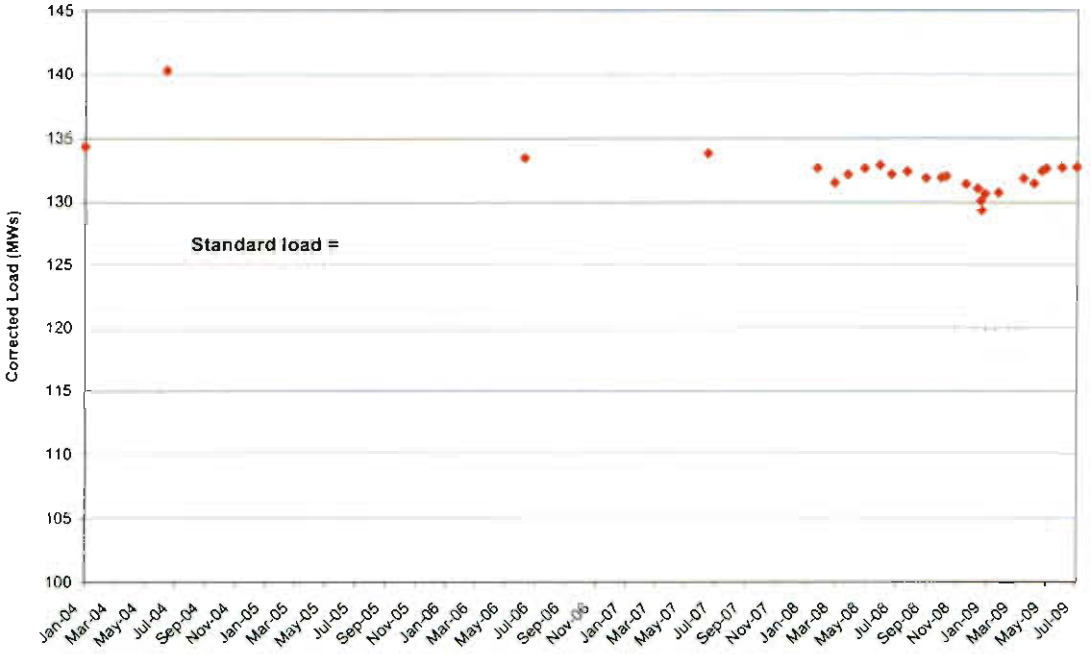
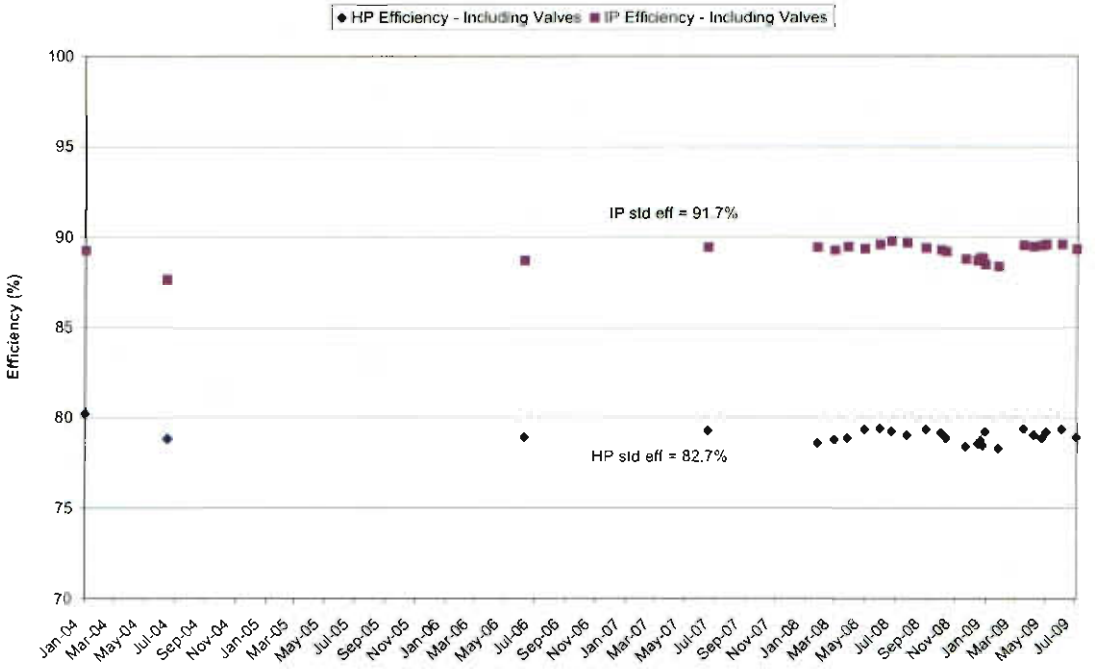
Meramec Unit 1 - Corrected Load



Meramec Unit 1 - HP and IP Efficiencies



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				

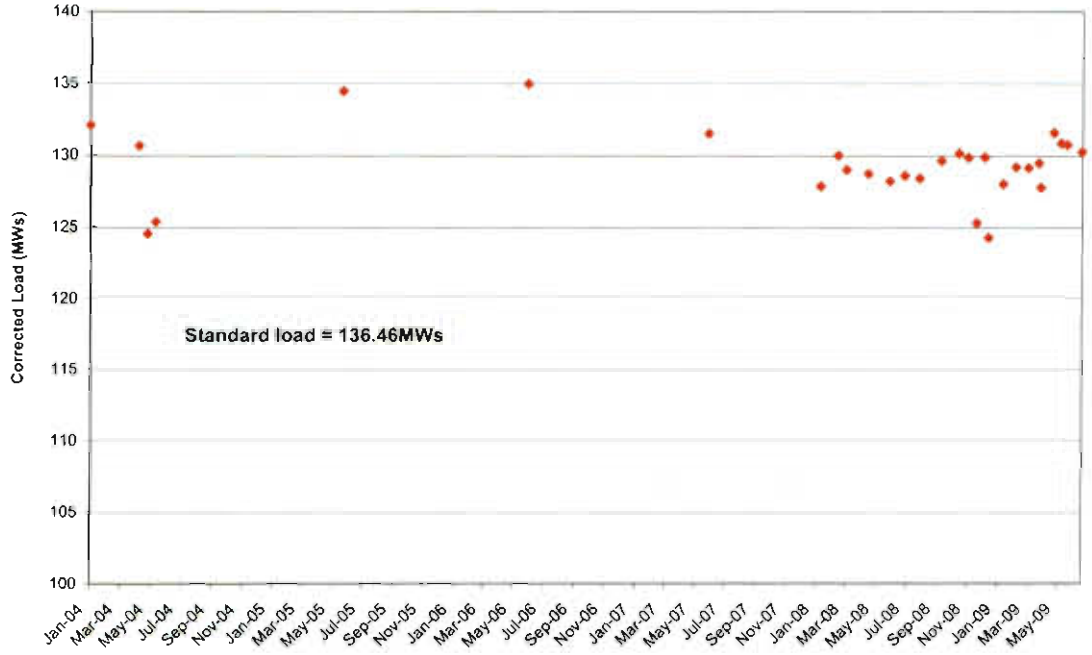
In last month's report it was stated that the elevated extraction steam temps to the No. 3 feedwater heater (600 vs expected around 525) and to the No. 5 feedwater heater (520 vs expected around 220) were investigated and found to be correct. Potential causes for these elevated temperatures are excess 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 %

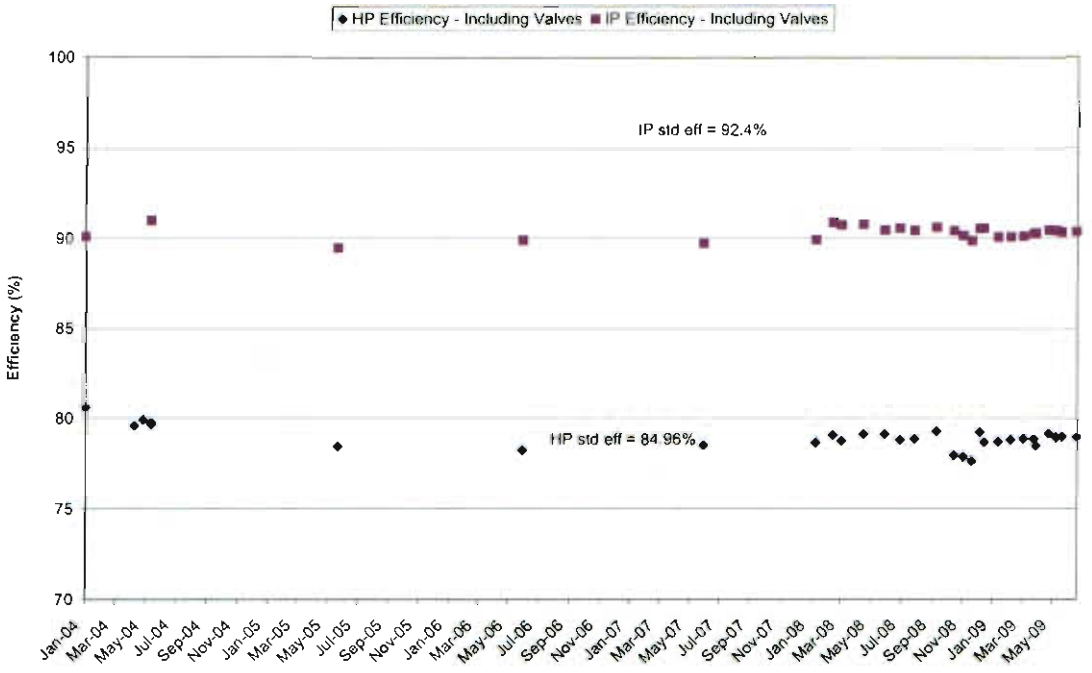
No. 5 FWH – 7250 pph from the IP dummy piston leakoff causing a loss of 0.5 MW and a heat rate increase of 0.6%

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

Meramec Unit 2 - Corrected Load



Meramec Unit 2 - HP and IP Efficiencies



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:

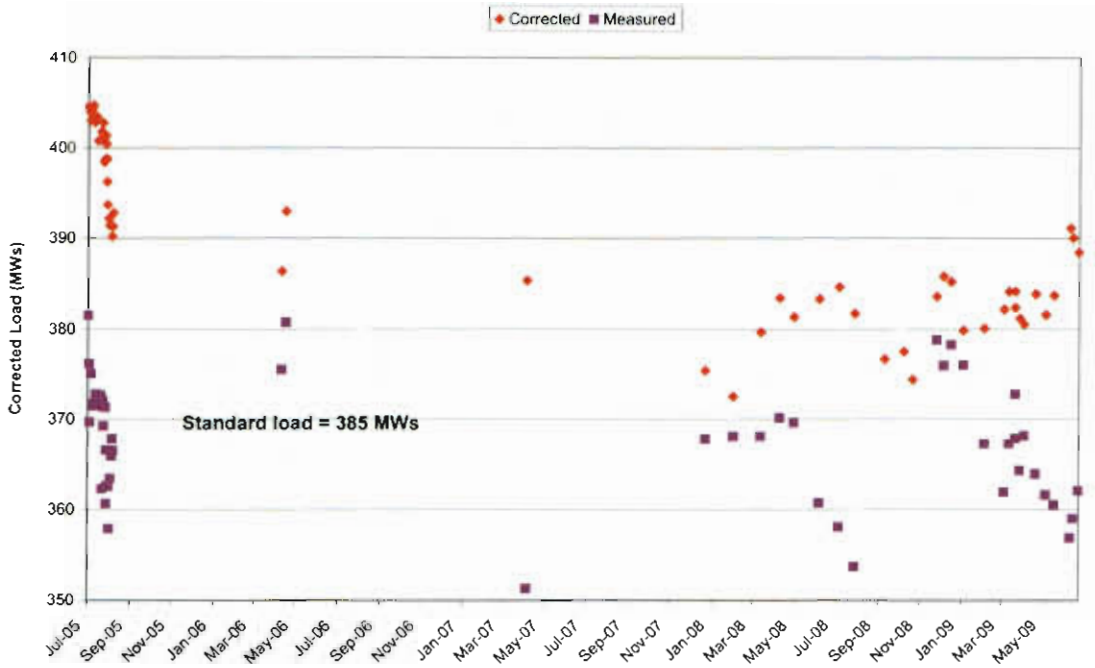
Plant	Meramec			
Unit	4			
Period		Jun-08	May-09	Jun-09
Full Load Performance = CVP>=98% and Load> 90% of capabilty table				
Hours of Data		331	410	309
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	358.3	356.6	353.9
AUX POWER	MW	20.6	21.1	21.5
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	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

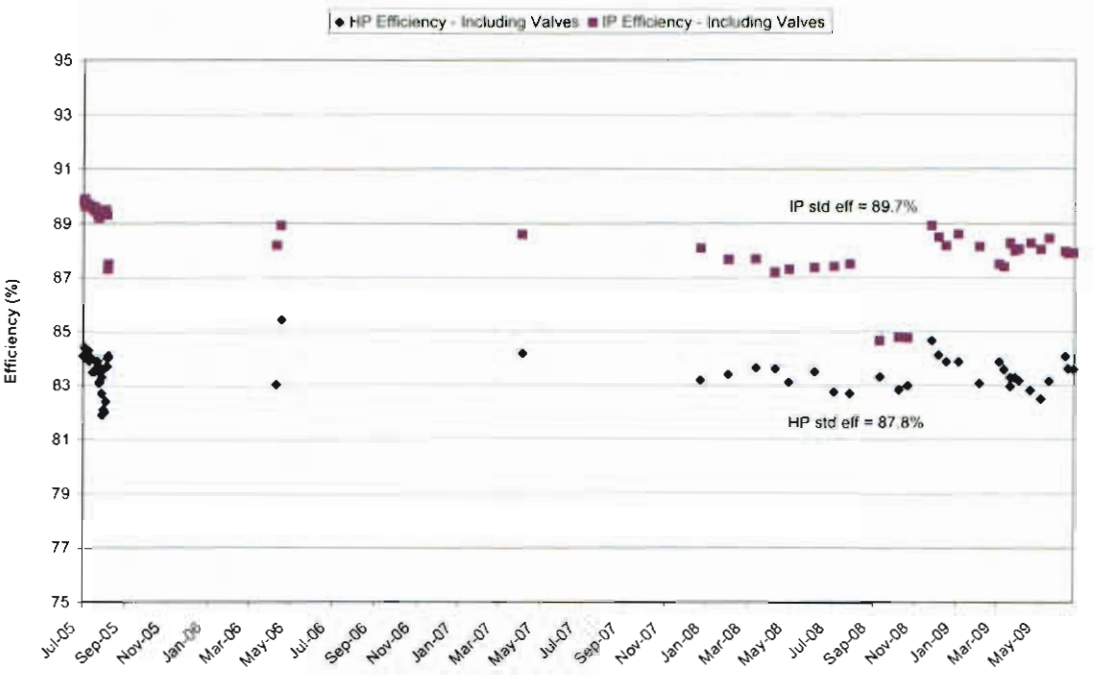
on 4/28/09 efficiency calc tags were checked and proper water legs and corrections applied.

suspect due to substituted air in temperature due to bad sensor

Meramec Unit 4 - Corrected Load



Meramec Unit 4 - HP and IP Efficiencies



June 5, 2009

To: Tim Lafser

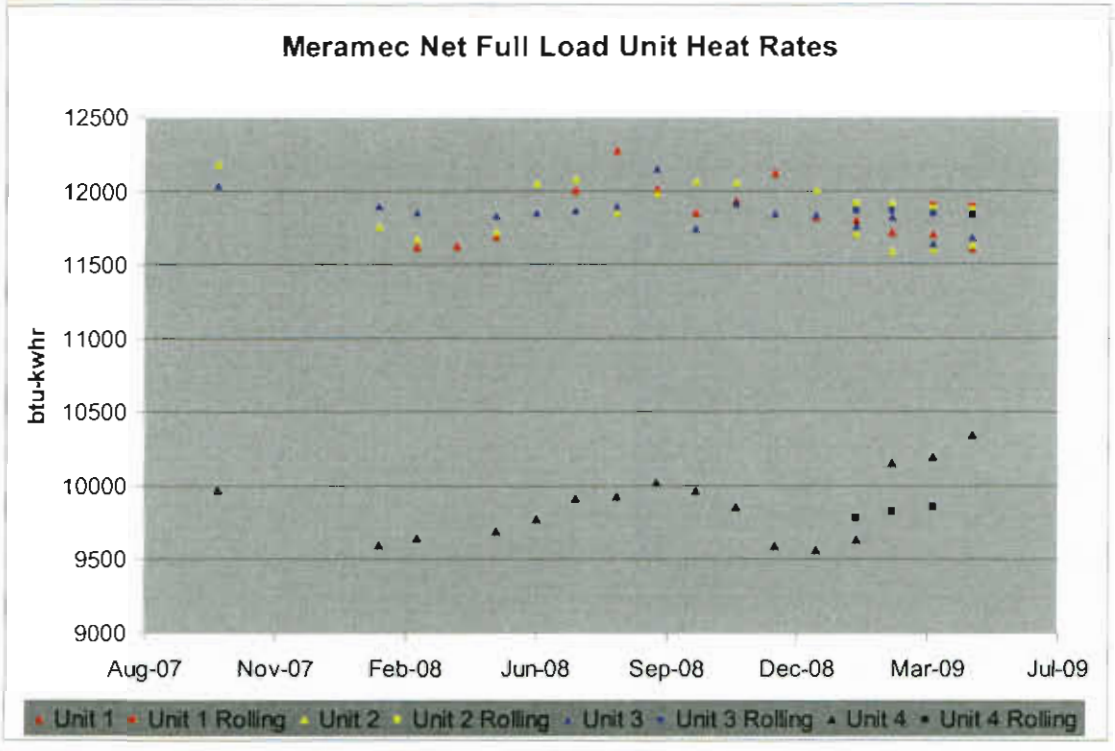
From: Joe Sind

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

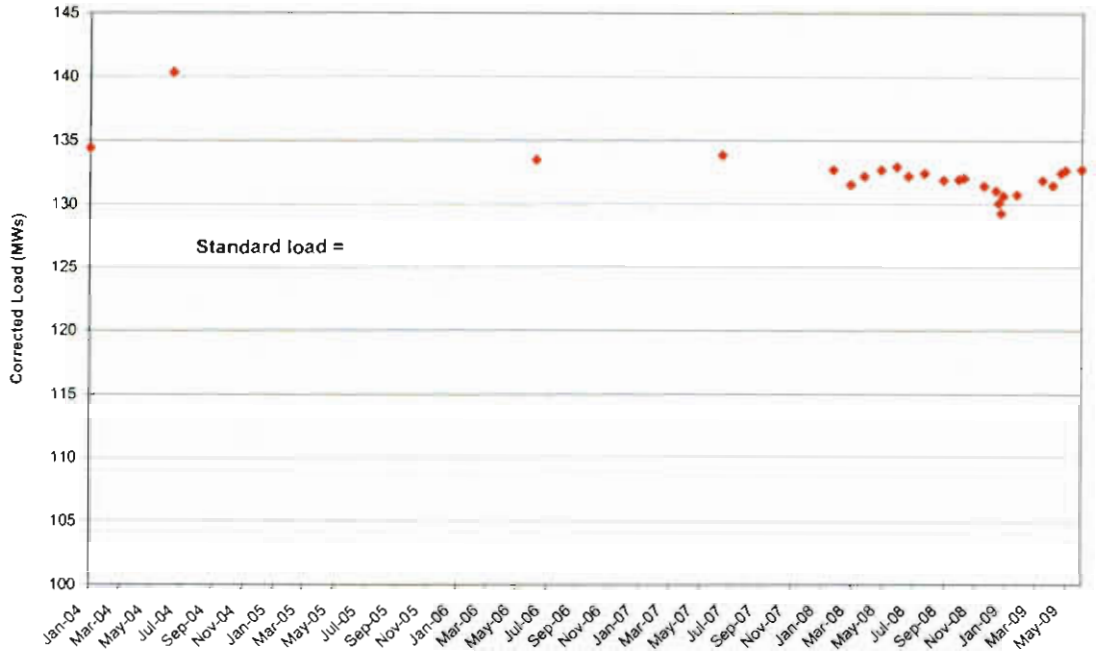
feedwater flow for heat rate calc. has not been validated

erroneous IP efficiency due to intermittent bad reheat temp

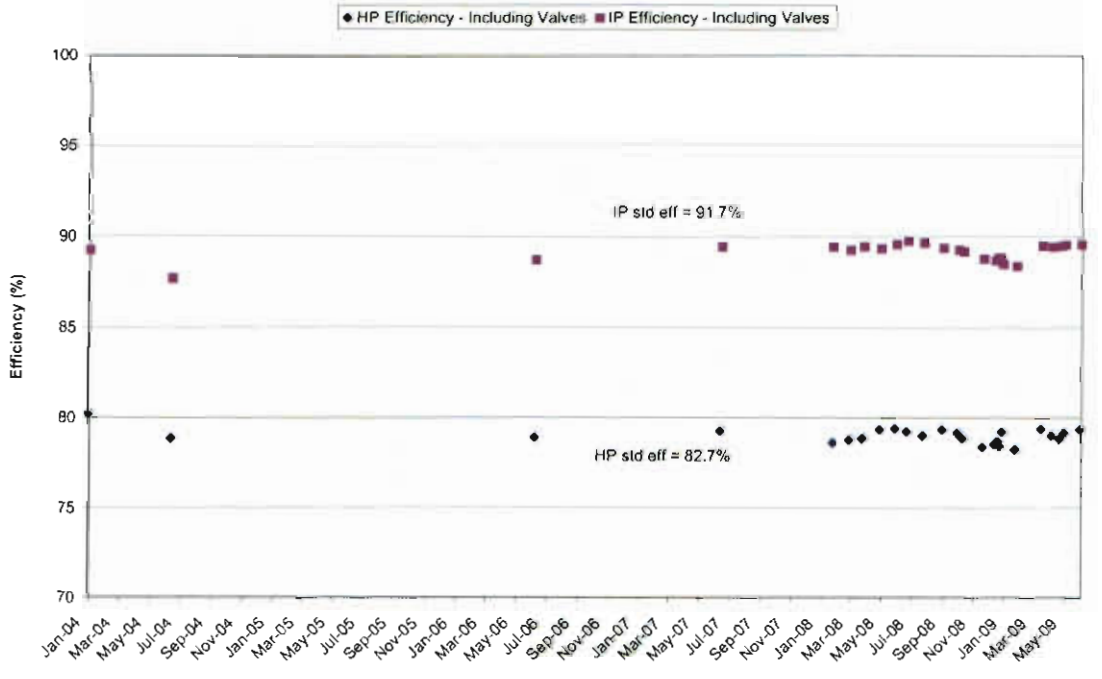
changes in cylinder efficiencies reflect proper corrections to data going forward, made late April

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



Meramec Unit 1 - HP and IP Efficiencies



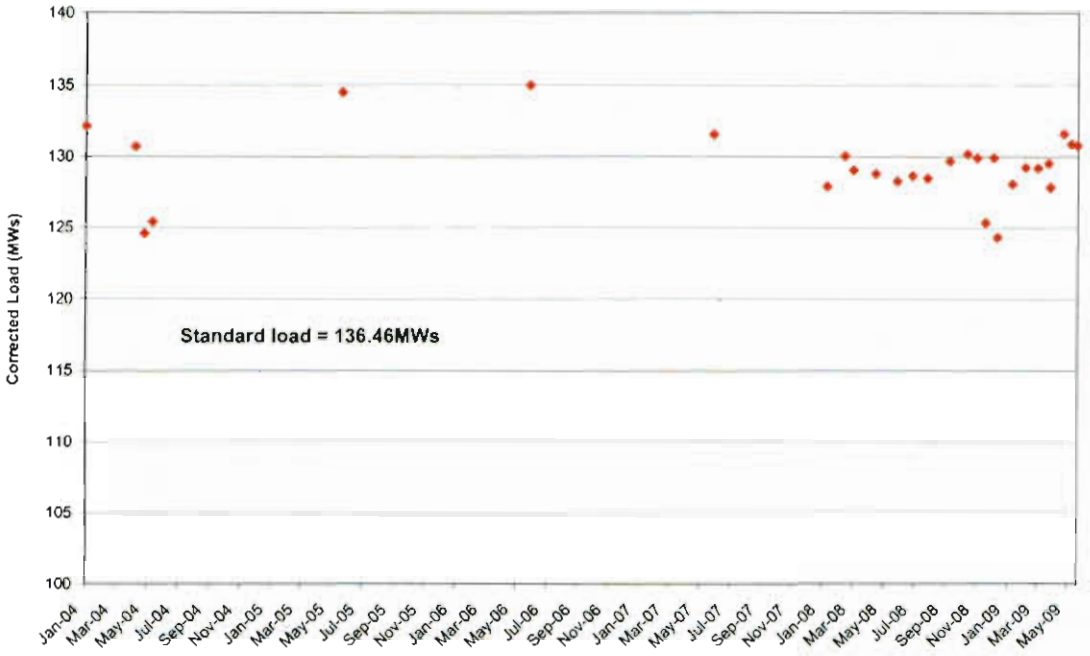
Unit 2

Summary of Performance Report for:

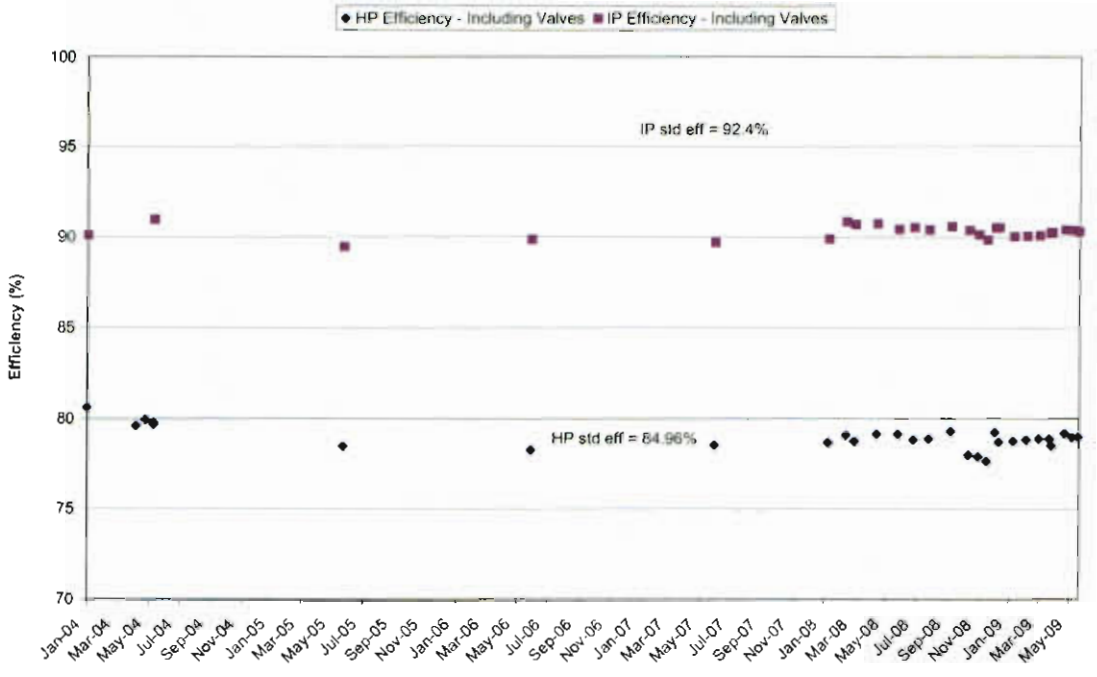
Plant	Meramec			
Unit	2			
Period		May-08	Apr-09	May-09
Full Load Performance Calc. GVP>97%				
Hours of Data		140	57	118
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	133.1	132.6	133.7
AUX POWER	MW	7.6	7.7	7.4
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11718.72	11599.78	11630.91
Boiler 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



Meramec Unit 2 - HP and IP Efficiencies



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

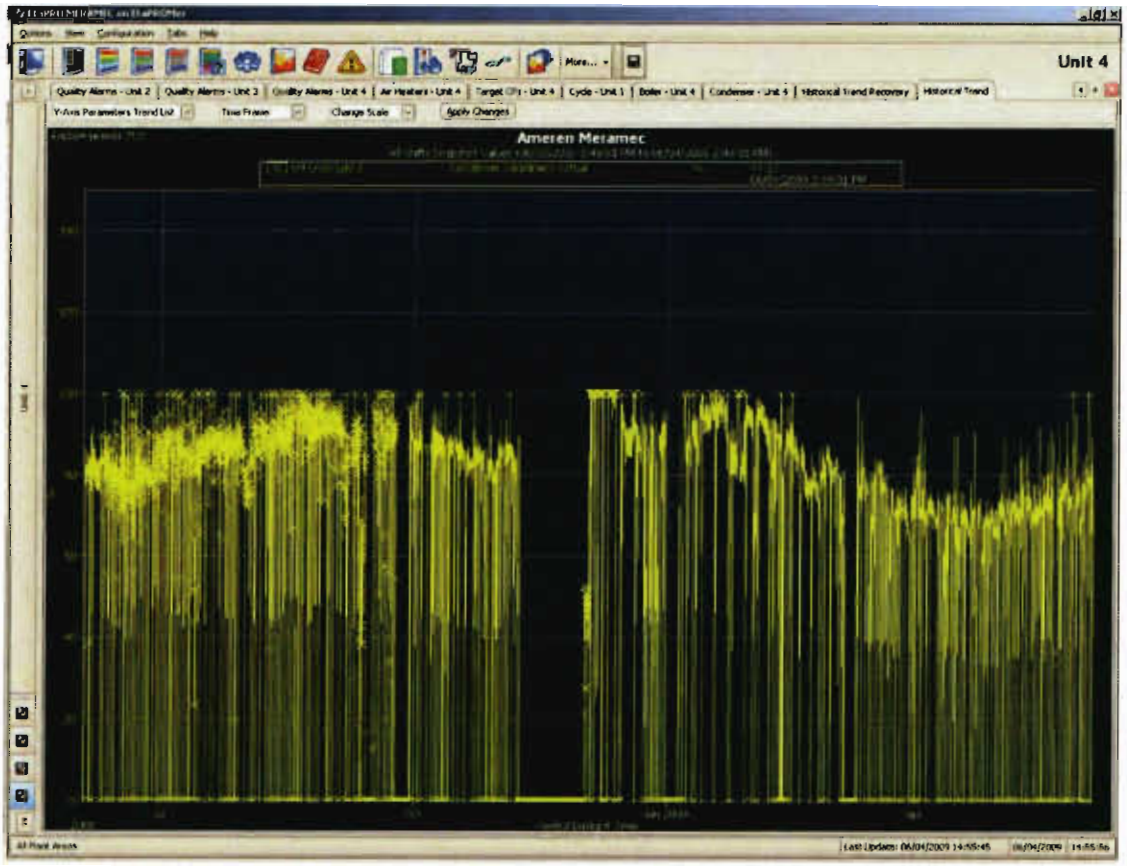
Unit 4

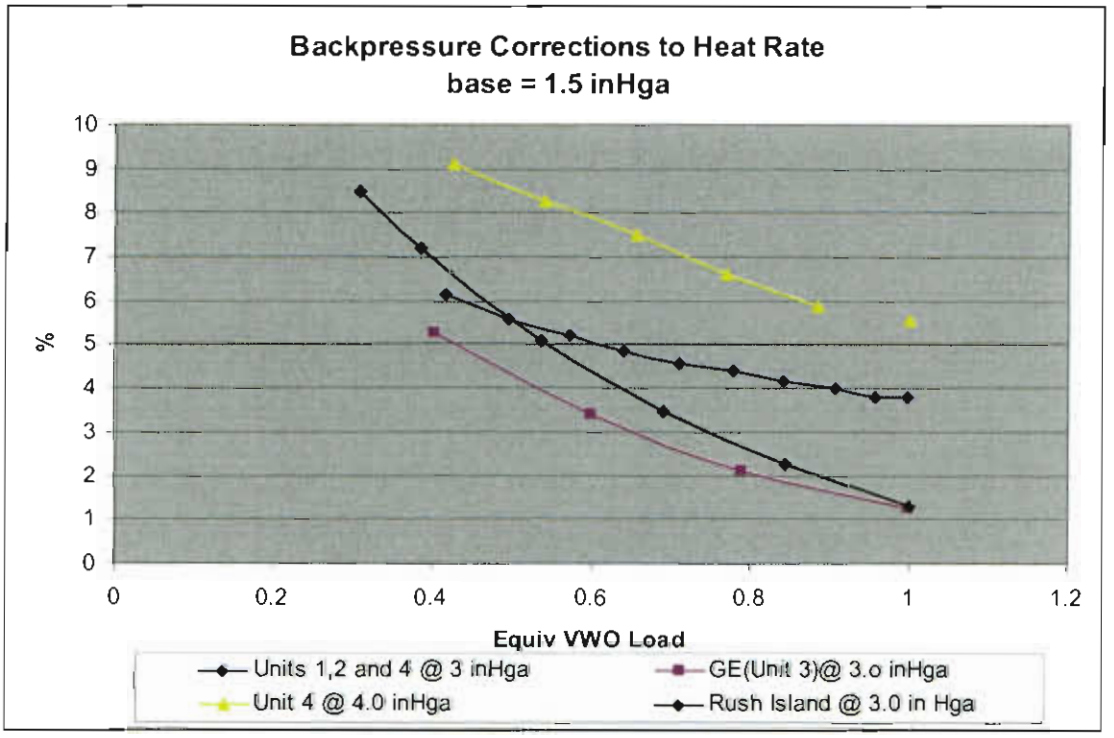
Summary of Performance Report for:

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
Month Rolling Average Net Unut Heat Rate			9855	9910

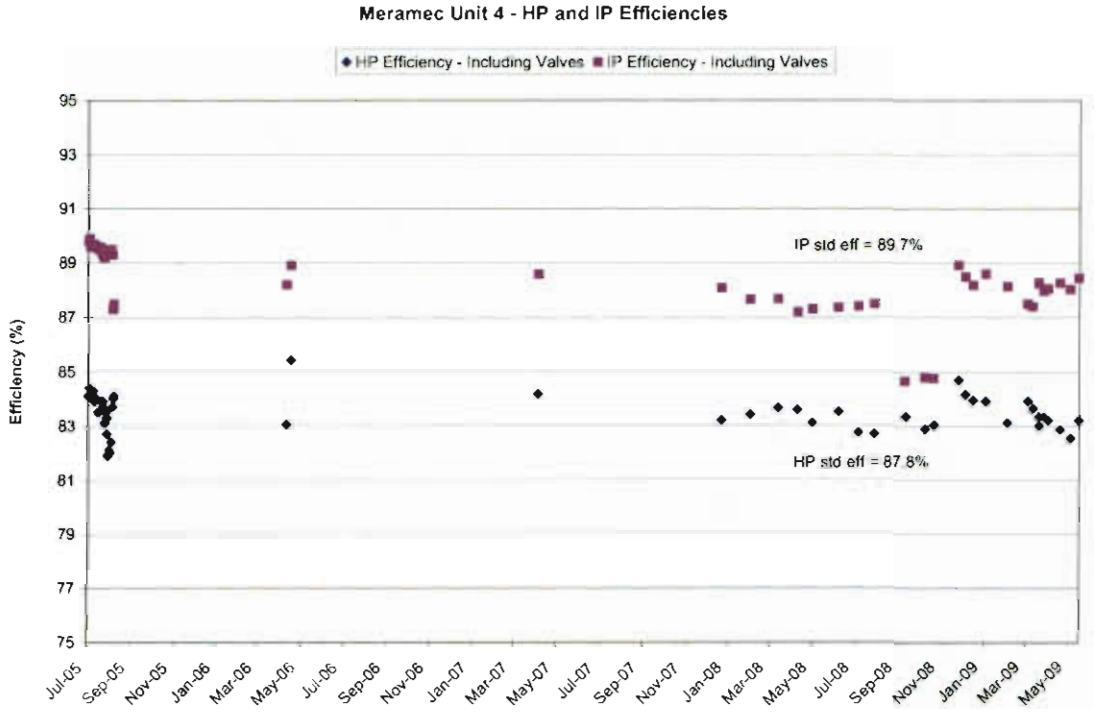
feedwater flow for heat rate calc. has not been validated
on 3/13/09 primary flow tags were changed to ones believed more realistic
on 4/28/09 efficiency calc tags were checked and proper water legs and corrections applied.
suspect due to substituted air in temperature due to bad sensor

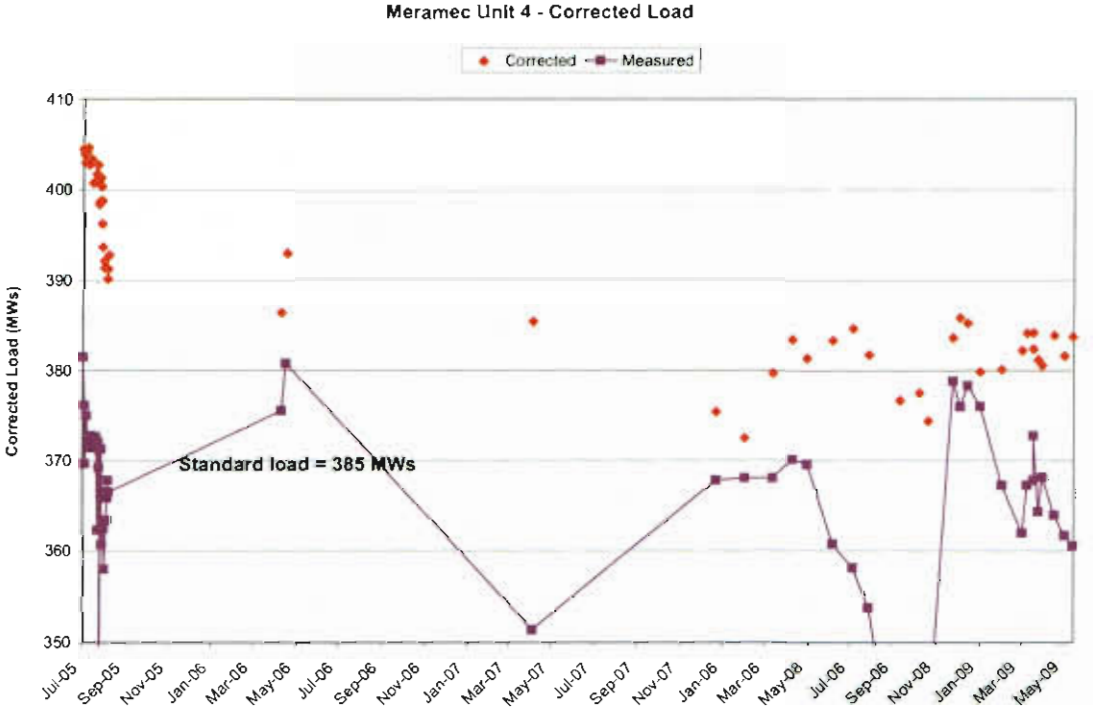
Although the boiler efficiency shown in the above table is suspect, actual excess O2 levels were slightly down (not shown) and both air heater outlet temperatures were lower compared to April. This would result in an improved boiler efficiency. Heat rates however are worse in May, and are felt most likely 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.


Unit 4
Ameren Meramec


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

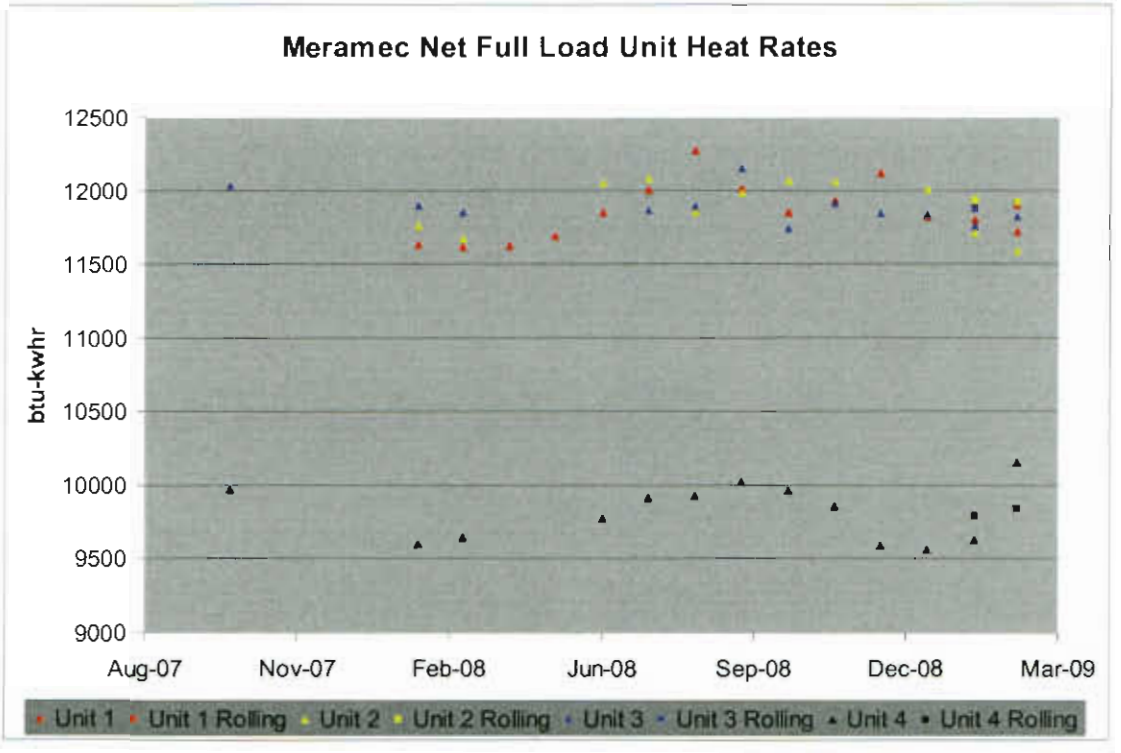
From: Joe Sind

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

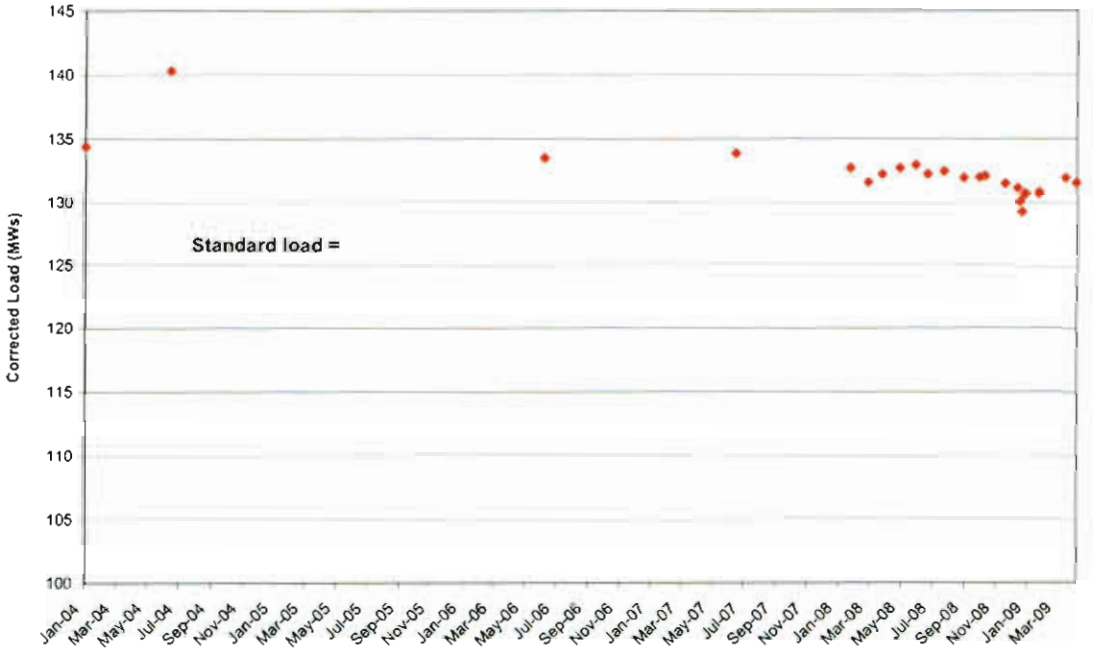
Summary of Performance Report for:

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

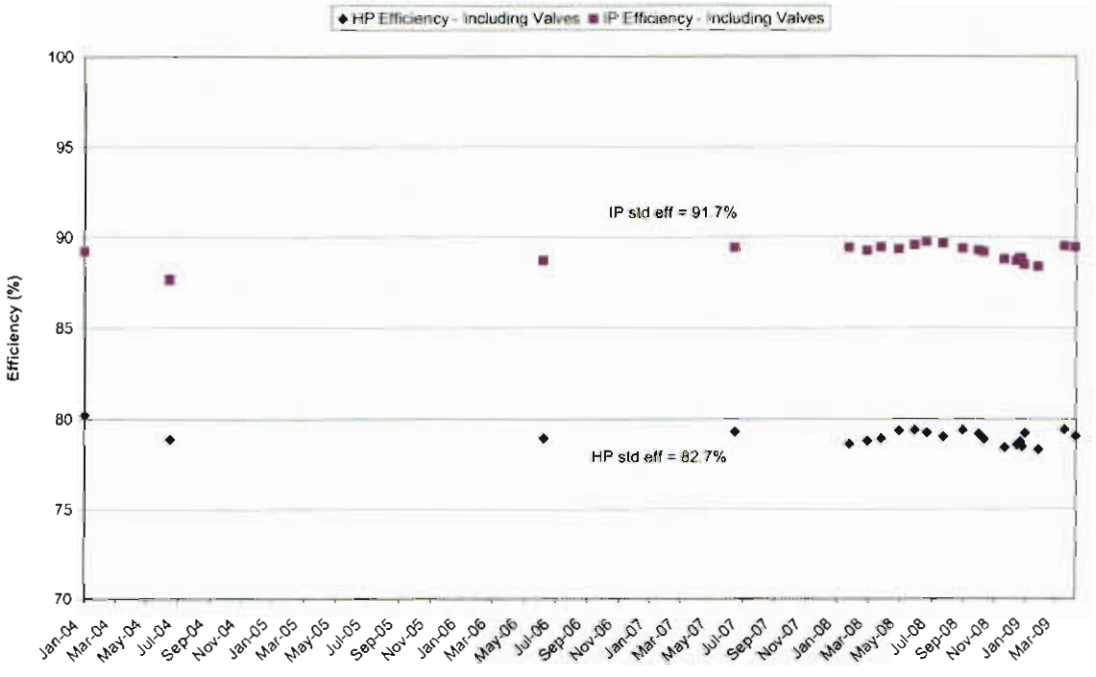
Plant	Meramec				
Unit	1				
Period			Mar-08	Feb-09	Mar-09
Full Load Performance					
Hours of Data			243	376	47
			Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS		MW	137	123	134.3
AUX POWER		MW	8.8	9.2	9.6
Net Unit Heat Rate Actual (GPHI)		BTU/KW-HR	11620	11799	11723
Boiler Efficiency Actual		%	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



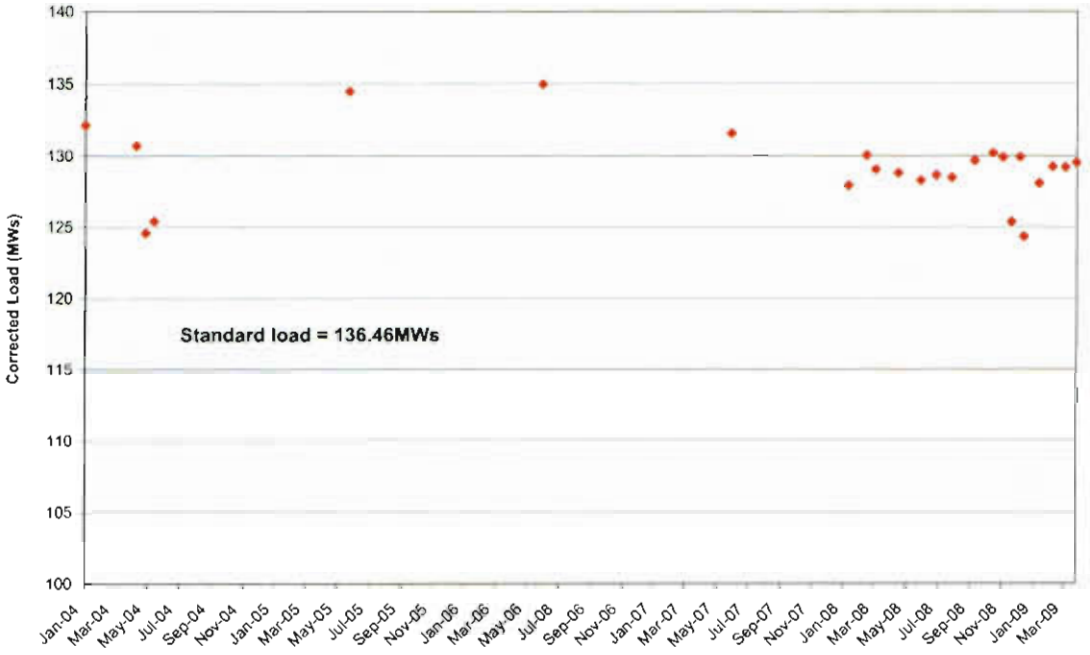
Unit 2

Summary of Performance Report for:

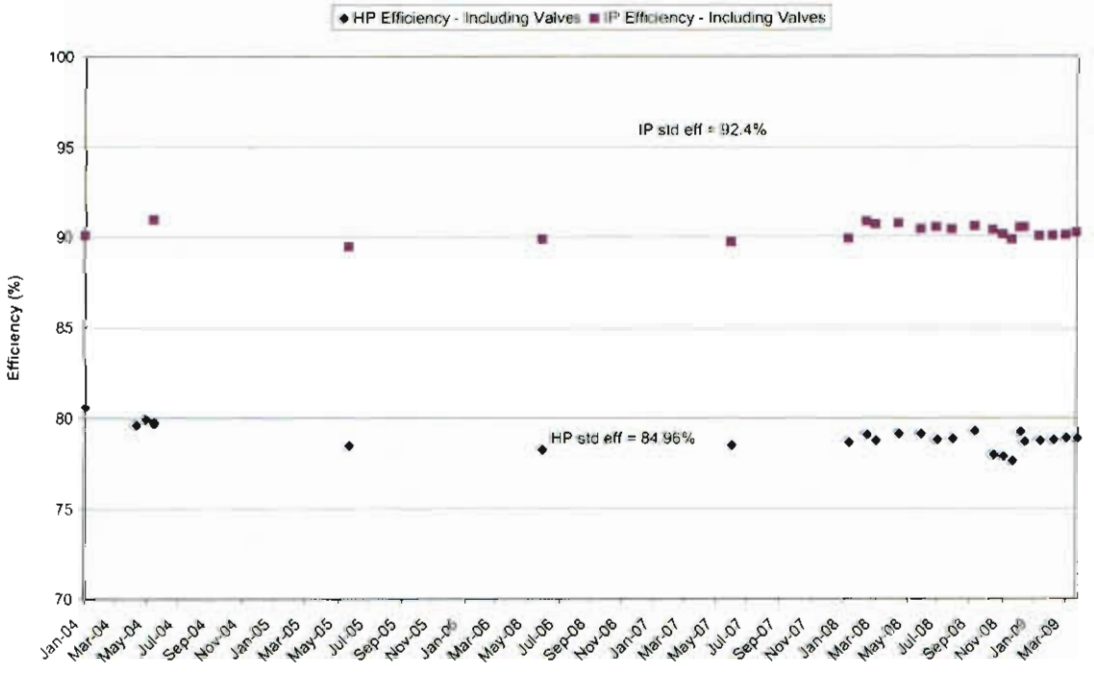
Plant	Meramec			
Unit	2			
Period		Mar-08	Feb-09	Mar-09
Full Load Performance				
Hours of Data		492	273	115
		Averages	**Averages**	**Averages**
GENERATOR MEGAWATTS	MW	134.8	130.3	130.8
AUX POWER	MW	7.7	7.6	7.6
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR	11671.3	11703.8	11591.5
Boiler Efficiency Actual	%	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

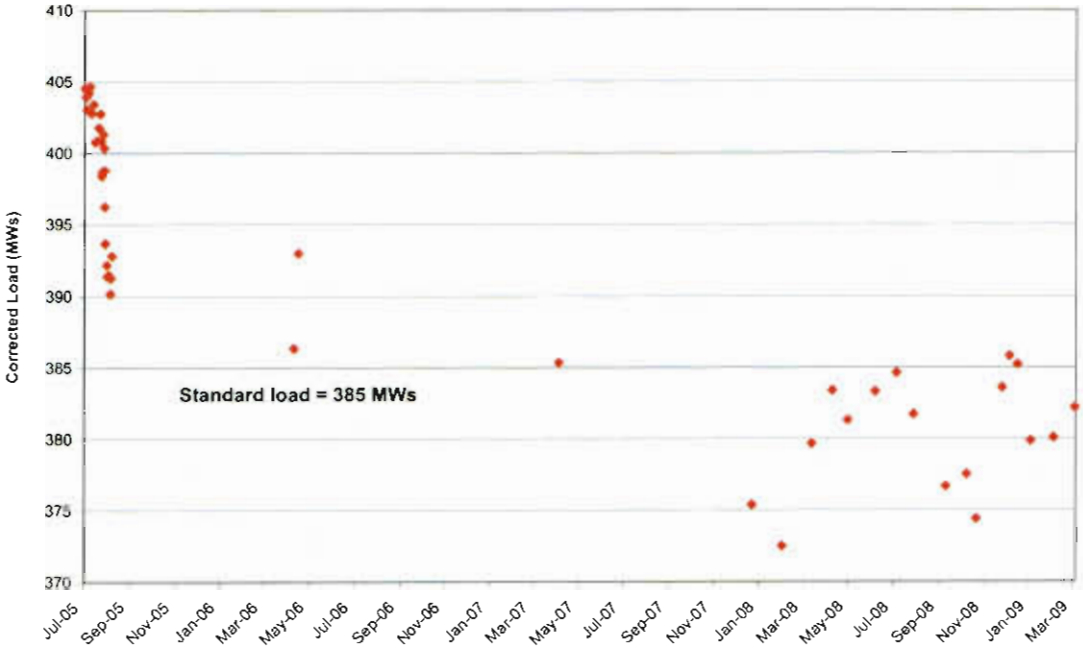
Summary of Performance Report for:

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

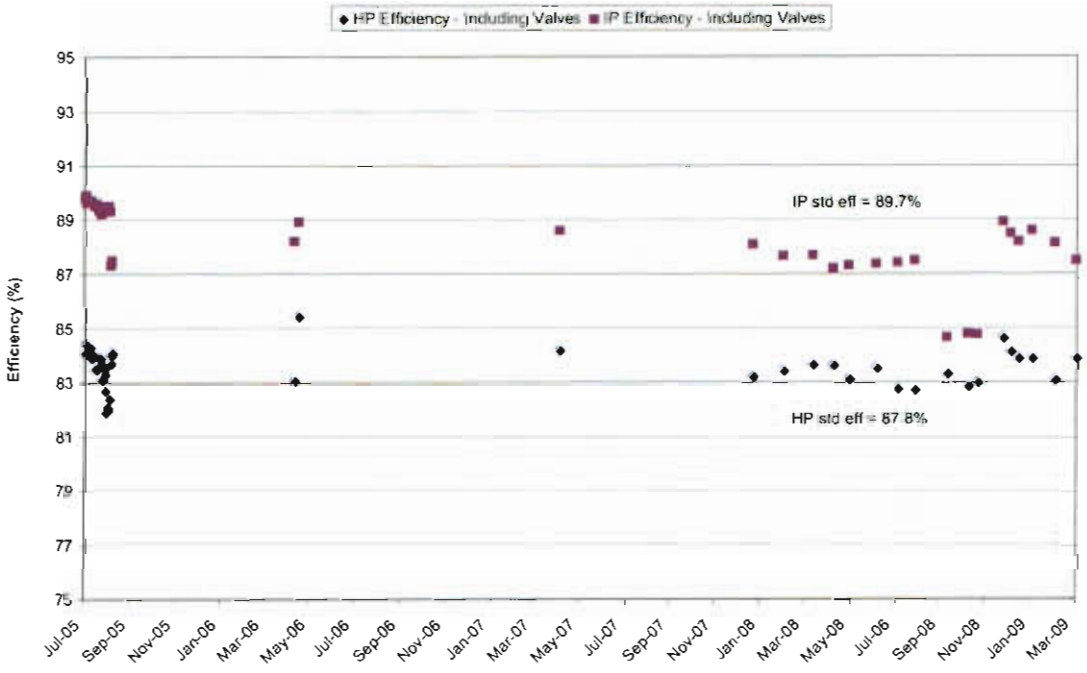
feedwater flow for heat rate calc. has not been validated
on 3/13/09 primary flow tags were changed to ones believed more realistic

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

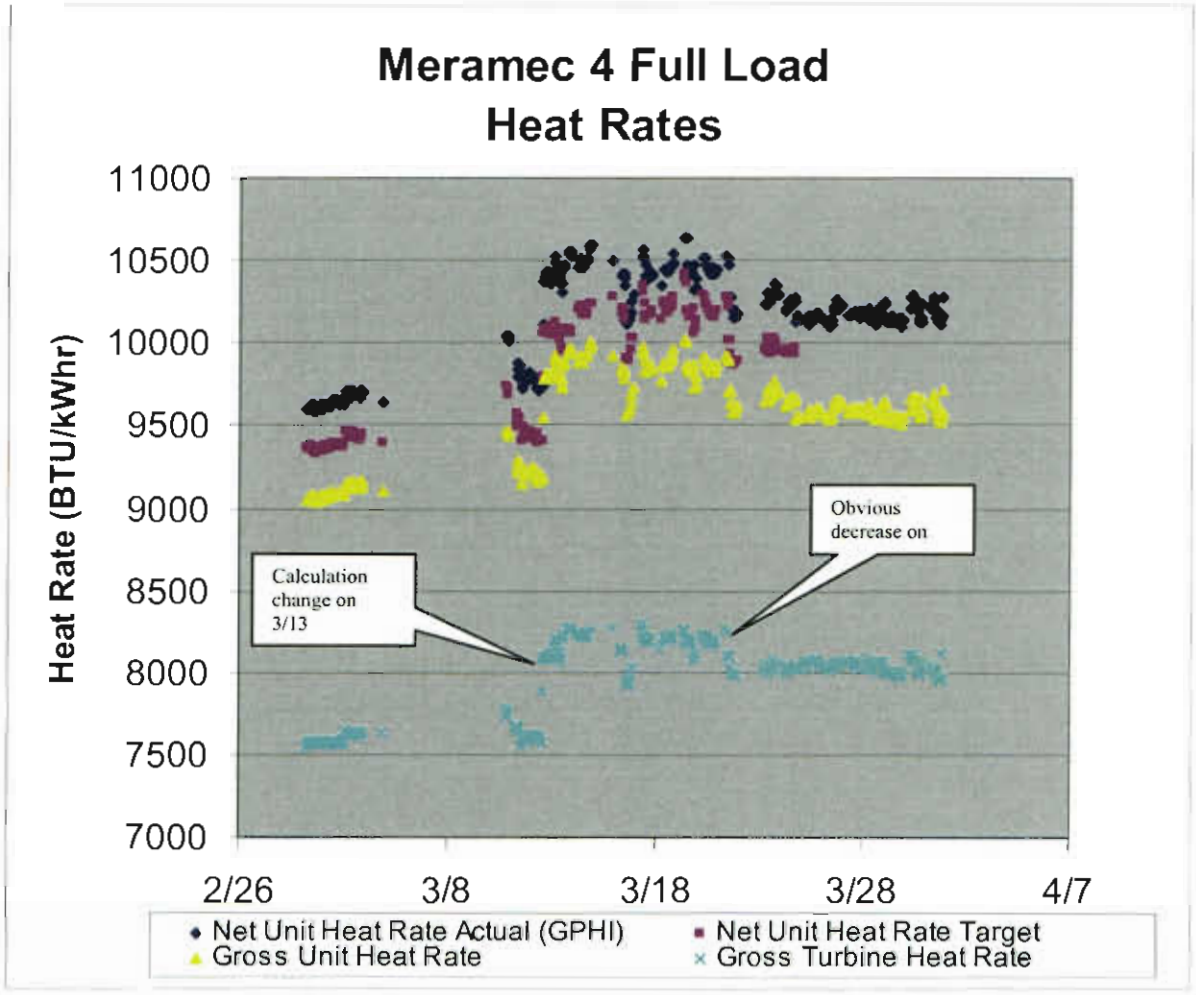
Meramec Unit 4 - Corrected Load



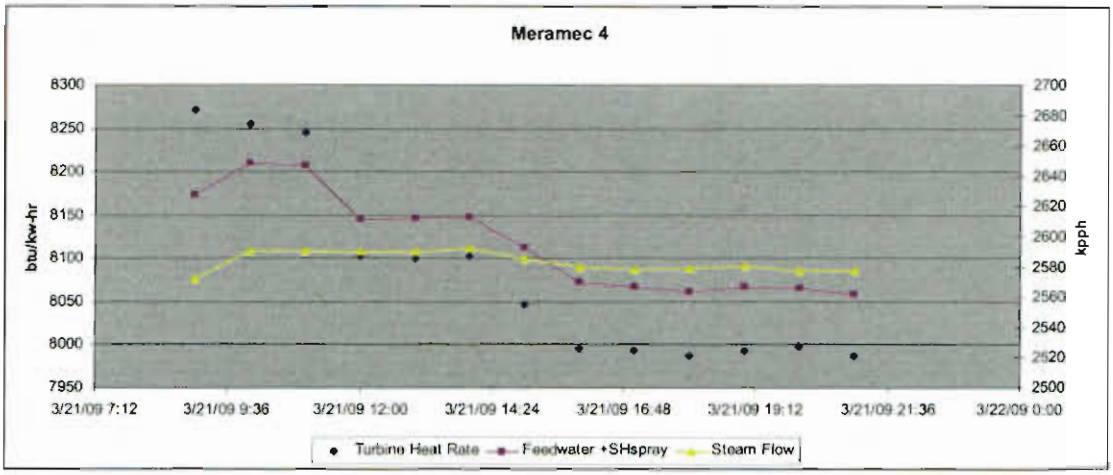
Meramec Unit 4 - HP and IP Efficiencies



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.



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

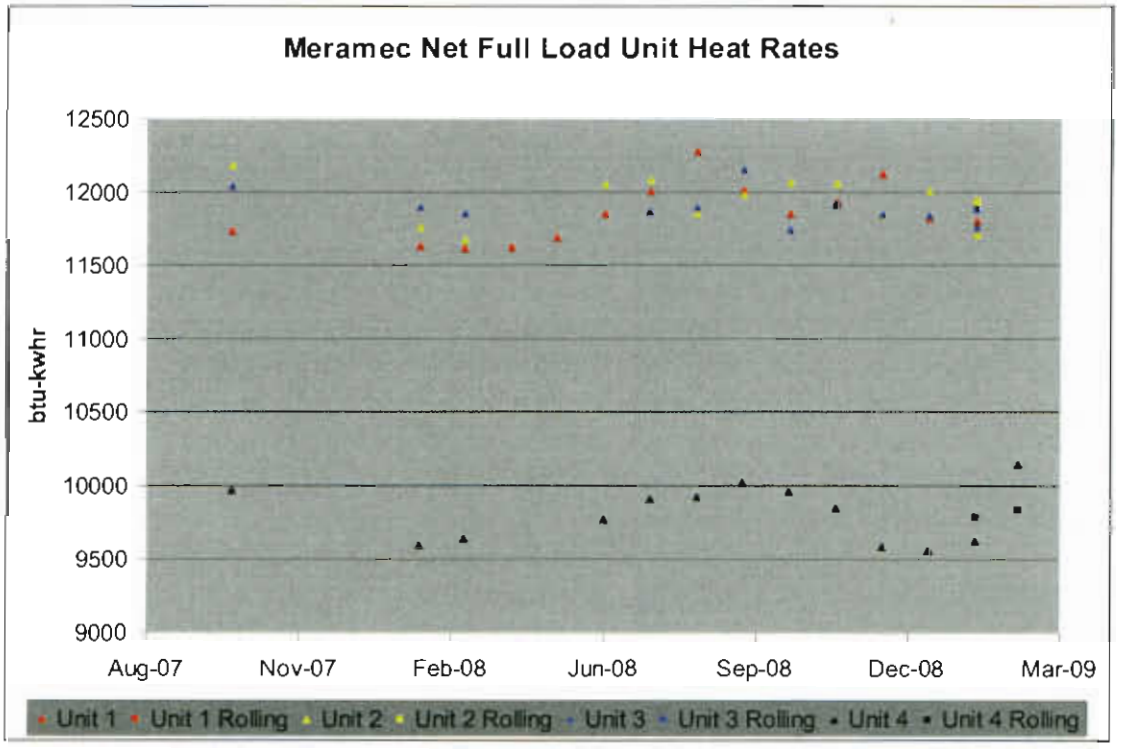
CC: Bob Meiners, John Beck, Steve Schaeffer, Jim Vaughn, Tom Hart, Jeff Scott, Mike Moade, Chris Brown, Matt Wallace, Ken Stuckmeyer, Don Clayton, Jeff Colter, Scott McCormack, Jeff Shelton, Scott Hixson, Jim Barnett, Glenn Tiffin

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.

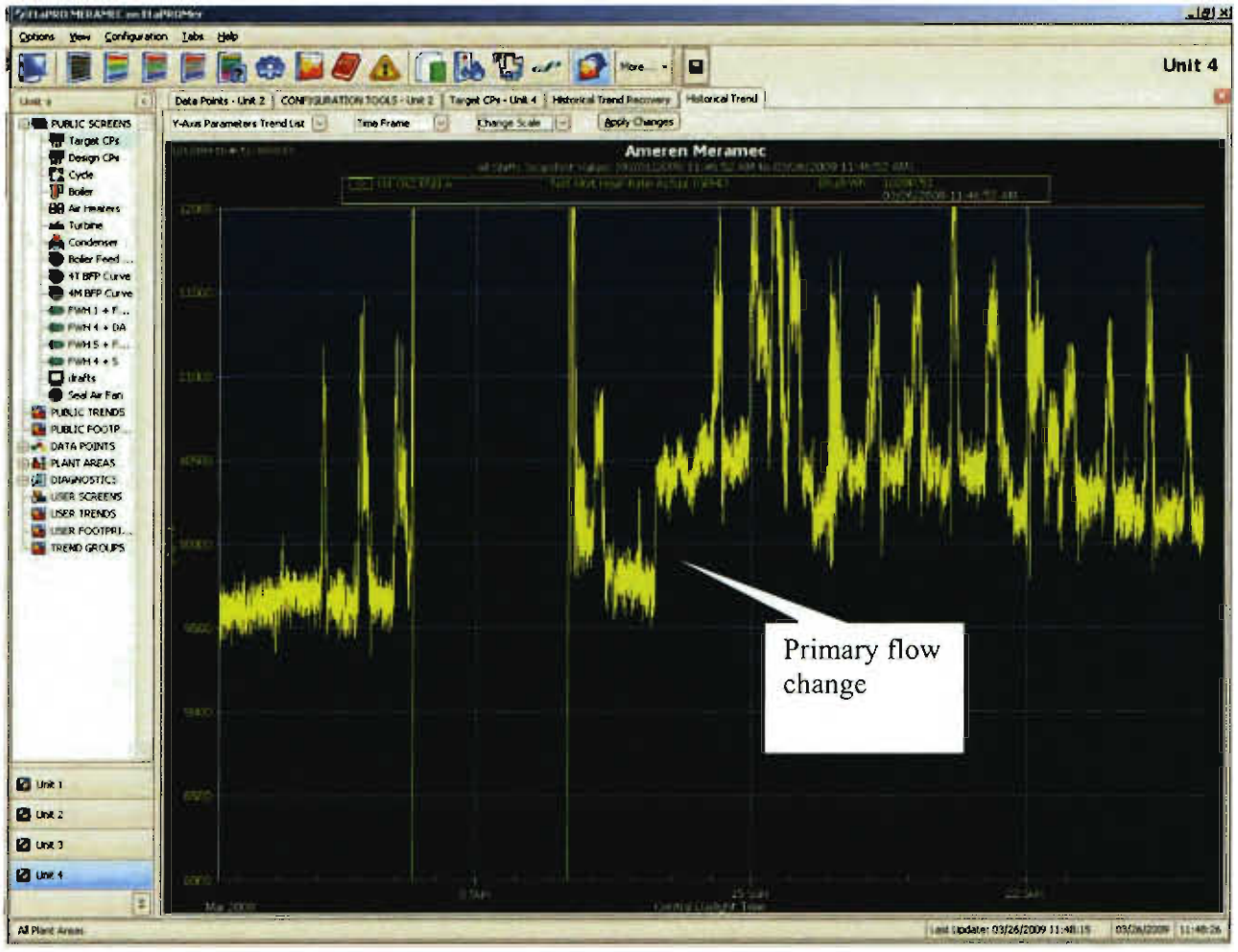
Unit 4

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 capability 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 Unit 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

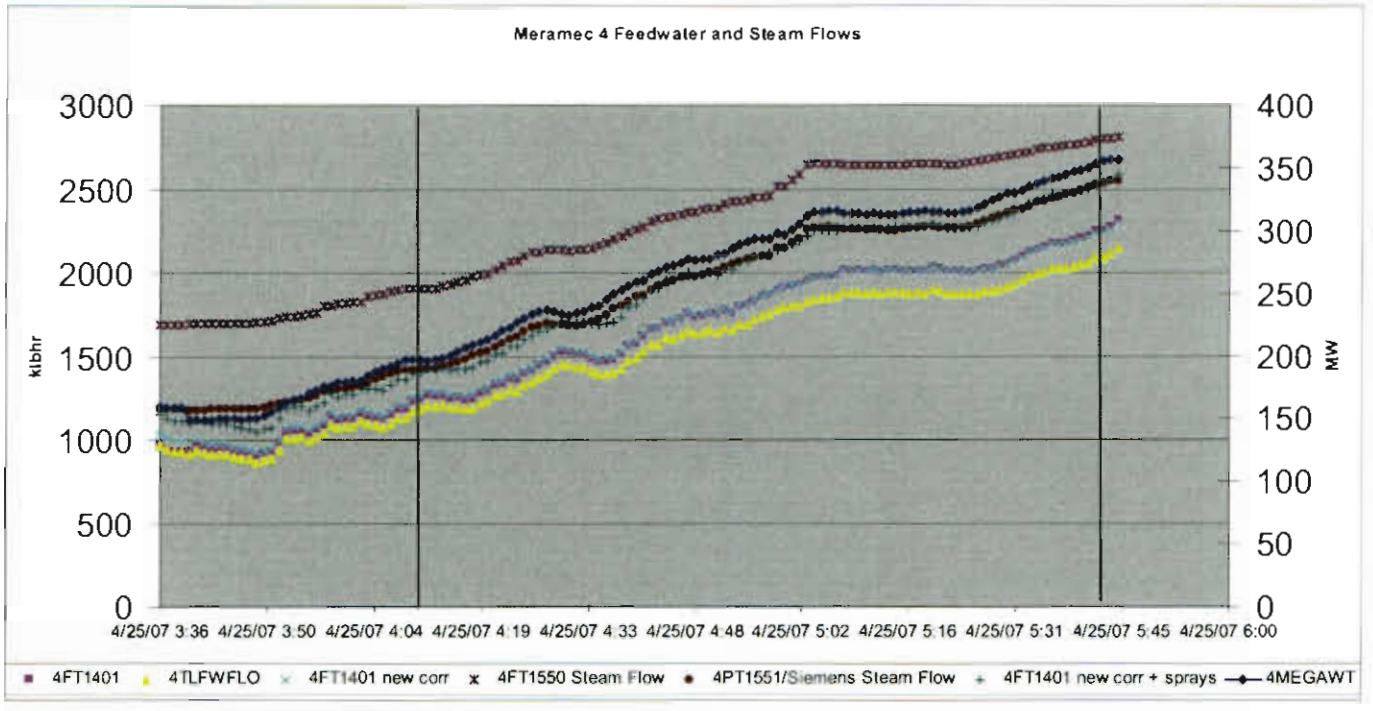
This is the first regular report following the initial demonstration in July's performance meeting. The report should not be considered in its final form for regular publication. Please advise on anything you think would be an improvement: presentation, content (additional content needed or content that 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:

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. Per Tim's request for suggestions

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:\Merarnec\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
Period
Full Load Performance
Hours of Data

		Oct-07	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08
		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

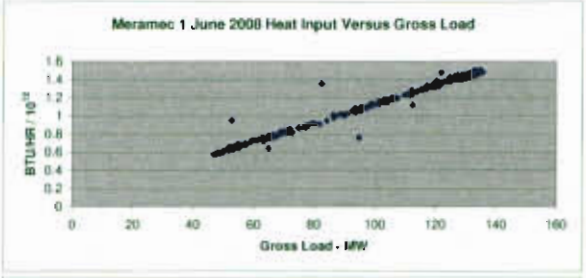
feedwater flow for heat rate calc. has not been validated

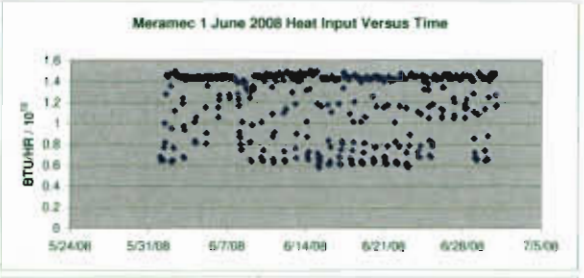
Summary of Performance Report for:

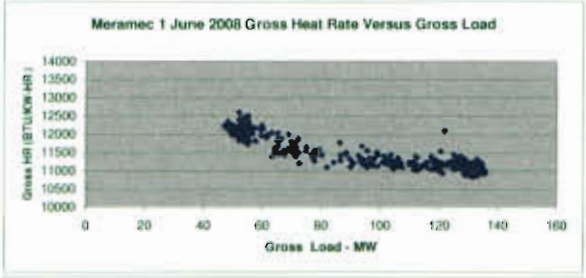
Plant	Meramec		
Unit	1		
Period	6/1/08	to	7/1/08

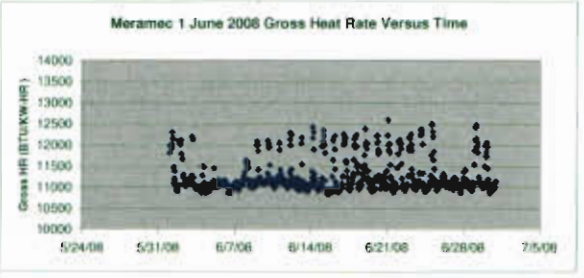
Full Load Performance

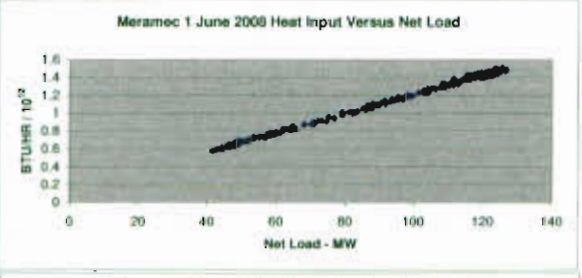
Hours of Data	465	
	Averages	
GENERATOR MEGAWATTS	130.9	MW
AUX POWER	8.9	MW
Net Unit Heat Rate Actual (GPHR)	11854.3	BTU/KW-HR
Boiler Efficiency Actual	85.2	%
CONTROL VALVE POSITION LVDT	100.0	%
FEEDWATER TEMP TO ECON	450.3	degF
FEEDWATER TEMP TO HTR 1	371.5	degF
HP Turbine Efficiency Actual	80.4	%
IP Turbine Efficiency Corrected	96.1	%
Condenser Pressure HP	2.8	inHga
AIR/HTR A GAS OUTLET TEMP	317.5	degF
AMBIENT AIR TEMP	82.0	degF
CIRC WTR TEMP TO LP CONDS	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

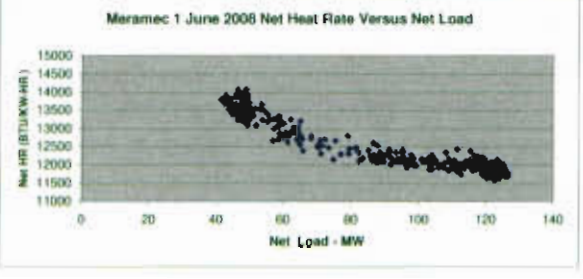


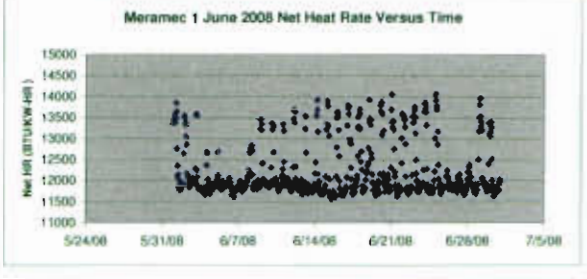












Meramec Unit 1 Rollup, June 2008

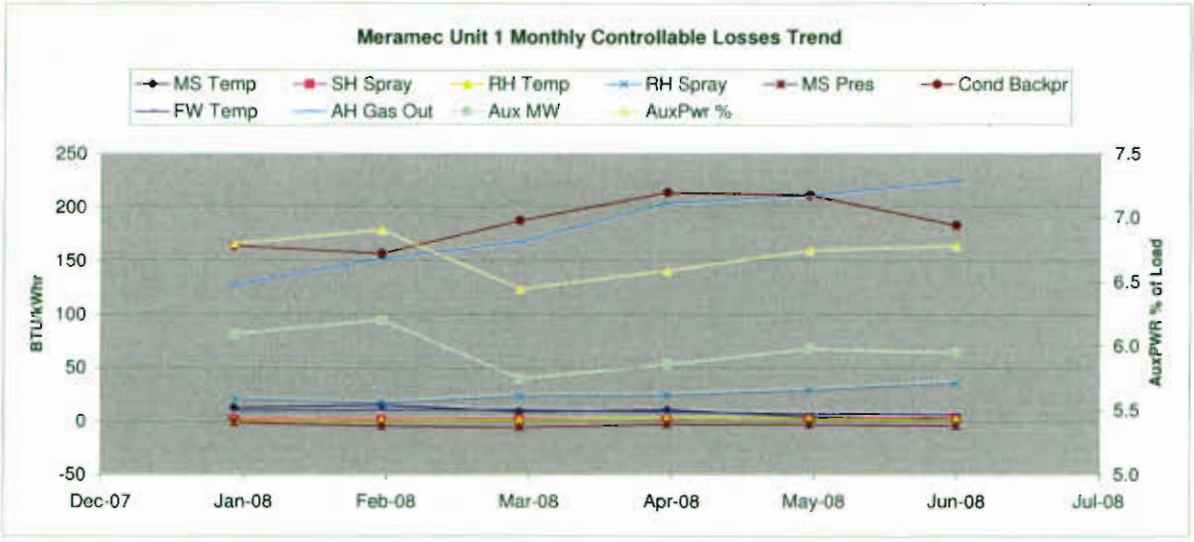
Notable Deviations in Plant Performance Data / Discussion Topics, etc.

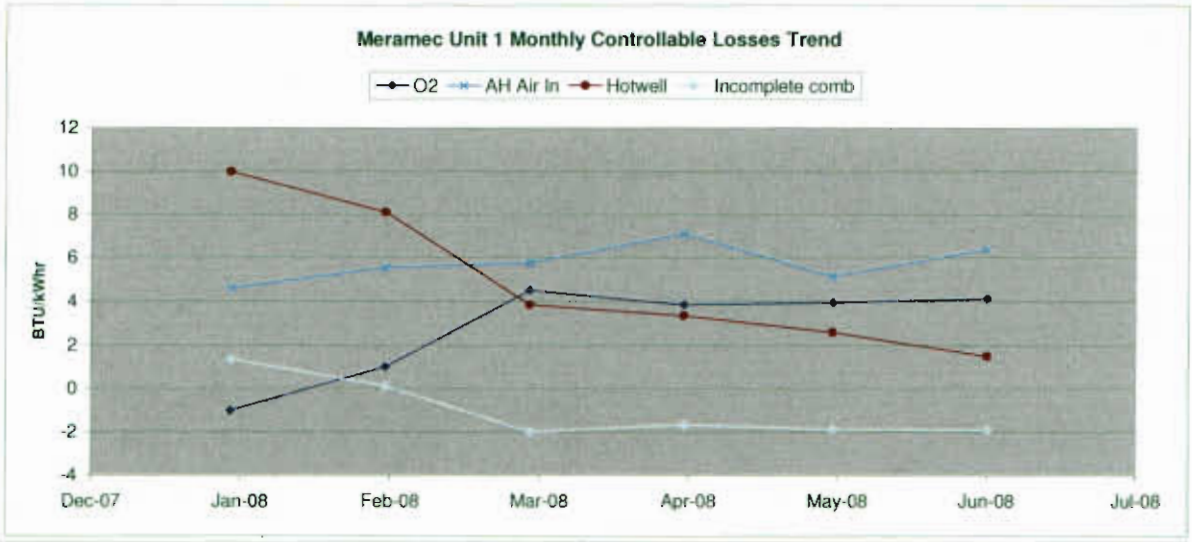
1 The controllable loss parameter target values need to updated to reflect current plant operation. The target values for all controllable loss parameters have been reviewed using actual 2007 unit data.

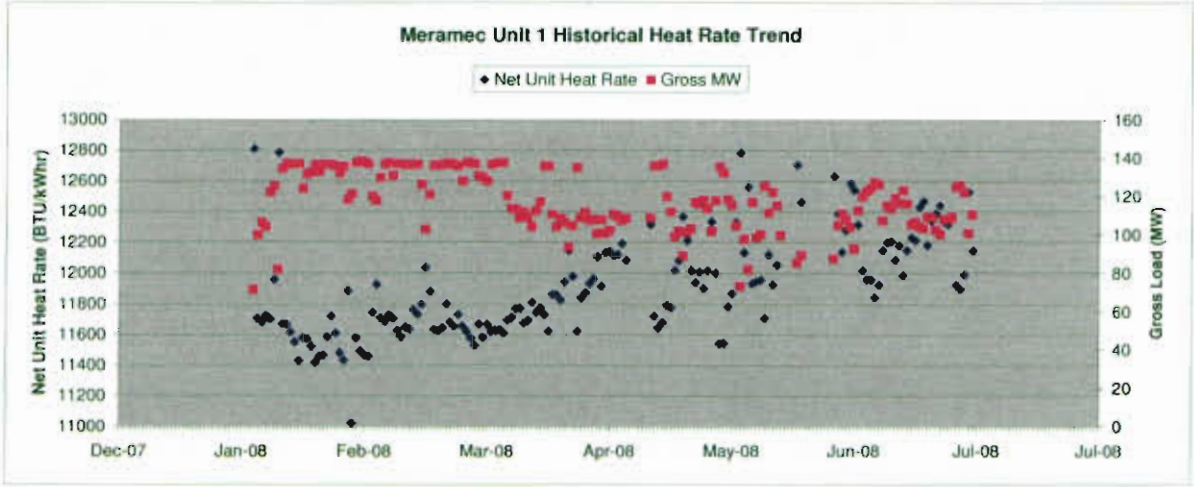
Top Priority Engineering Action Items	JR#	Priority	Resp Pty

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

Top Priority OPM/EtaPro Action Items	Priority	Resp Pty
Update targol 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

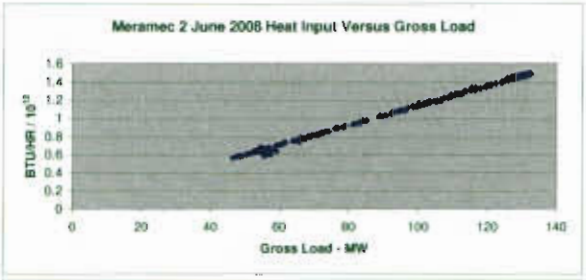
Meramec Unit 1 Rollup, June 2008 June-08
Overall Heat Rate & Losses Summary
1. The controllable loss parameter target values need to updated to reflect current plant operation.
Steam Generator Performance Summary:
No items noted
Steam Turbine Performance Summary:
No items noted
Condenser Performance 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:

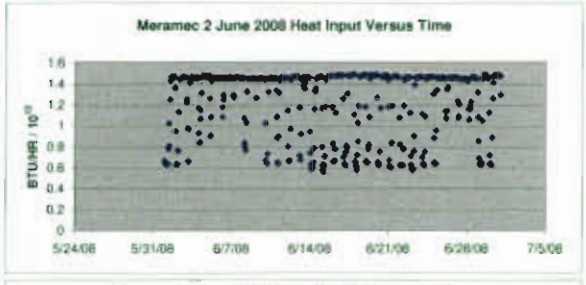
Summary of Performance Report for:

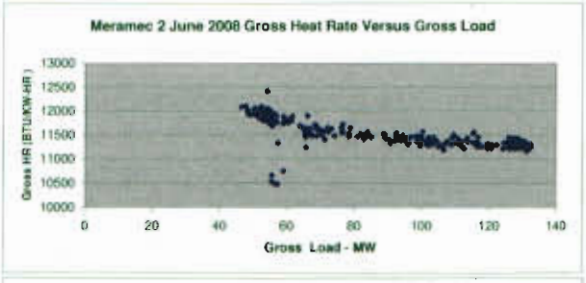
Plant	Meramec		
Unit	2		
Period	6/1/08	to	7/1/08

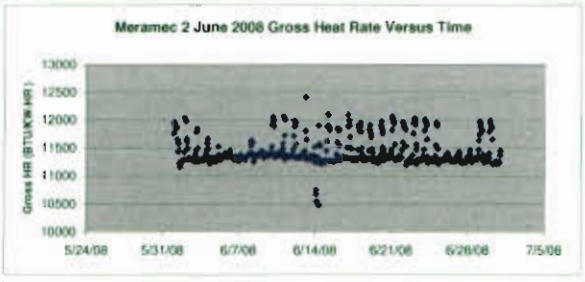
Full Load Performance
Hours of Data 481

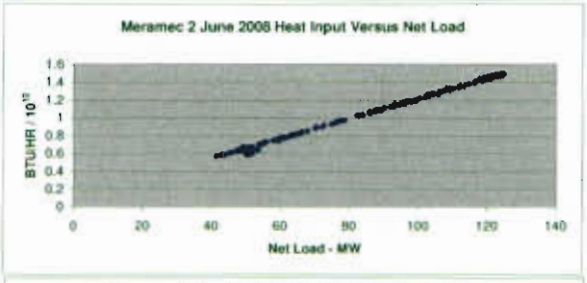
	Averages	
GENERATOR MEGAWATTS	129.6	MW
AUX POWER	7.7	MW
Net Unit Heat Rate Actual (GPHR)	12049.5	BTU/KW-HR
Boiler Efficiency Actual	84.4	%
CONTROL VALVE POSITION LVDT	-10.0	%
FEEDWATER TEMP TO ECON	452.8	degF
FEEDWATER TEMP TO HTR 1	370.4	degF
HP Turbine Efficiency Actual	80.3	%
IP Turbine Efficiency 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 CONDR	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 Est 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

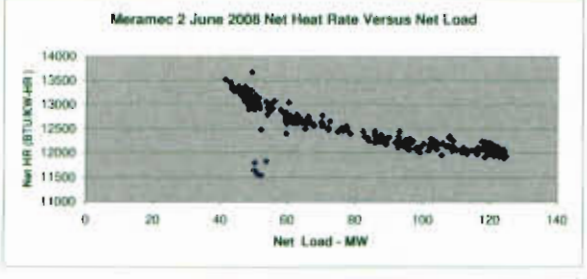


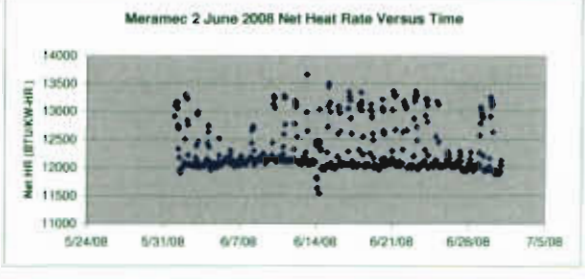












Meramec Unit 2 Rollup, June 2008

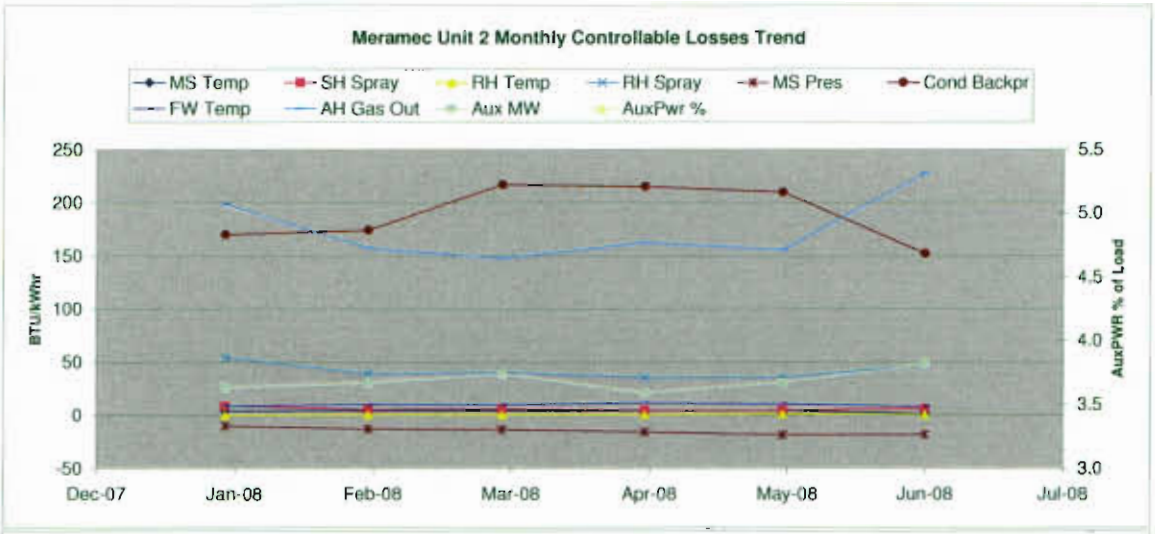
Notable Deviations in Plant Performance Data / Discussion Topics, etc.

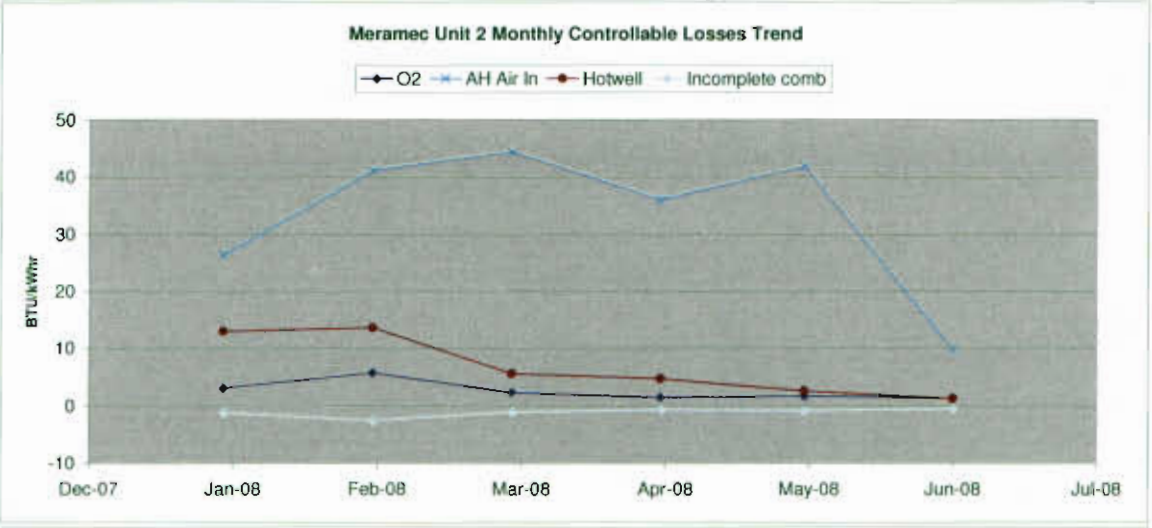
1. The controllable loss parameter target values need to updated to reflect current plant operation. The target values for all controllable loss parameters have been reviewed using actual 2007 unit data.

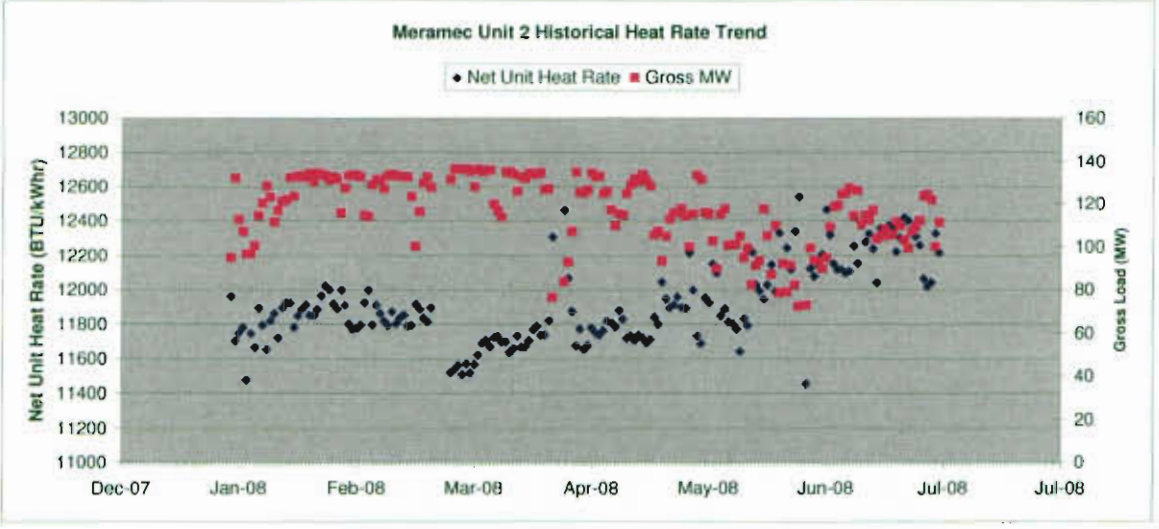
Top Priority Engineering Action Items	JR#	Priority	Resp Pty

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 CONDR	78.6	degF
Minimum River Temperature	78.5	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