Pressure	2.1	inHga
AIRHTR-A GAS OUTLET TEMP	300.9	degF
AIRHTR-B GAS OUTLET TEMP	308.0	degF
AMBIENT AIR TEMP	82.4	degF
River Temperature	73.8	degF
FWH 1 Temperature Rise	66.8	degF
Net Load	443.2	MW
Average Exit Gas Temperature	304.5	degF
Aux Power	5.8	%
Gross Unit Heat Rate	9109.9	BTU/KW-HR
Gross Turbine Heat Rate	7901.3	BTU/KW-HR

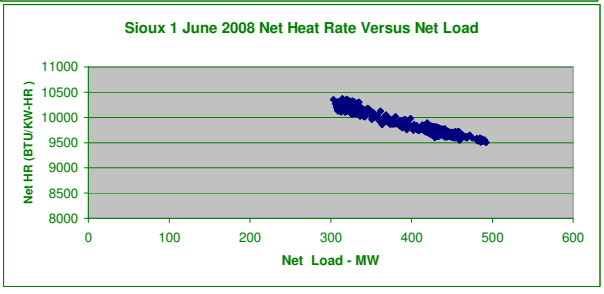


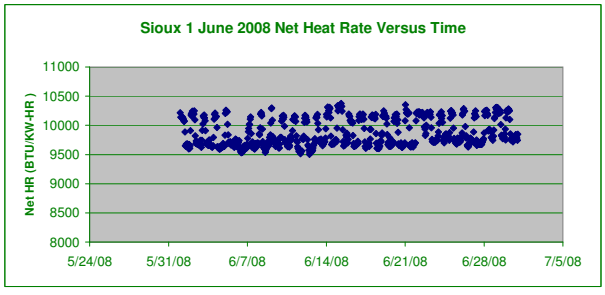












Sioux Unit 1 Rollup, June 2008

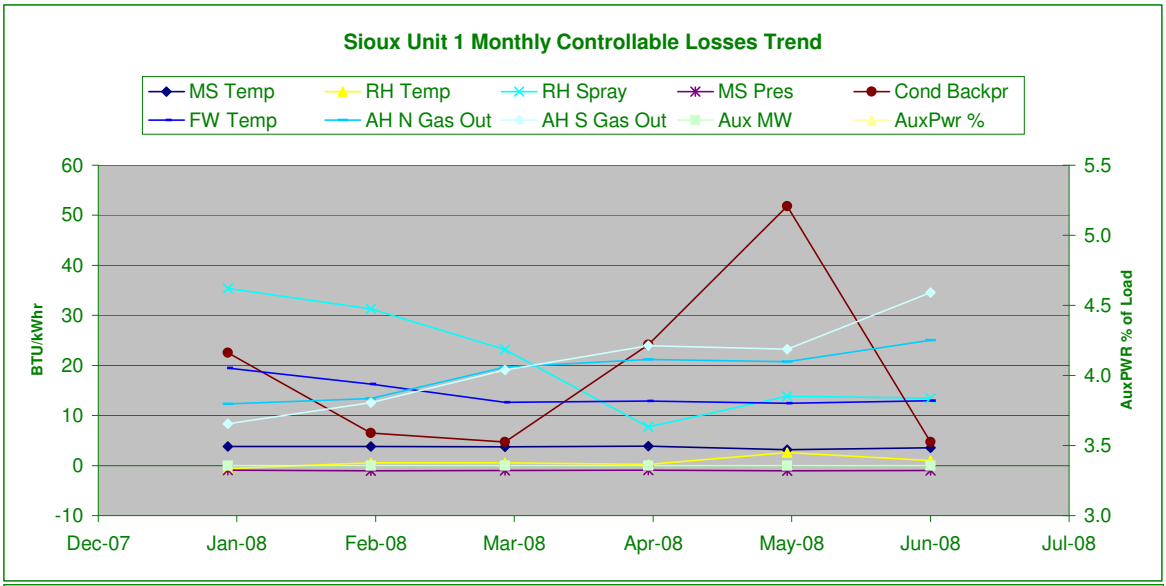
Notable Deviations in Plant Performance Data / Discussion Topics, etc.

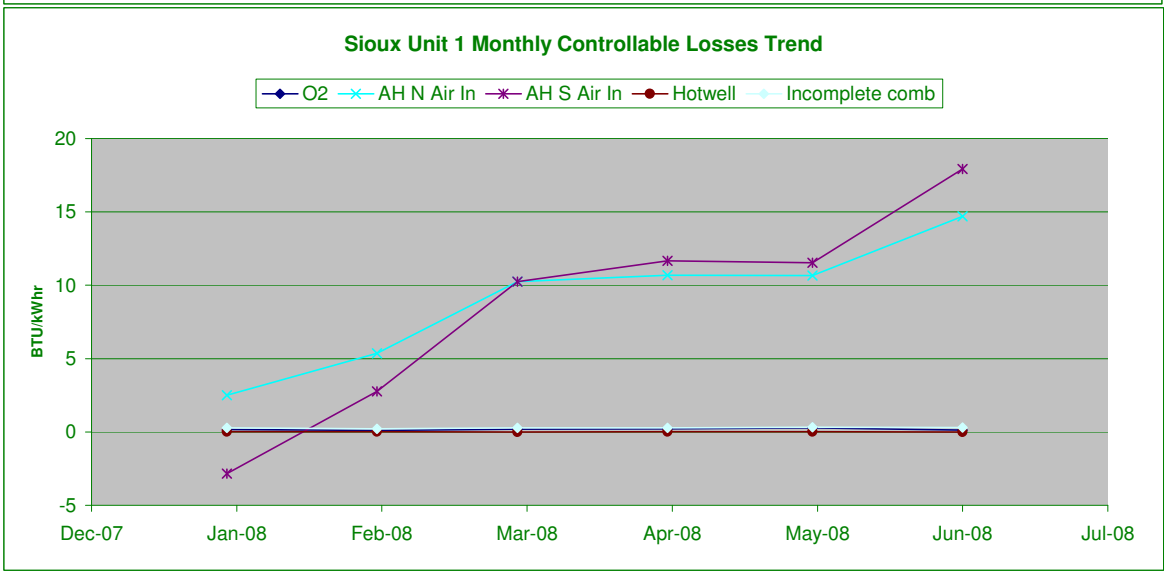
1. The controllable loss parameter target values need to updated to reflect current plant operation. The target values for all controllable loss parameters have been reviewed using actual 2007 unit data.
2. AH Air Inlet temperature loss higher in the summer. Why don't we stop steam flow to the coils in summer?

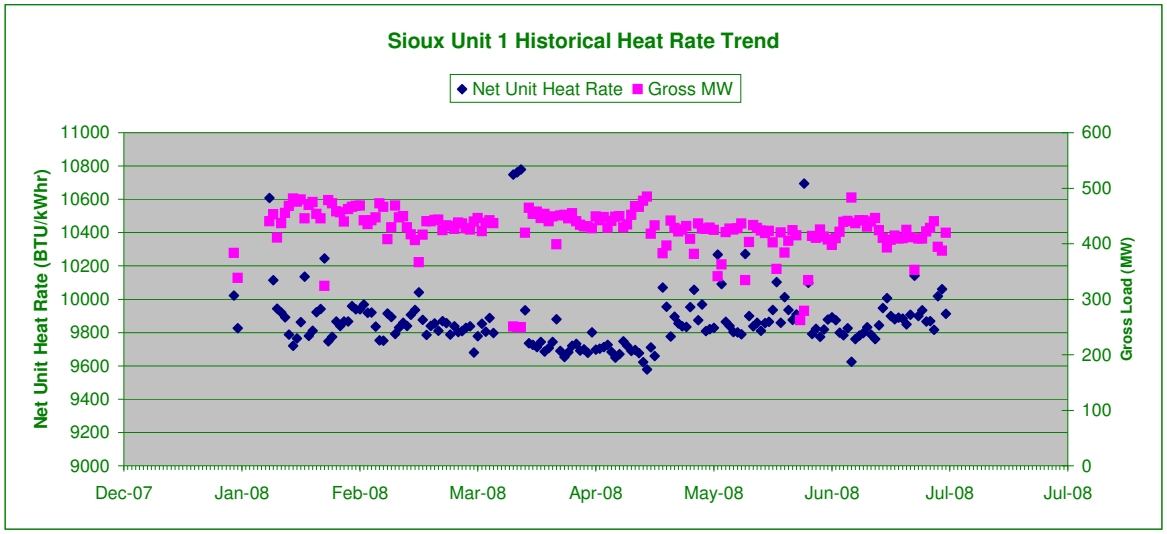
Top Priority Engineering Action Items	JR#	Priority	Resp Pty

Top Instrumentation Deficiencies	Point ID	Actual	Expected	JR#	Priority	Resp Pty
SX1BFW-FWHTR6A-0001-TI reading 0						

Top Priority OPM/EtaPro Action Items	Priority	Resp Pty
Update target values with agreed upon target values/curves	1	JDS


Sioux Unit 1 Monthly Controllable Losses Trend
MS Temp
RH Temp
RH Spray
MS Pres
Cond Backpr
FW Temp
AH N Gas Out
AH S Gas Out
Aux MW
AuxPwr %
BTU/kWhr
AuxPWR % of Load
60
50
40
30
20
10
0
-10
5.5
5.0
4.5
4.0
3.5
3.0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Sioux Unit 1 Monthly Controllable Losses Trend
O2
AH N Air In
AH S Air In
Hotwell
Incomplete comb
BTU/kWhr
20
15
10
5
0
-5
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Sioux Unit 1 Historical Heat Rate Trend
Net Unit Heat Rate
Gross MW
Net Unit Heat Rate (BTU/kWhr)
Gross Load (MW)
11000
10800
10600
10400
10200
10000
9800
9600
9400
9200
9000
600
500
400
300
200
100
0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Jul-08

Sioux Unit 1 Rollup, June 2008

June-08

Overall Heat Rate & Losses Summary

1. The controllable loss parameter target values need to be updated to reflect current plant operation.
2. Why isn't steam flow to the preheat coils stopped in summer?

Steam Generator Performance Summary:

No items noted

Steam Turbine Performance Summary:

No items noted

Condenser Performance Summary:

1. Why is the B604 valve cycling while the A602 valve remains in a constant position?

Feedwater Heater Performance Summary:

1. FWH 7B heater getting less extraction flow (calculated) than 7A with corresponding decrease in delta T. Venting issue?
2. FWH 6B heater has large swings in TTD with a drop in delta T at low loads. Air inleakage since heater is at negative pressure at low loads?
3. FWH 2 temp rise is 10F lower than expected. FWH 1 temp rise is 5F lower than expected.

Recommended Actions:

Instrumentation or calculation related issues:

The EtaPro target values need to be updated to reflect current plant operation.

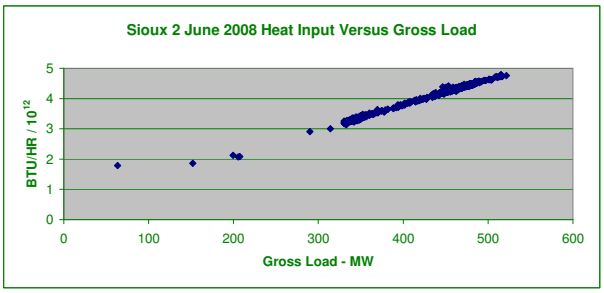
Changes made to the system that affects this month's report:

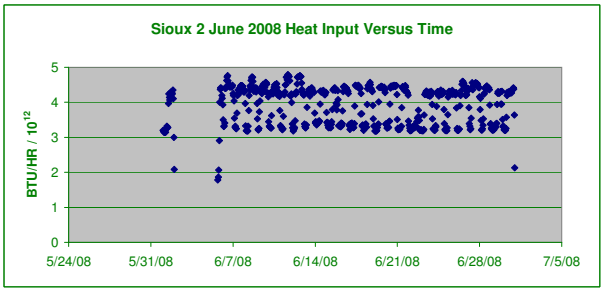
Summary of Performance Report for:

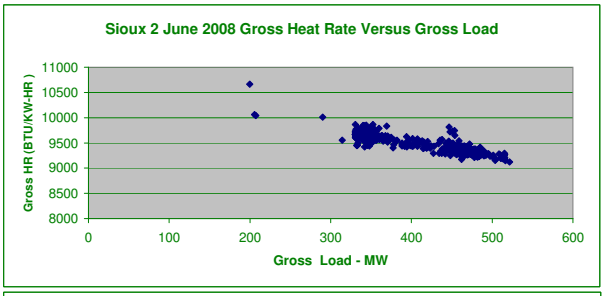
Plant Sioux
Unit 2
Period 6/1/08 to 7/1/08

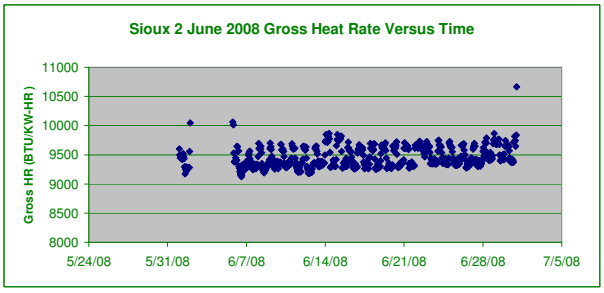
Full Load Performance
Hours of Data (Gross load>450 MW) 317

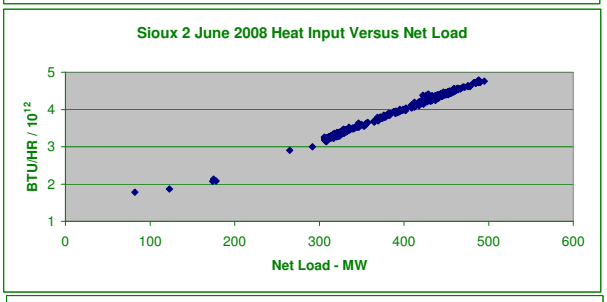
	Averages	
GENERATOR MEGAWATTS	471.7	MW
AUX POWER	25.3	MW
Net Unit Heat Rate Actual (GPHI)	9857.4	BTU/KW-HR
Boiler Efficiency Actual	87.0	%
CONTROL VALVE POSITION LVDT	28.5	%
FEEDWATER TEMP TO ECON	473.6	degF
FEEDWATER TEMP TO HTR 1	407.1	degF
HP Turbine Efficiency Actual	83.9	%
IP Turbine Efficiency Corrected	92.5	%
Condenser Pressure	2.6	inHga
AIRHTR-A GAS OUTLET TEMP	323.4	degF
AIRHTR-B GAS OUTLET TEMP	332.1	degF
AMBIENT AIR TEMP	82.1	degF
River Temperature	74.5	degF
FWH 1 Temperature Rise	66.5	degF
Net Load	446.4	MW
Average Exit Gas Temperature	327.7	degF
Aux Power	5.4	%
Gross Unit Heat Rate	9328.4	BTU/KW-HR
Gross Turbine Heat Rate	8111.7	BTU/KW-HR

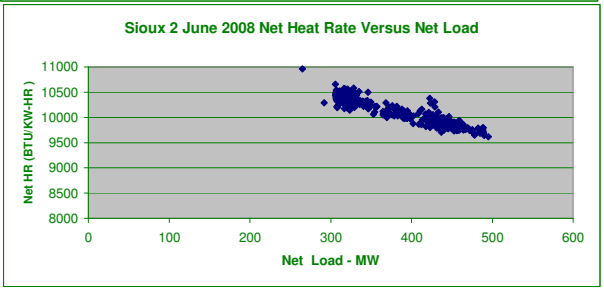


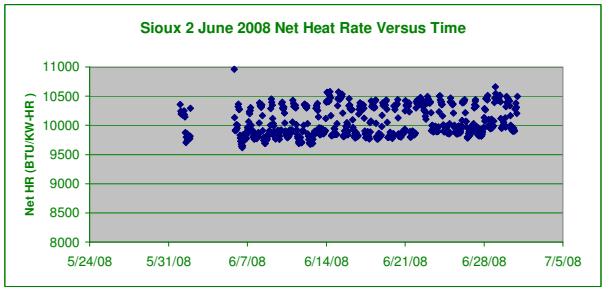












Sioux Unit 2 Rollup, June 2008

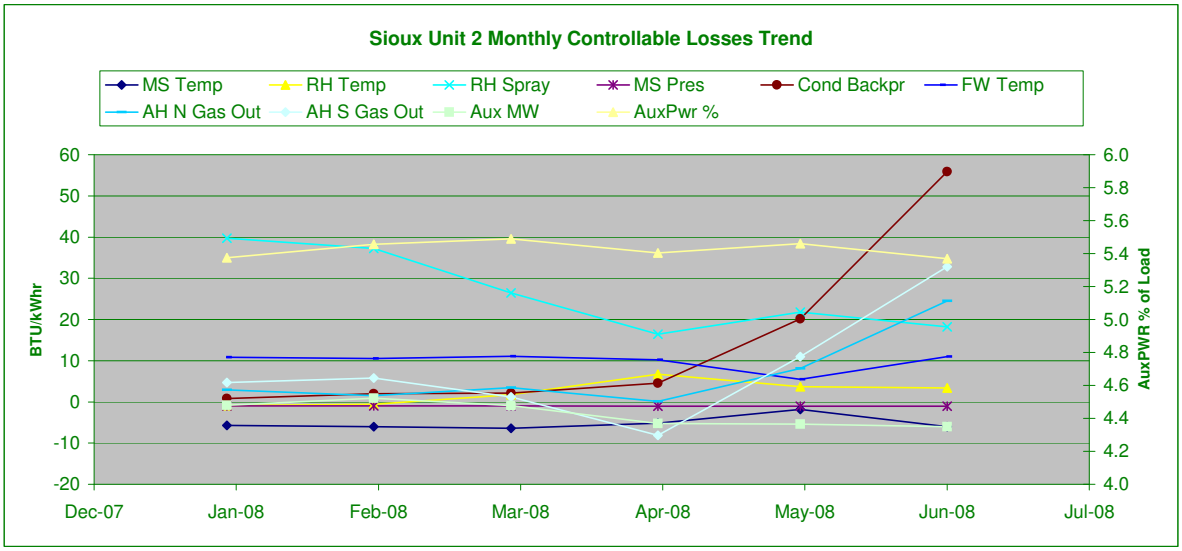
Notable Deviations in Plant Performance Data / Discussion Topics, etc.

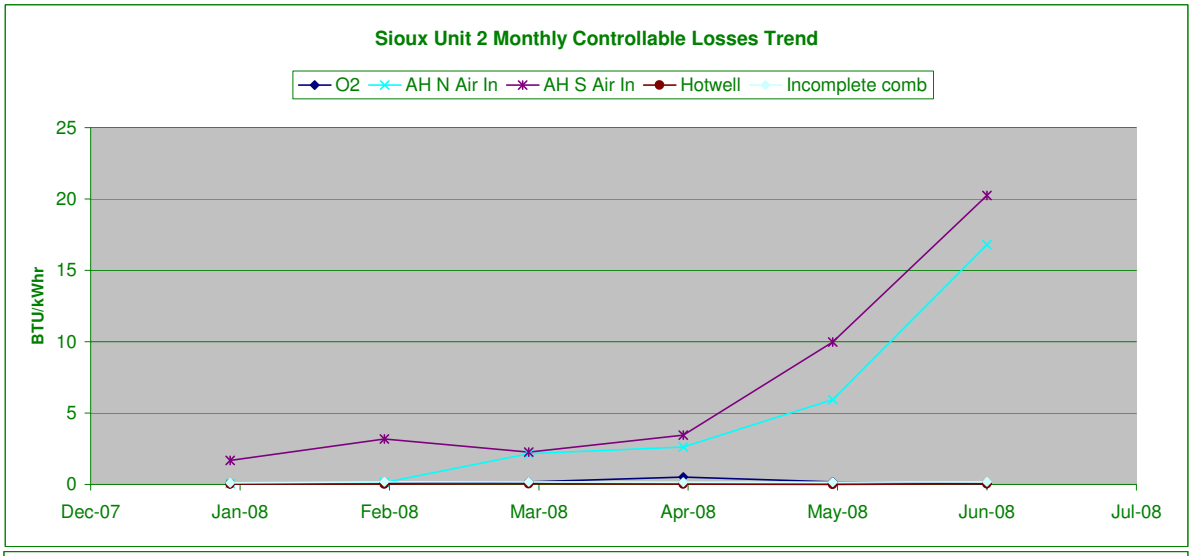
1. The controllable loss parameter target values need to updated to reflect current plant operation. The target values for all controllable loss parameters have been reviewed using actual 2007 unit data.

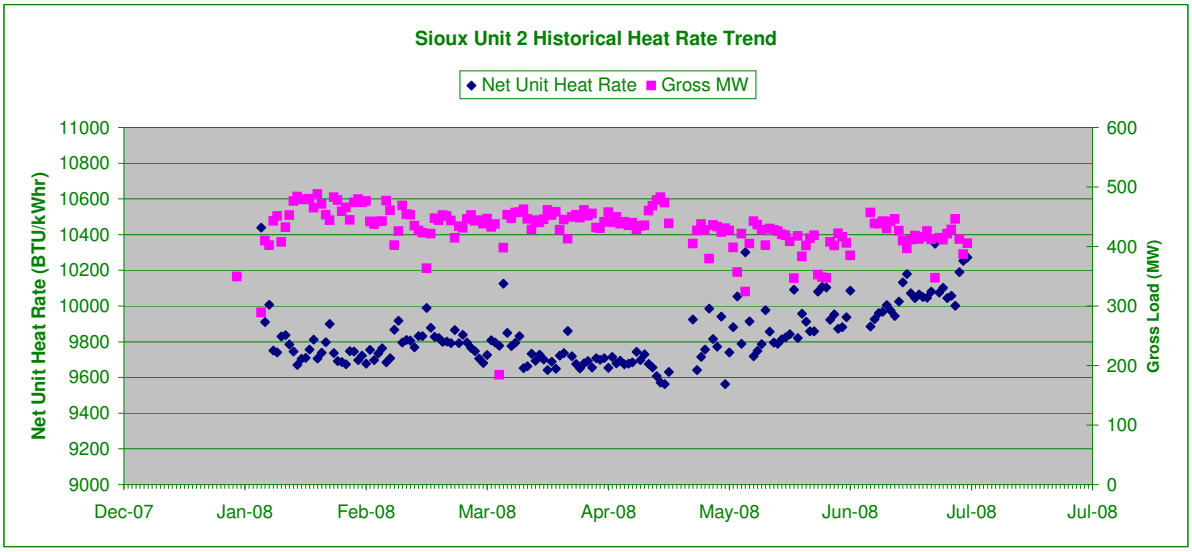
Top Priority Engineering Action Items	JR#	Priority	Resp Pty

Top Instrumentation Deficiencies	Point ID	Actual	Expected	JR#	Priority	Resp Pty

Top Priority OPM/EtaPro Action Items	Priority	Resp Pty
Update target values with agreed upon target values/curves	1	JDS


Sioux Unit 2 Monthly Controllable Losses Trend
MS Temp
RH Temp
RH Spray
MS Pres
Cond Backpr
FW Temp
AH N Gas Out
AH S Gas Out
Aux MW
AuxPwr %
BTU/kWhr
AuxPWR % of Load
60
50
40
30
20
10
0
-10
-20
6.0
5.8
5.6
5.4
5.2
5.0
4.8
4.6
4.4
4.2
4.0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Sioux Unit 2 Monthly Controllable Losses Trend
O2
AH N Air In
AH S Air In
Hotwell
Incomplete comb
BTU/kWhr
25
20
15
10
5
0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08


Sioux Unit 2 Historical Heat Rate Trend
Net Unit Heat Rate
Gross MW
Net Unit Heat Rate (BTU/kWhr)
Gross Load (MW)
11000
10800
10600
10400
10200
10000
9800
9600
9400
9200
9000
600
500
400
300
200
100
0
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Jul-08

Sioux Unit 2 Rollup, June 2008

June-08

Overall Heat Rate & Losses Summary

1. The controllable loss parameter target values need to updated to reflect current plant operation.
2. Why isn't steam flow to the preheat coils stopped in summer?

Steam Generator Performance Summary:

No items noted

Steam Turbine Performance Summary:

No items noted

Condenser Performance Summary:

No items noted

Feedwater Heater Performance Summary:

1. FWH 7A has a high DCA compared to 7B.
2. FWH 1 & 2 have lower temperature rises than expected.

Recommended Actions:

Instrumentation or calculation related issues:

The EtaPro target values need to be updated to reflect current plant operation.

Changes made to the system that affects this month's report: