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.

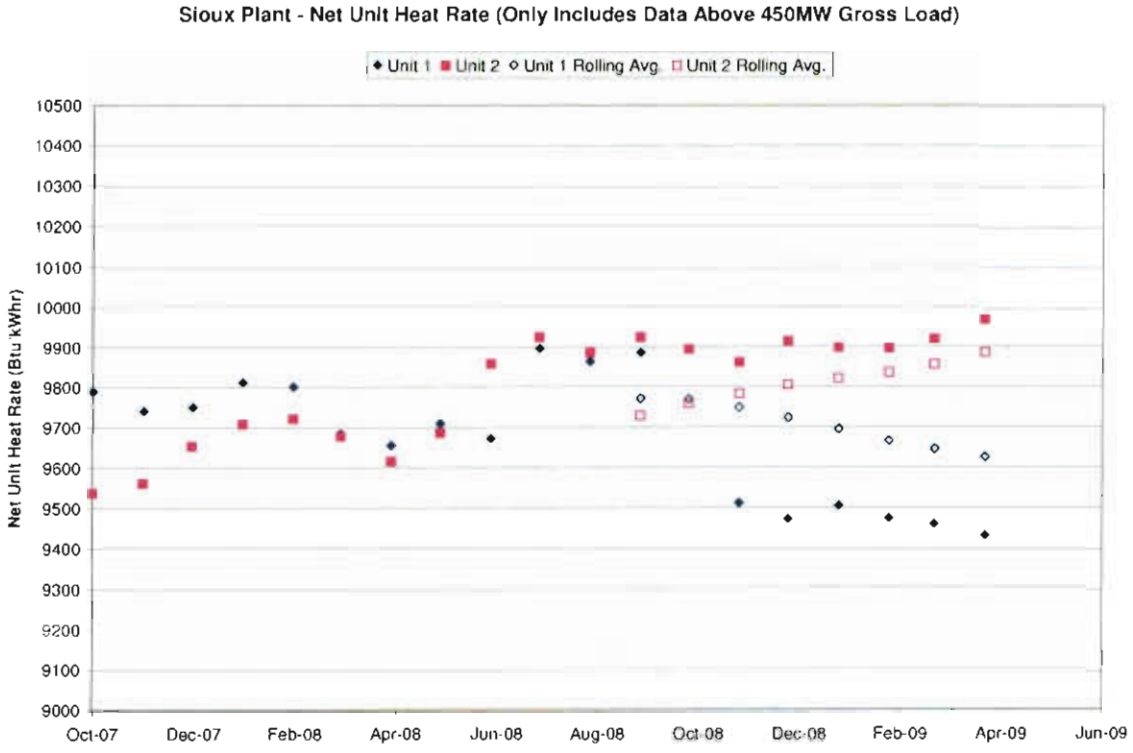


Fig. 1 Individual Unit Heat Rates

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

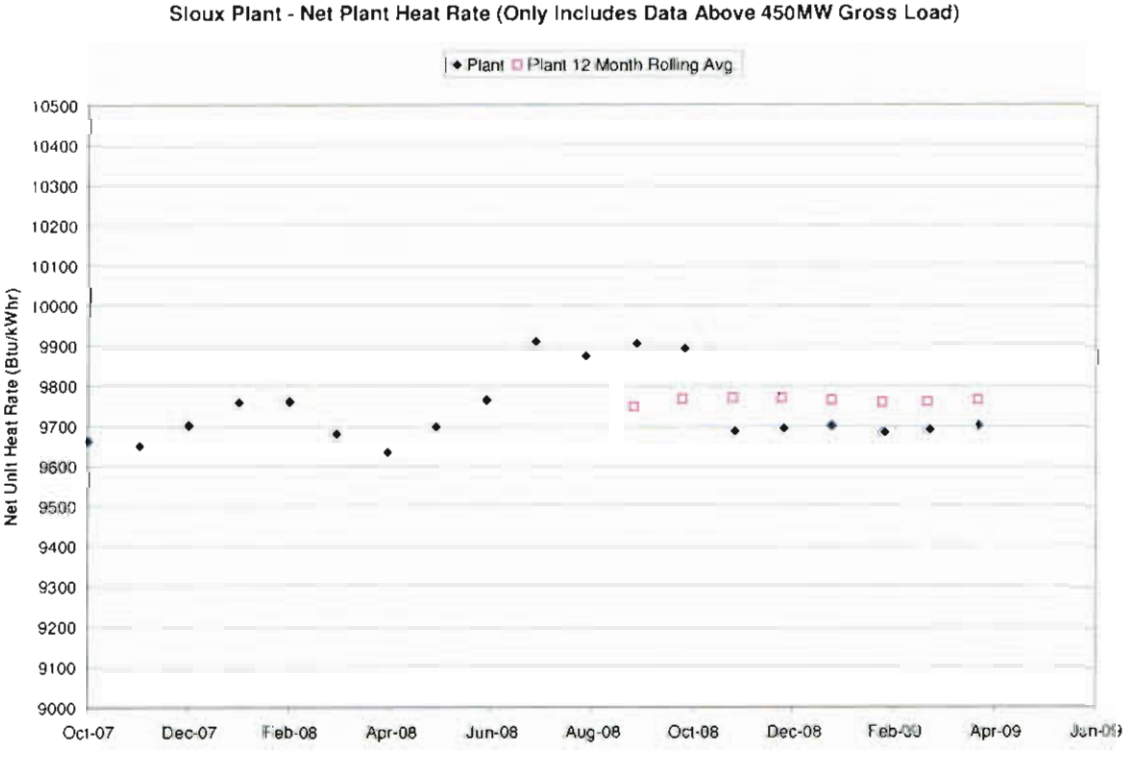


Fig 2. Plant Heat Rate

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.

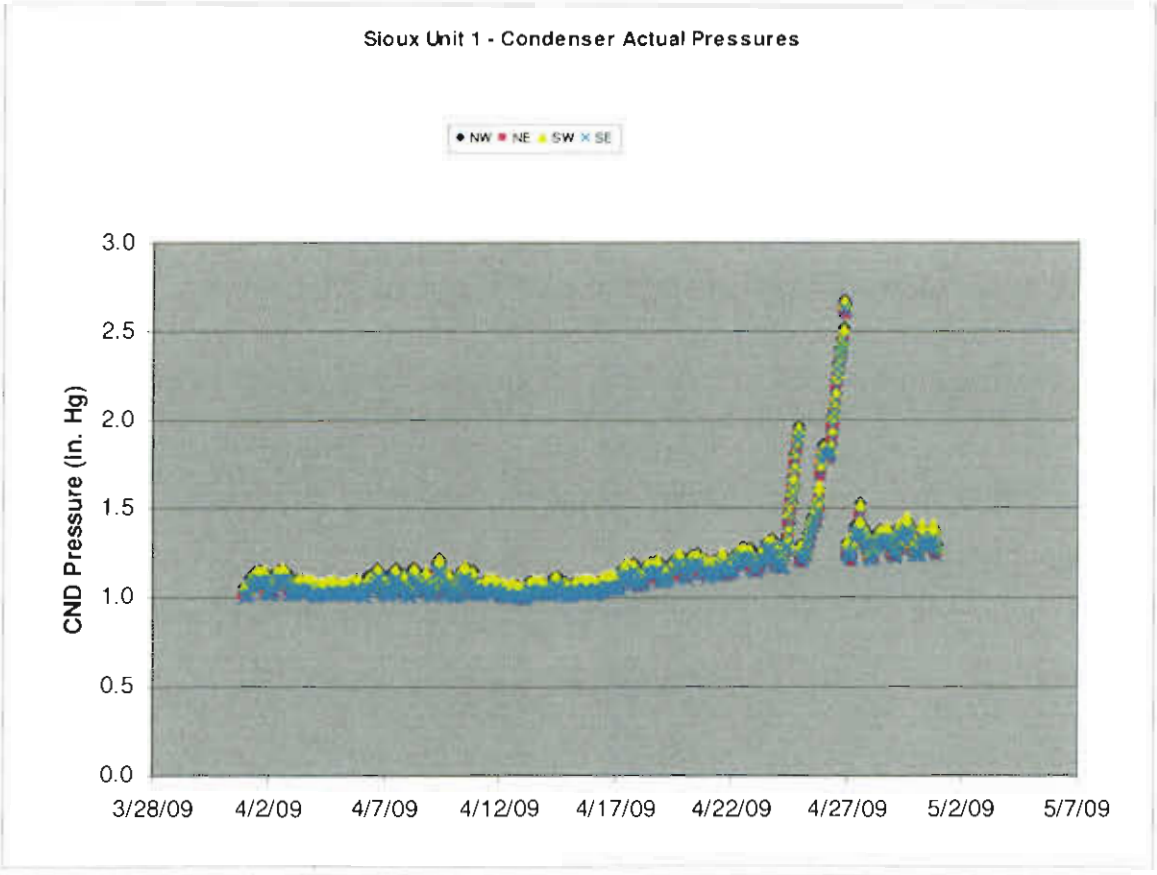
Unit 1

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.

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

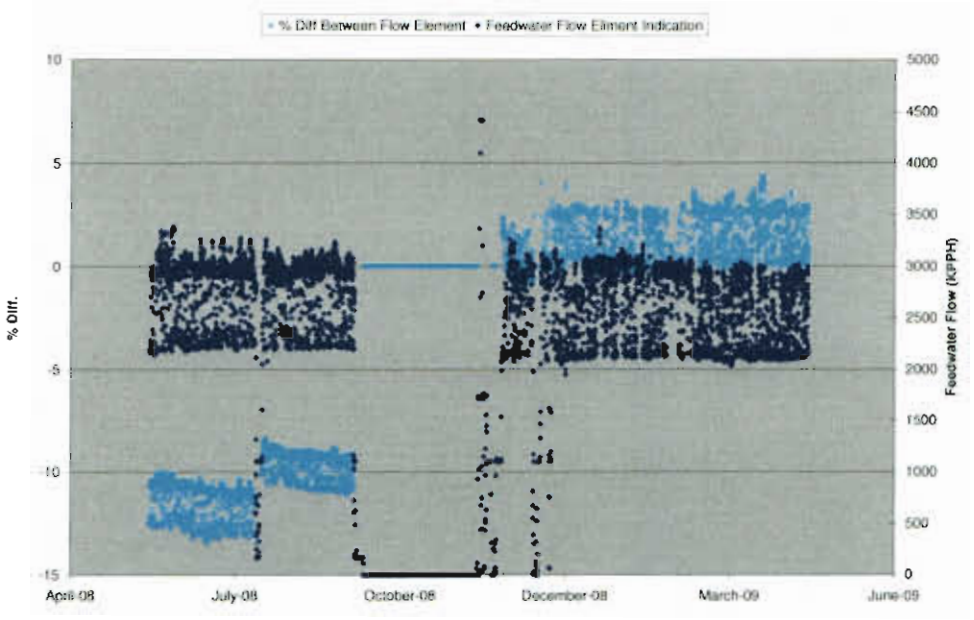
The following observations were made regarding Unit 2 operation and performance:

- 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.

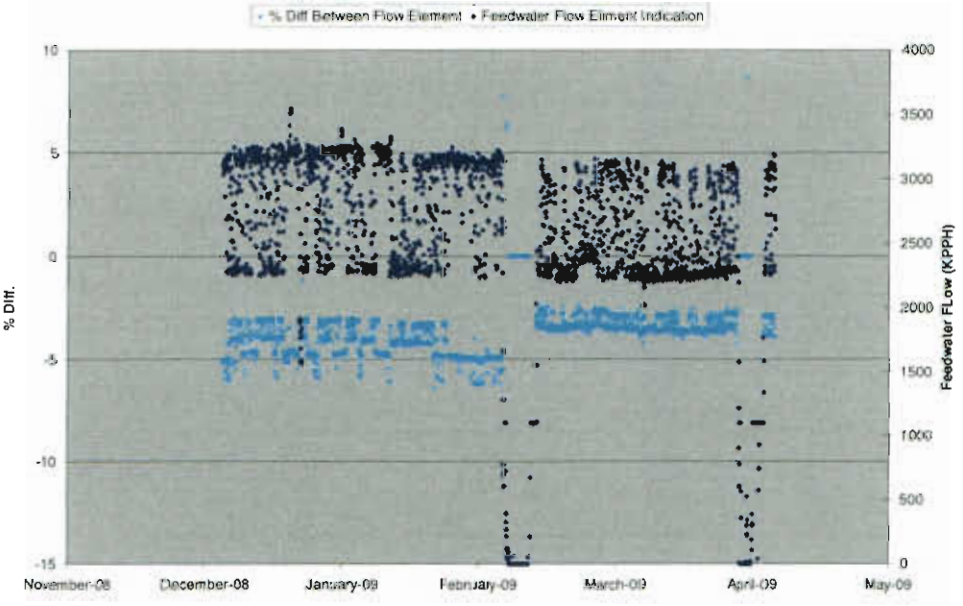
Summary of Performance Report for:

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

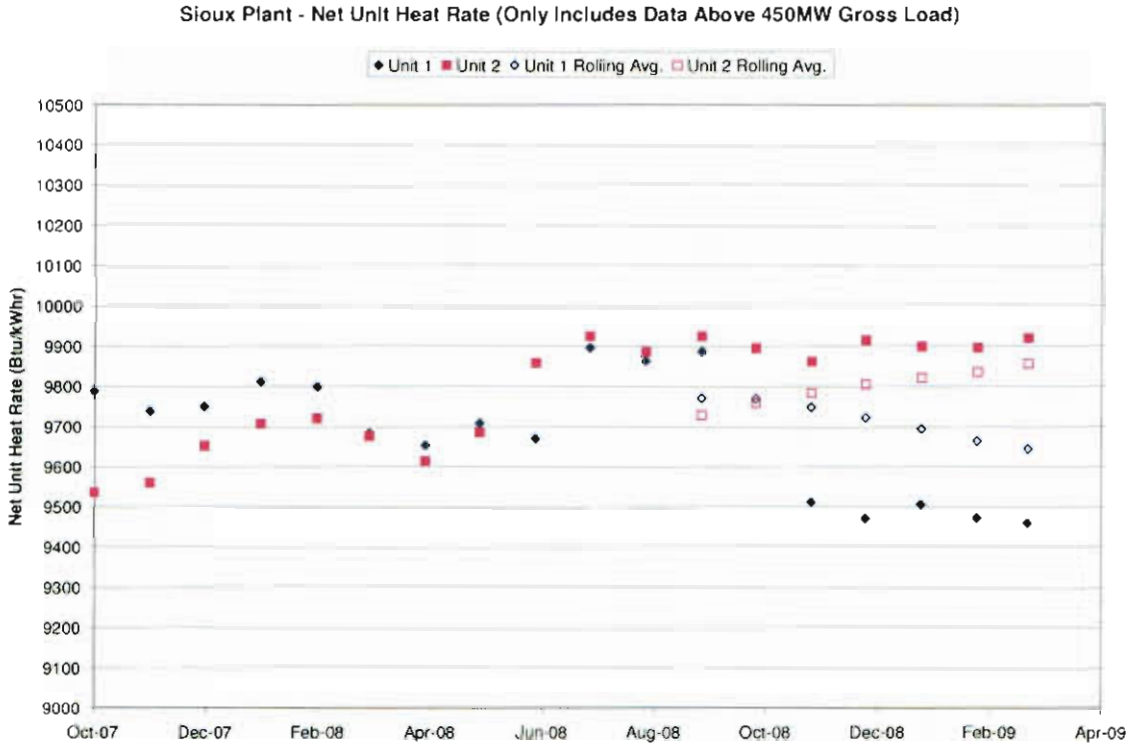
The most notable items regarding Sioux unit performance were:

- 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

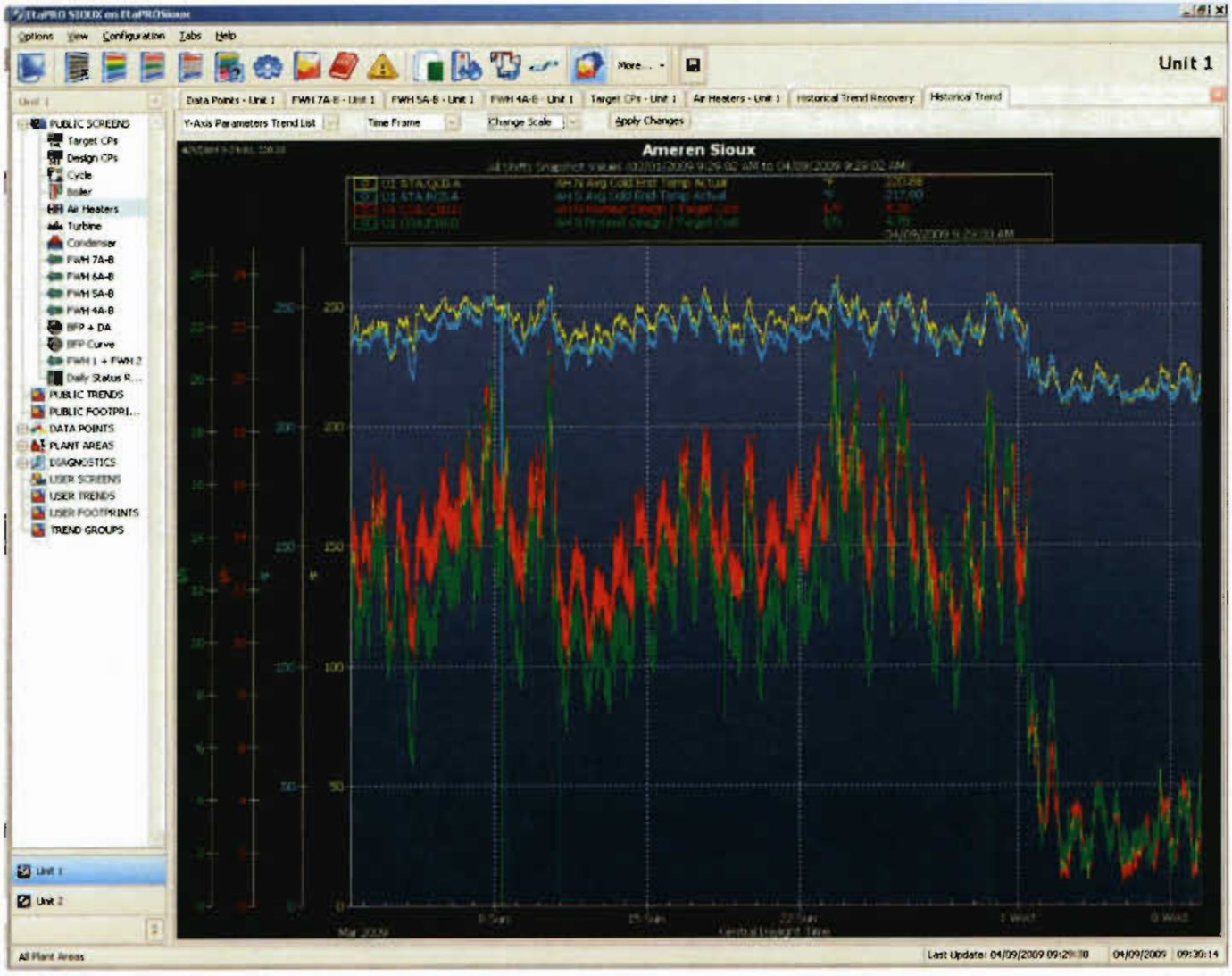
The following observations were made regarding Unit 1 operation and performance:

- 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

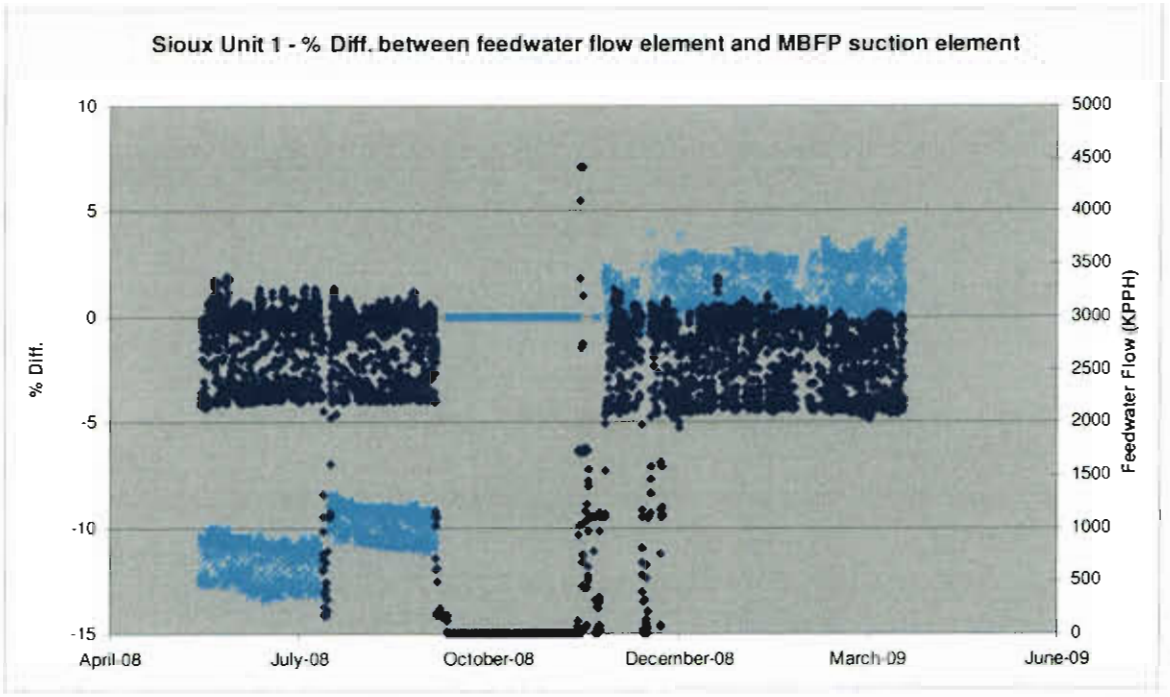
The following observations were made regarding Unit 2 operation and performance:

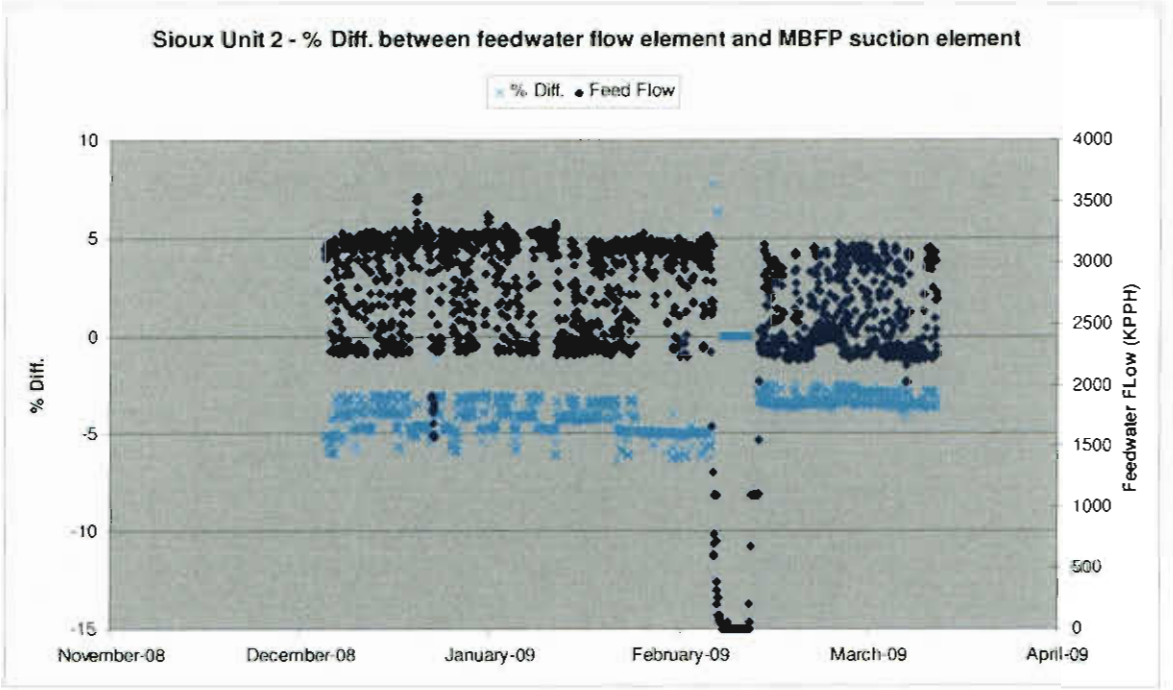
- The heat rate for Unit 2 is generally up from the prior year. For example, Unit 2's heat rate in January 2009 was almost 250 Btu/kWhr higher than in March 2008. Performance engineering has action to investigate further and determine the cause of the increasing trend in heat rate on the units. In comparing 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:

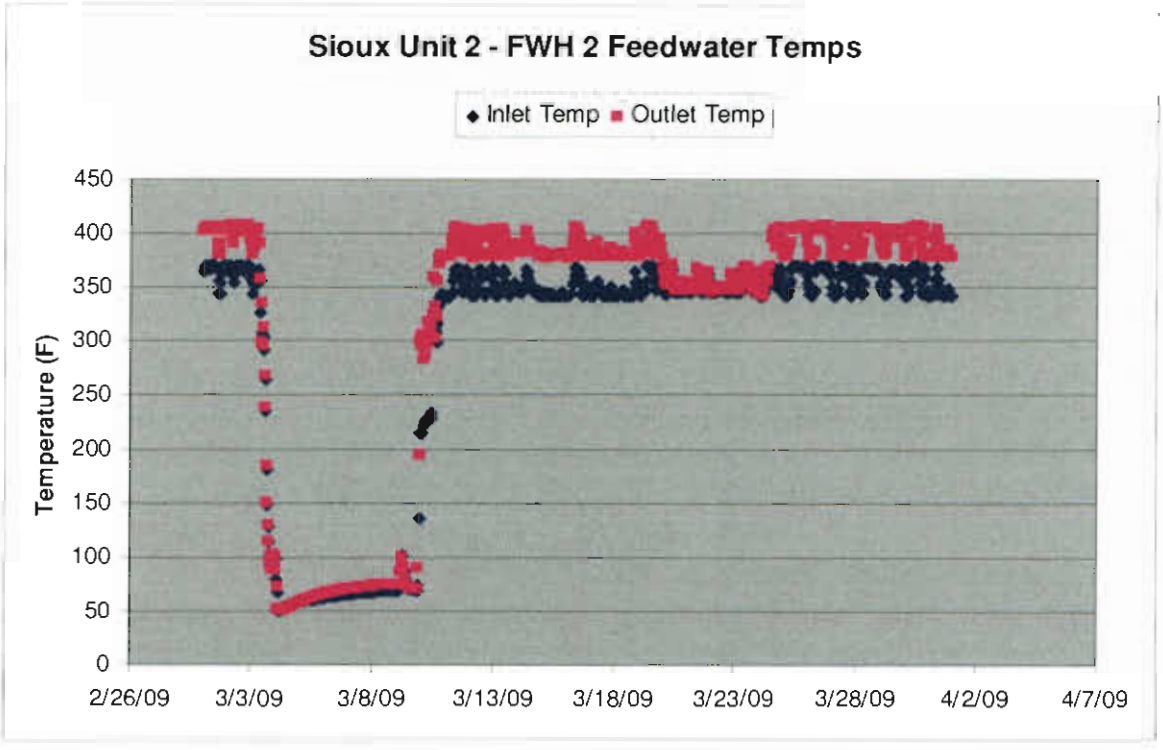
Plant	Sioux					
Unit	2					
Period	3/1/09	to	4/1/09			
Full Load Performance			Mar-09		Feb-09	Mar-08
Hours of Data (Gross load>450 MW)			148		370	386
			Averages		Averages	Averages
GENERATOR MEGAWATTS	MW		467.1		472.5	459.1
AUX POWER	MW		27.2		27.2	25.2
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9920.3		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			

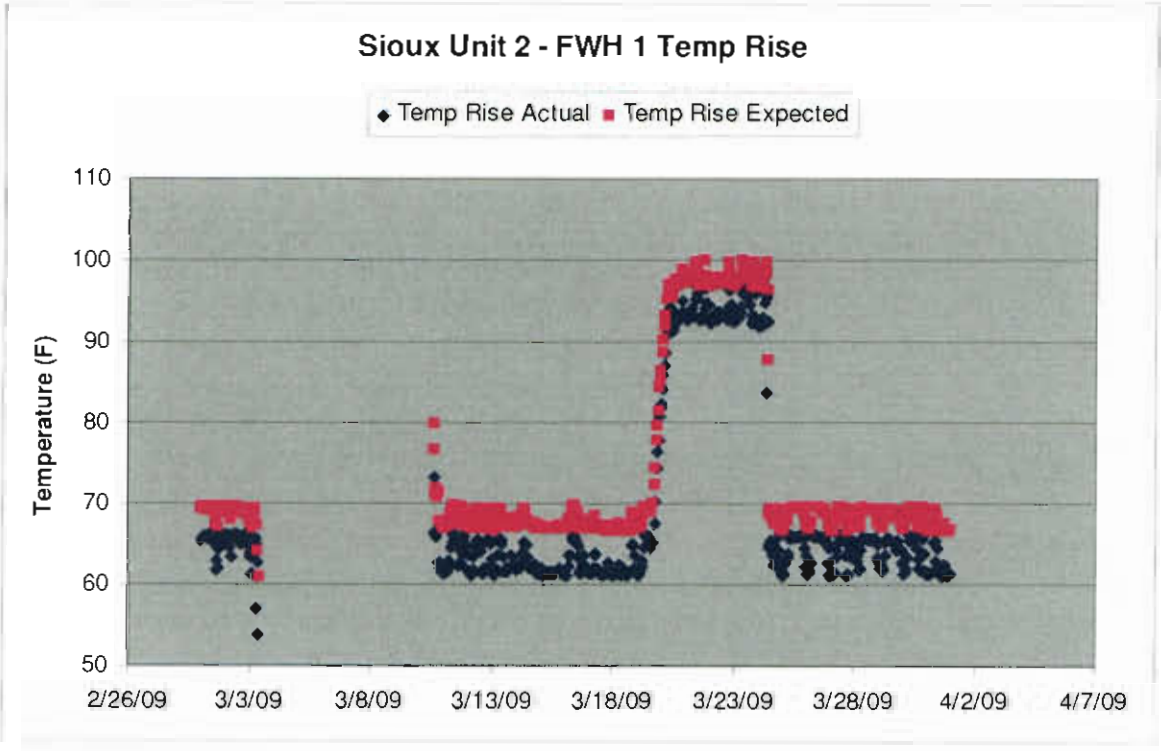
Most parameters in March were very consistent with the values from February.





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

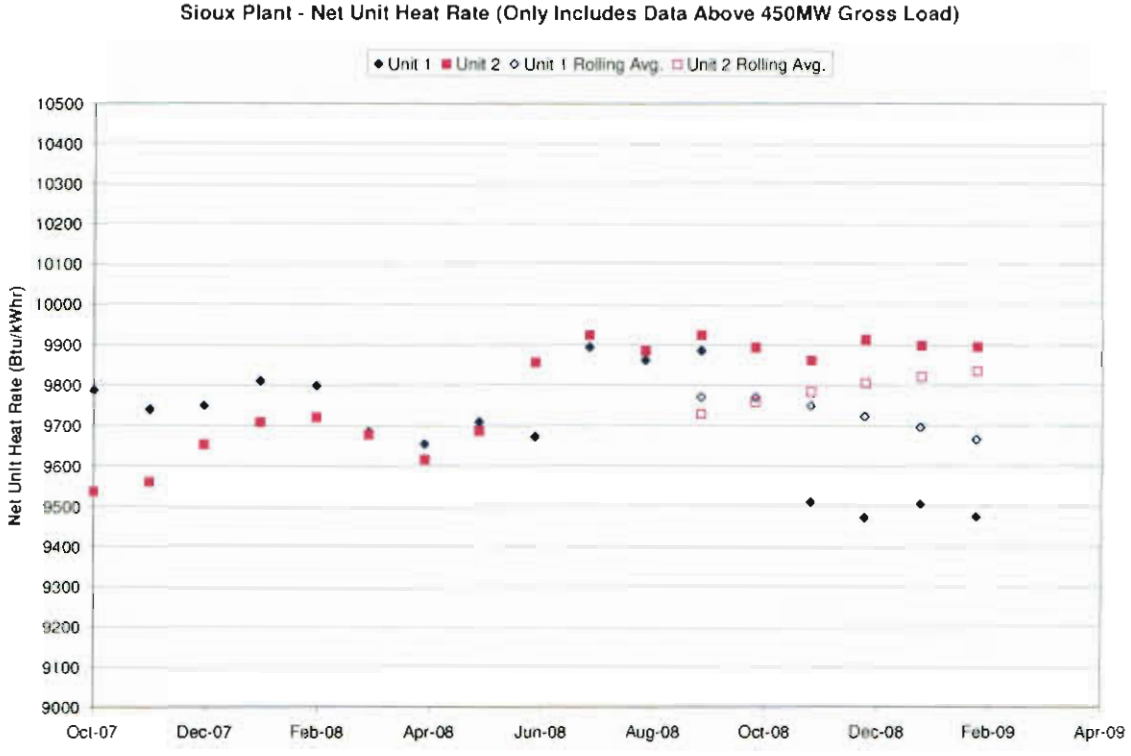
The most notable items regarding Sioux unit performance were:

- 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

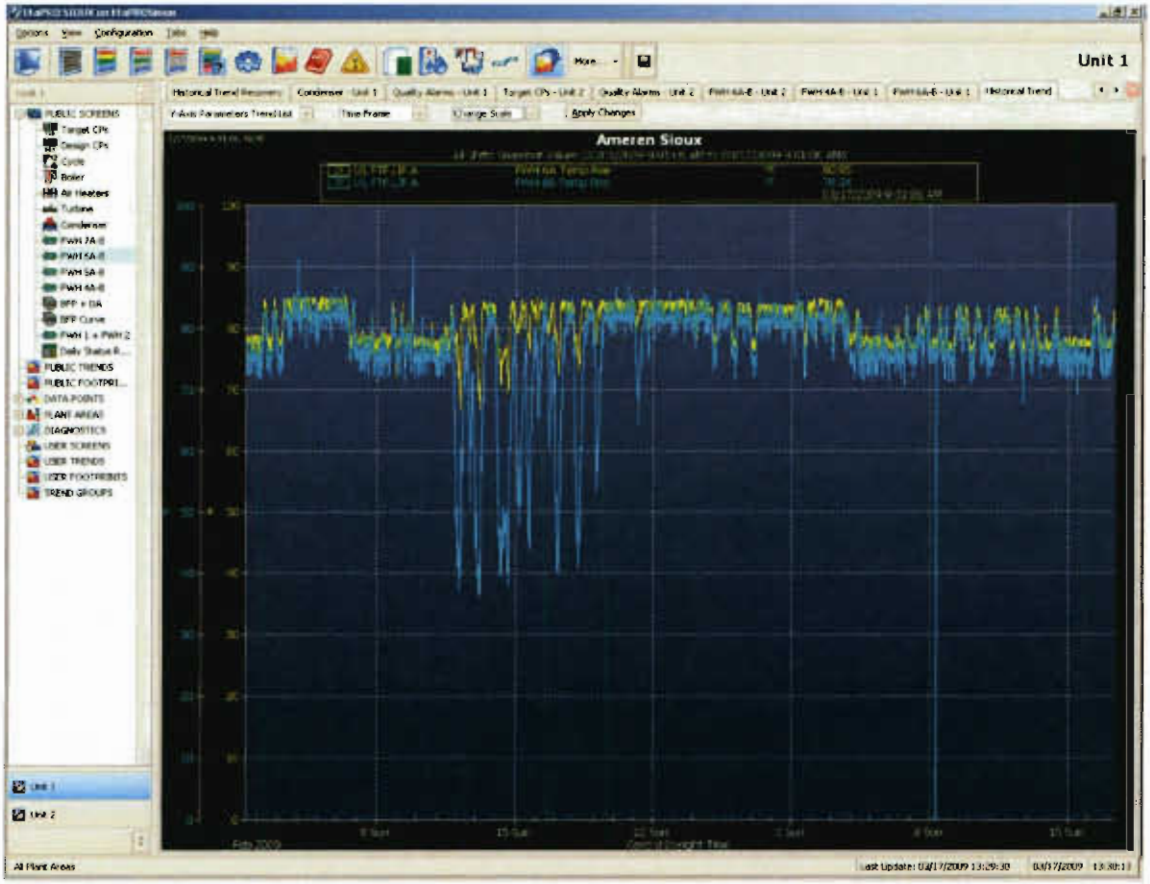
The following observations were made regarding Unit 1 operation and performance:

- 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).

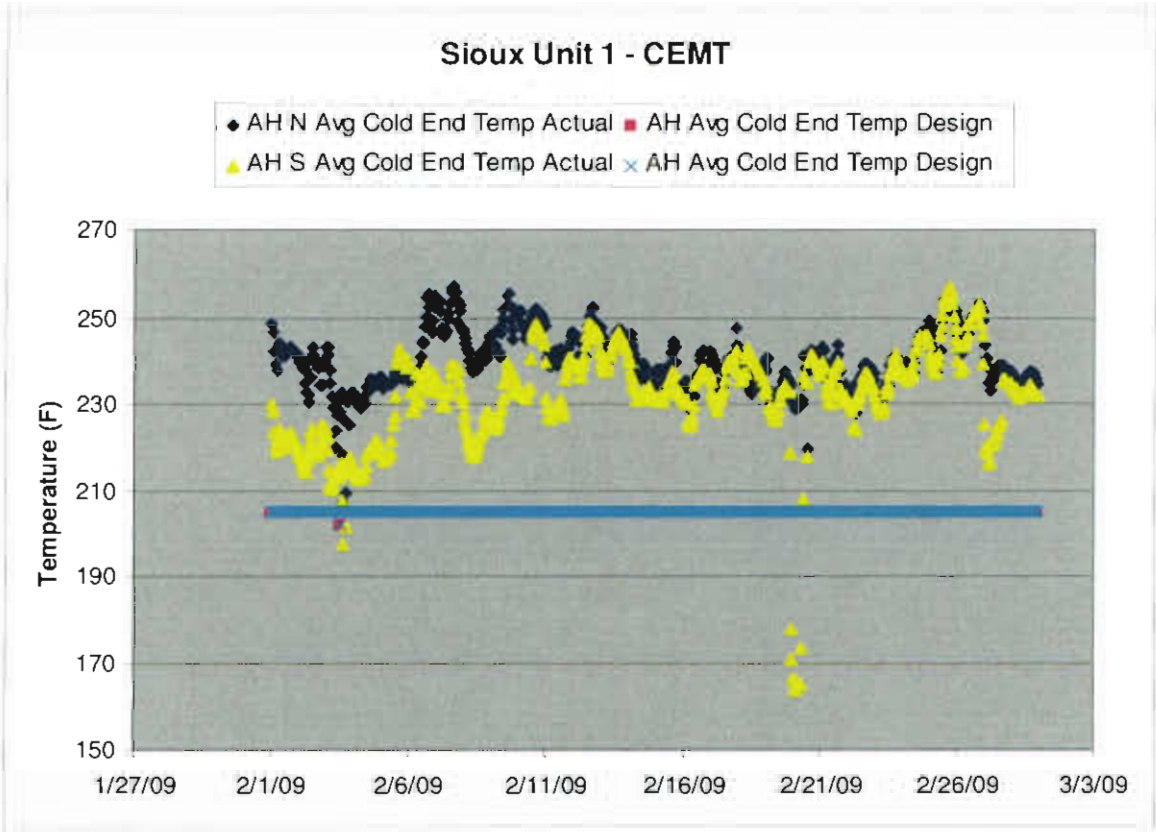
Summary of Performance Report for:

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

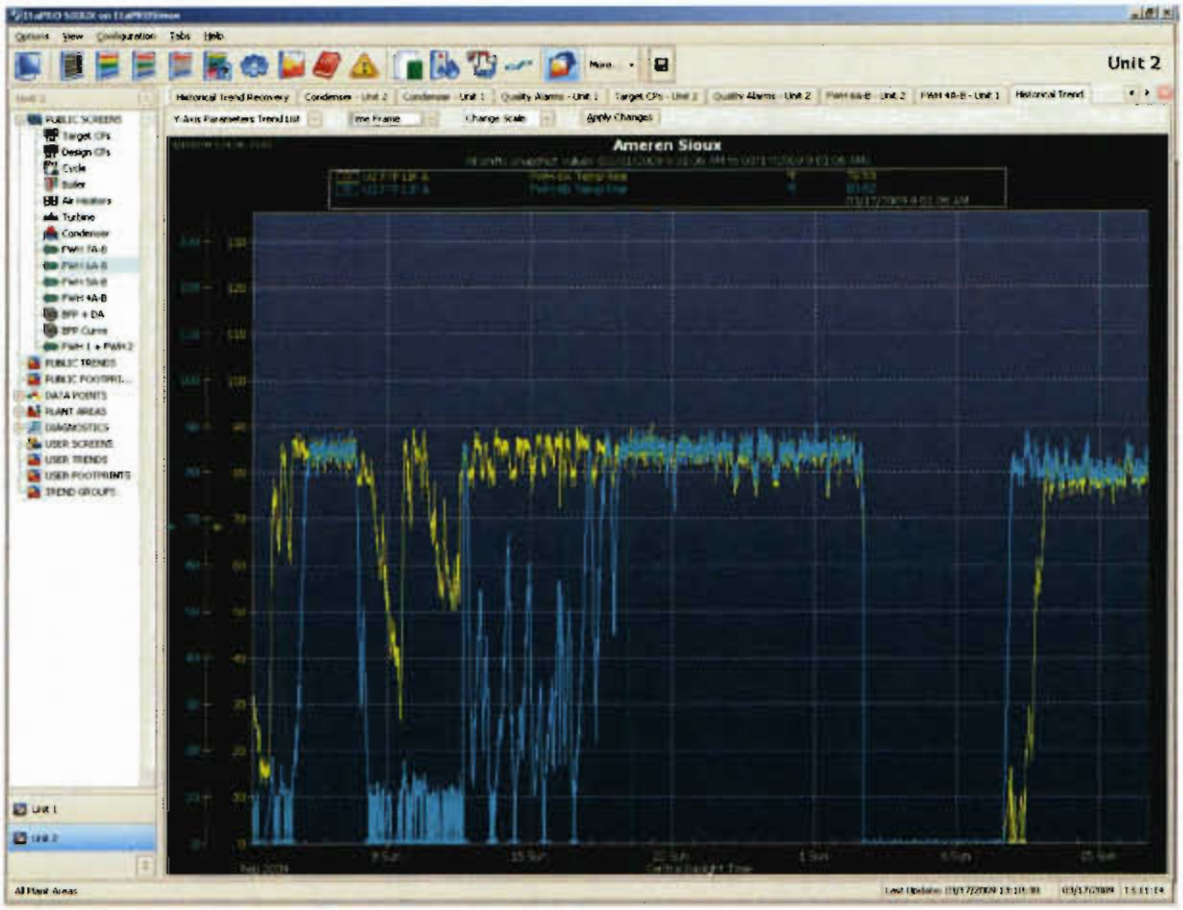
The following observations were made regarding Unit 2 operation and performance:

- 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.

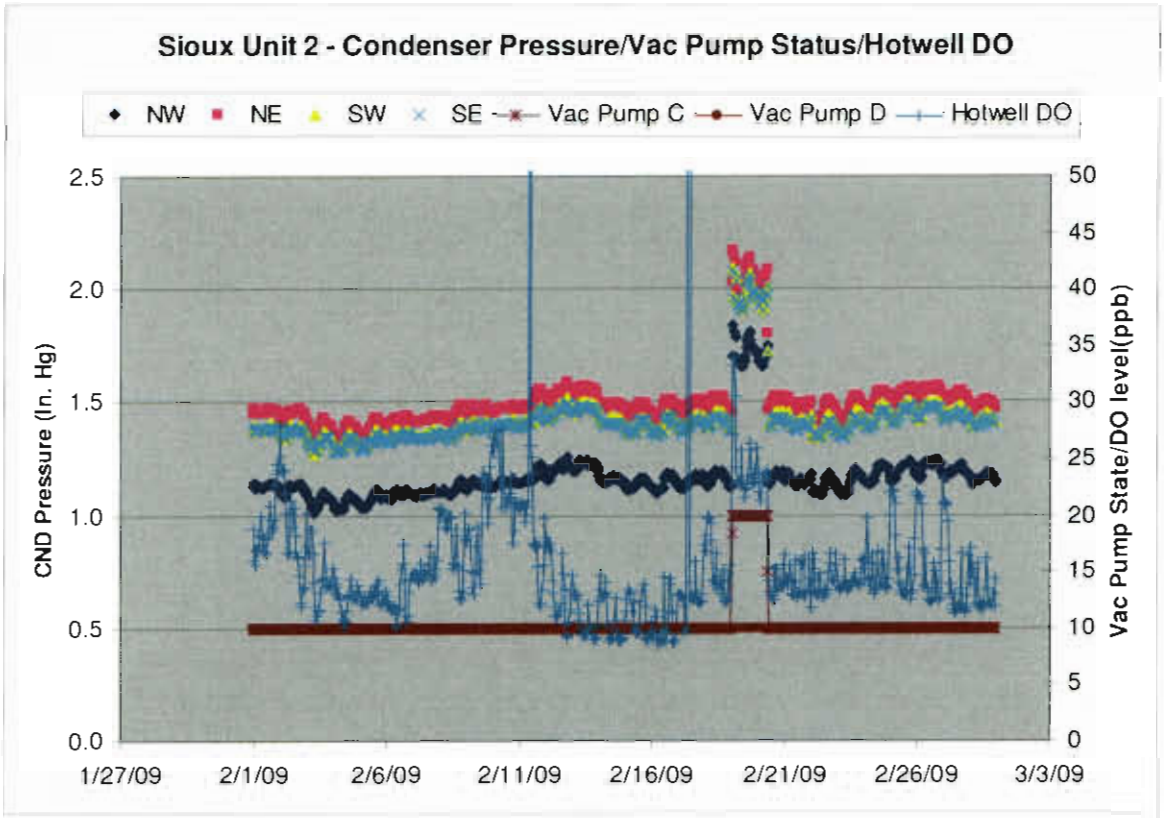
Summary of Performance Report for:

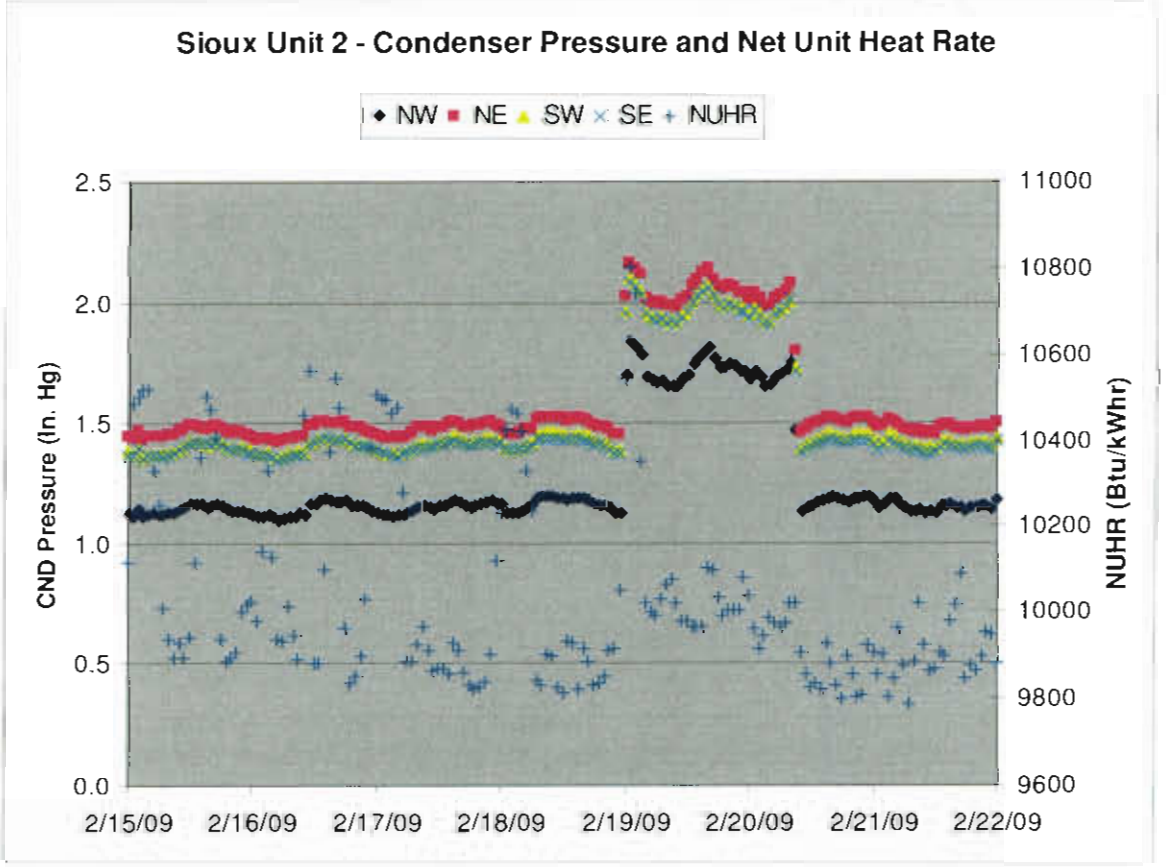
Plant	Sioux					
Unit	2					
Period	2/1/09	to	3/1/09			
Full Load Performance			Feb-09		Jan-09	Feb-08
Hours of Data (Gross load>450 MW)			370		410	323
			Averages		Averages	Averages
GENERATOR MEGAWATTS	MW		472.5		477.6	468.6
AUX POWER	MW		27.2		27.2	25.6
Net Unit Heat Rate Actual (GPHI)	BTU/KW-HR		9896.4		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

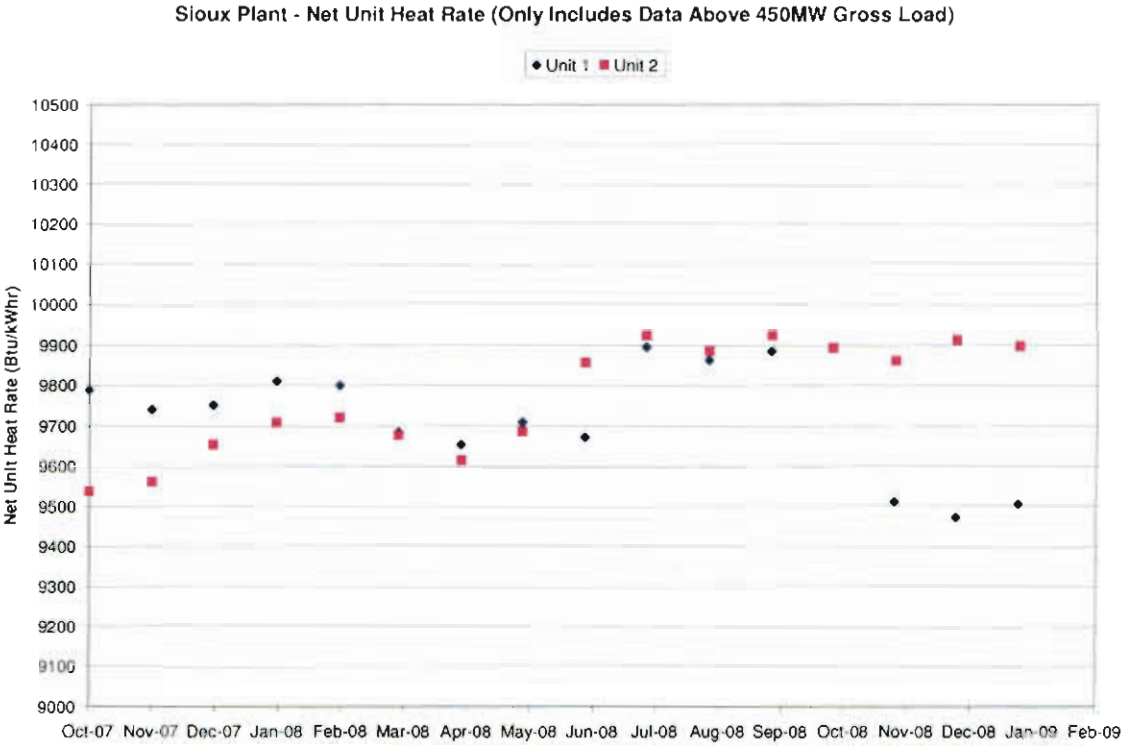
The most notable items regarding Sioux unit performance were:

- 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:

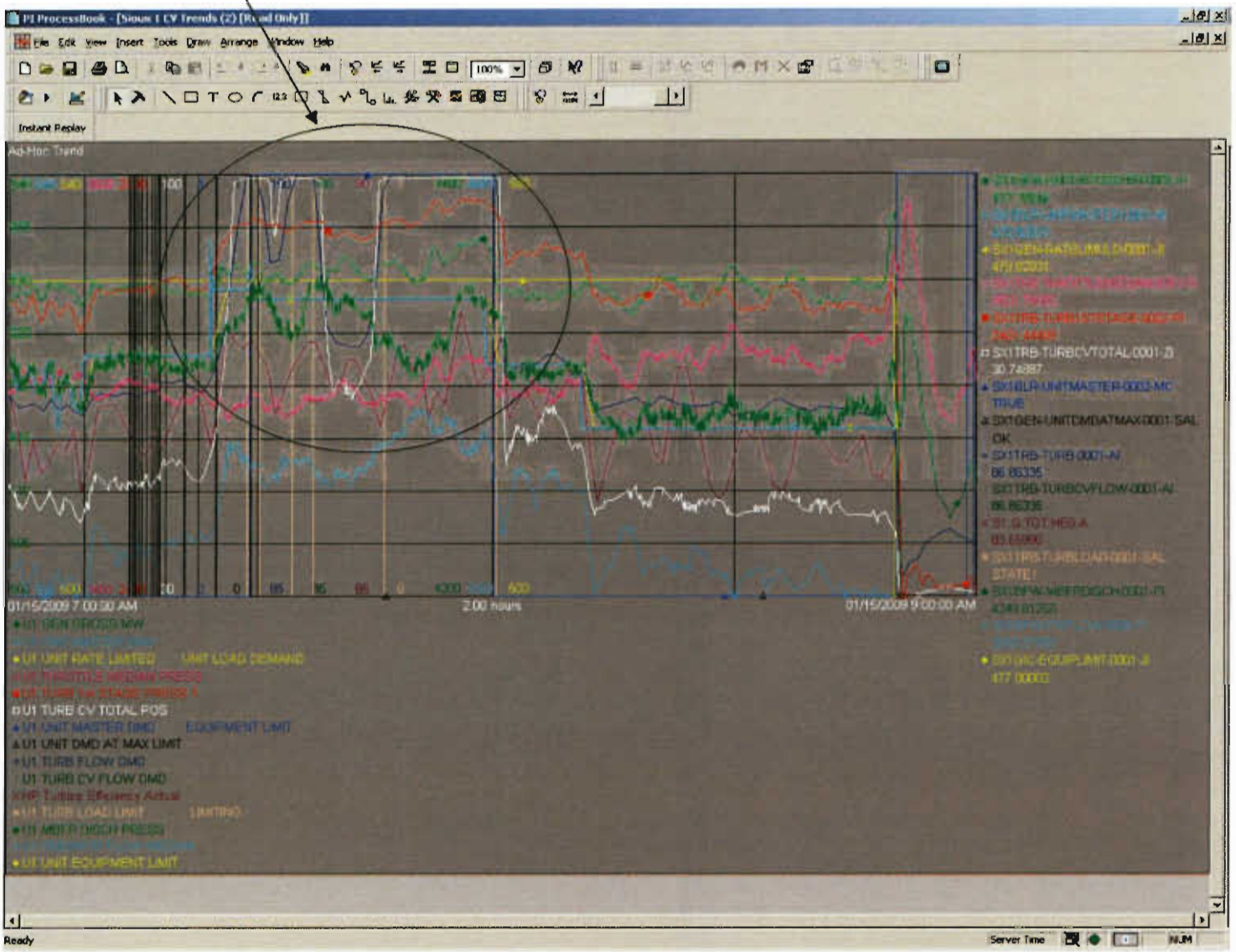
- The condenser air in-leakage monitor was restored in mid-December. Air in-leakage was first observed to be about 80 SCFM and has drifted down to just above 60 scfm at the end of January. Does Sioux have a value to which they try to maintain condenser air in-leakage? HEI recommends a value of less than 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



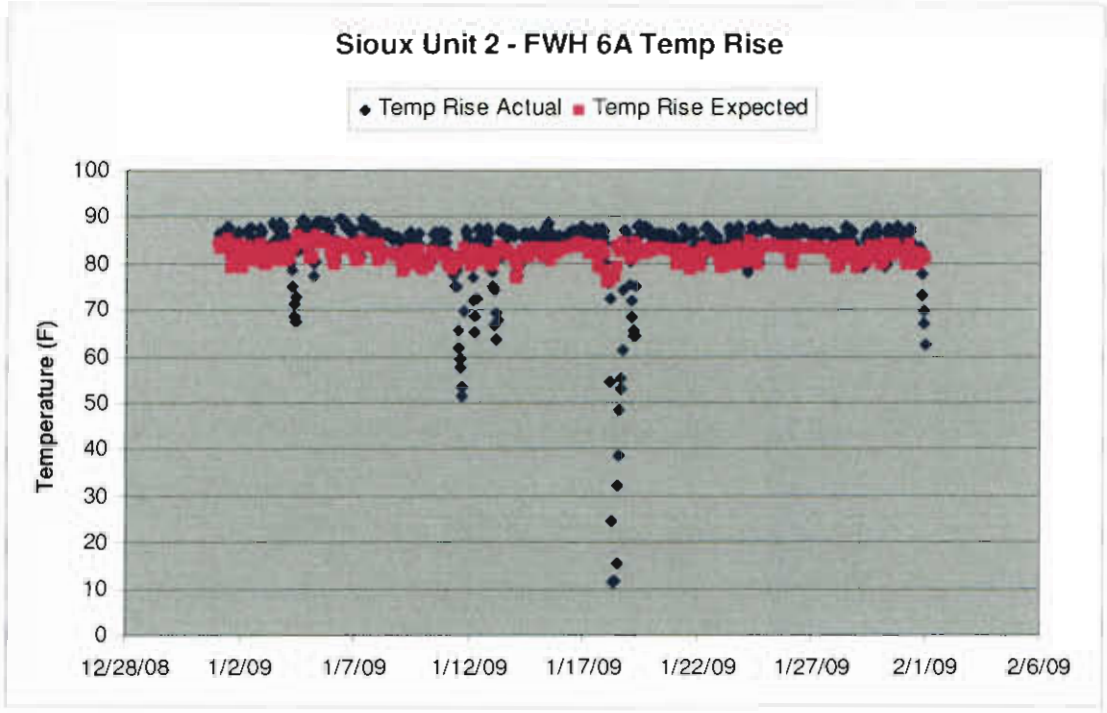
Unit 2

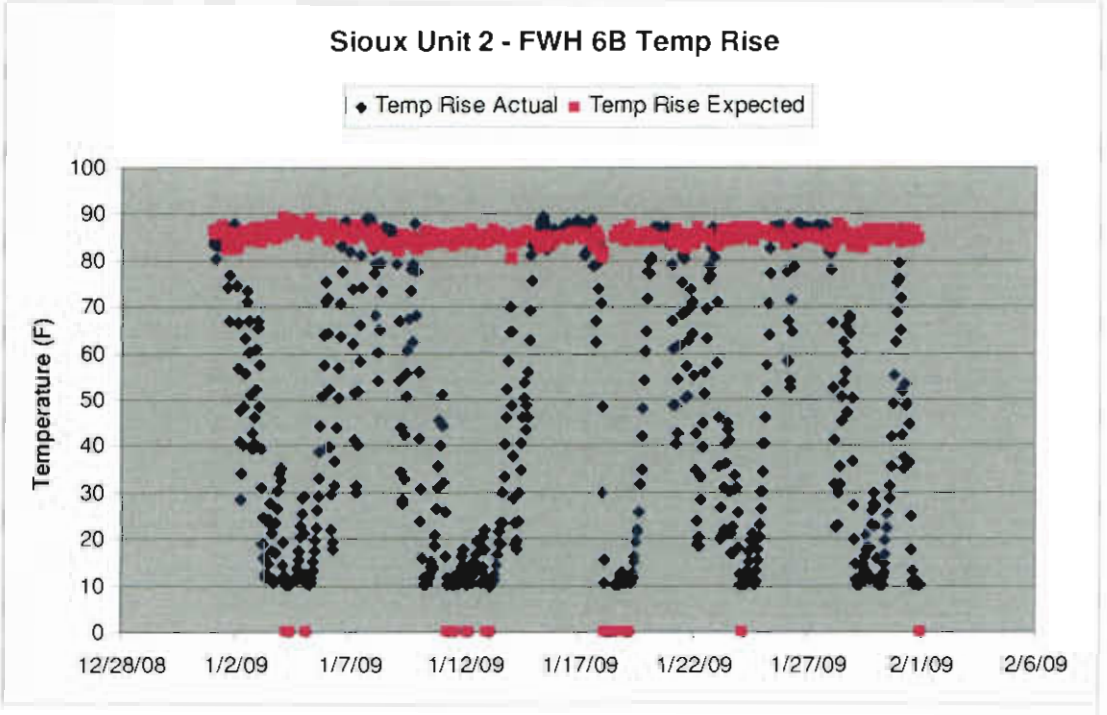
The following observations were made regarding Unit 2 operation and performance:

- 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.

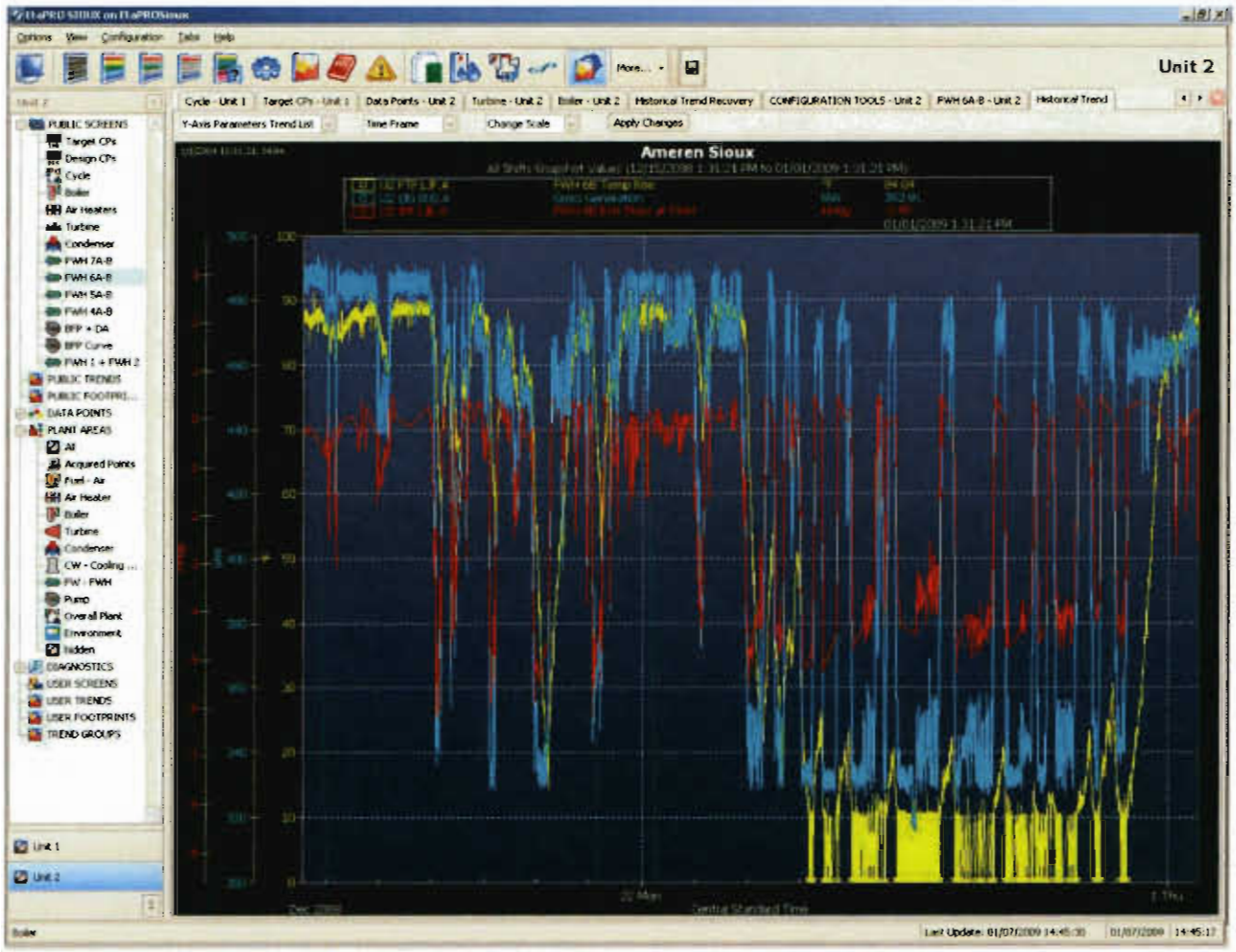
Summary of Performance Report for:

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

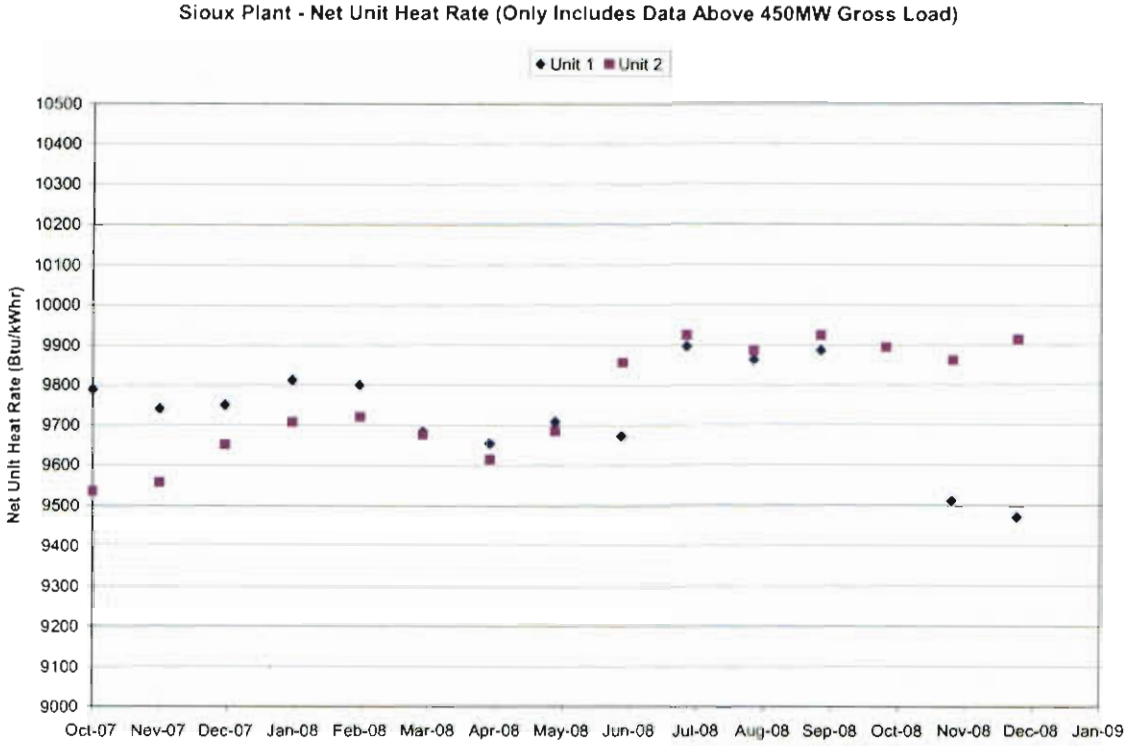
The following table shows the known instrument deficiencies for both units:

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

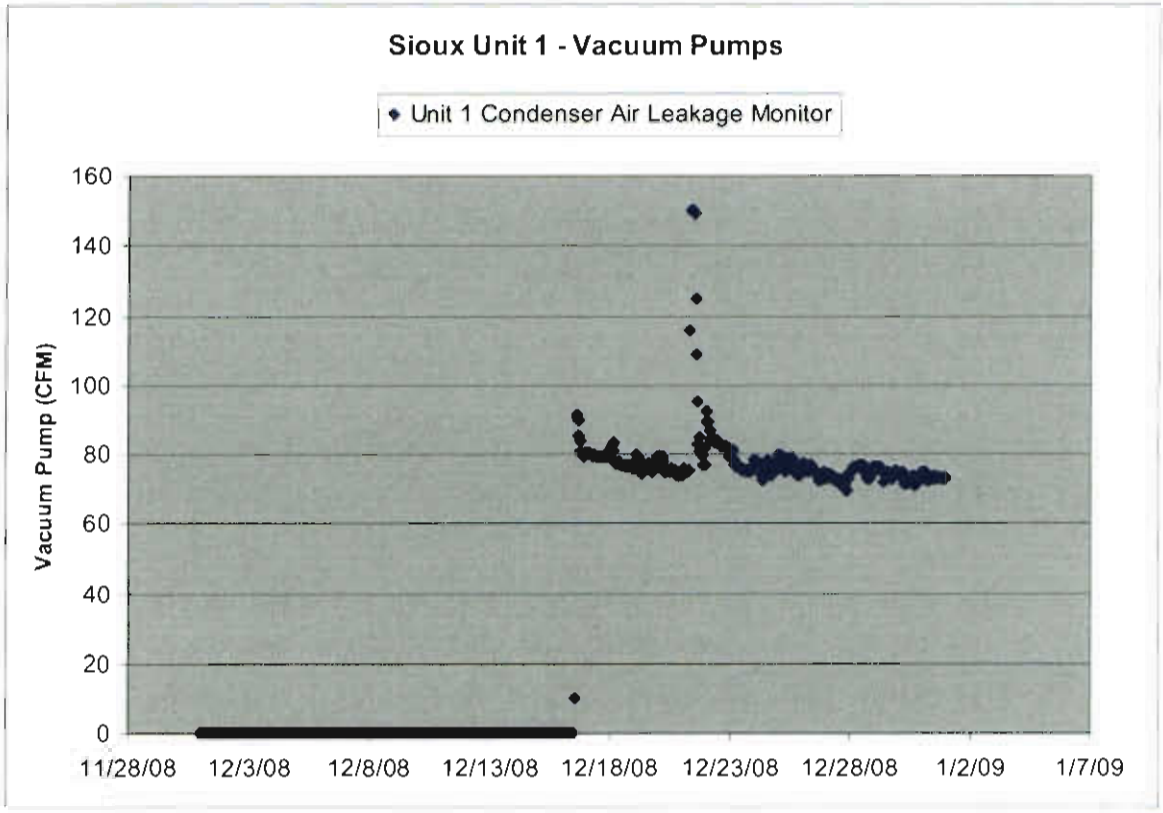
The following observations were made regarding Unit 1 operation and performance:

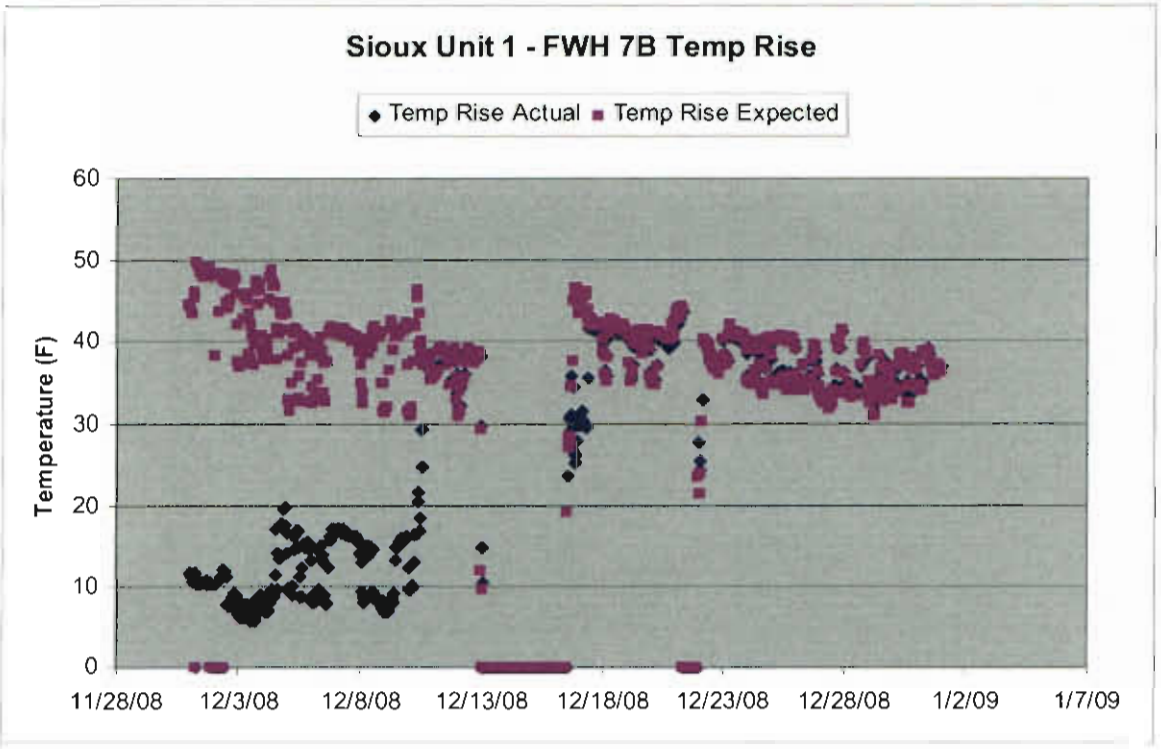
- The condenser air in-leakage monitor was restored in mid-December. Air in-leakage was observed to be about 80 SCFM. Does Sioux have a value to which they try to maintain condenser air in-leakage? HEI recommends a value of less than 2 SCFM per 100MWs.
- After some initial complications, the 7B feedwater 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.



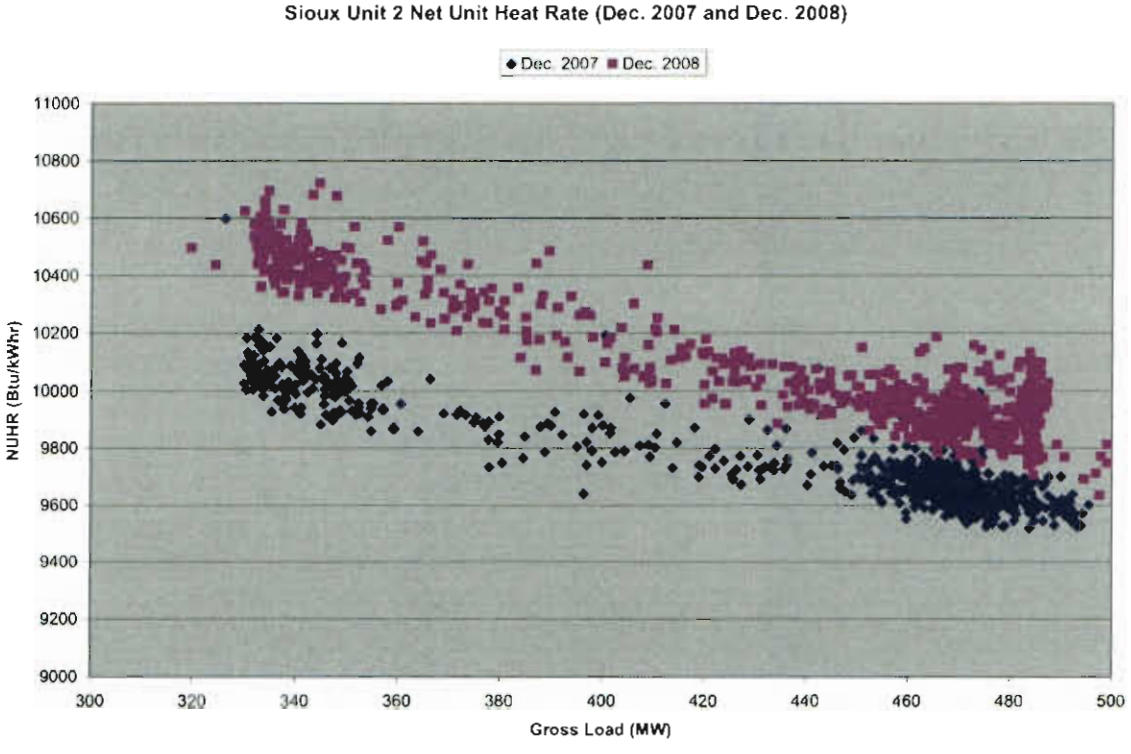


As shown, the temperature rise over the 7B heater went from about 10-20F to the expected range of 30-40F in mid-December.

Unit 2

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

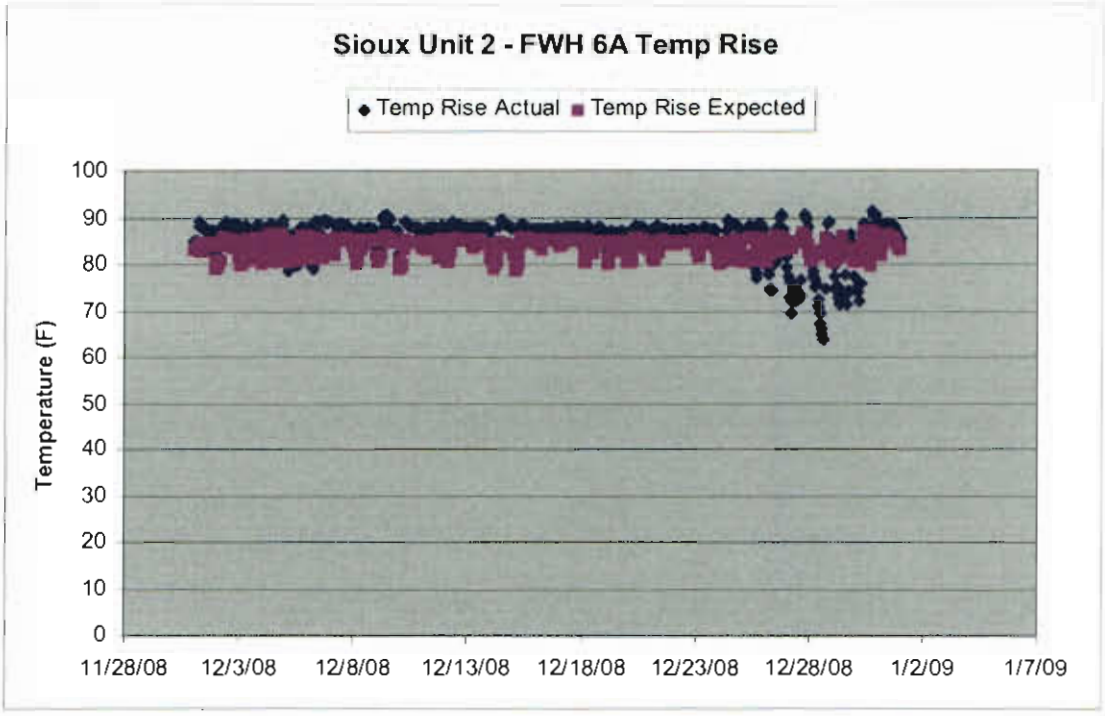
- The heat rate for Unit 2 is generally up from the prior year. For example, Unit 2's heat rate in December 2008 was almost 260 Btu/kWhr higher than in December 2007. Performance engineering has action to investigate further and determine the cause of the increasing trend in heat rate on the units. In 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.

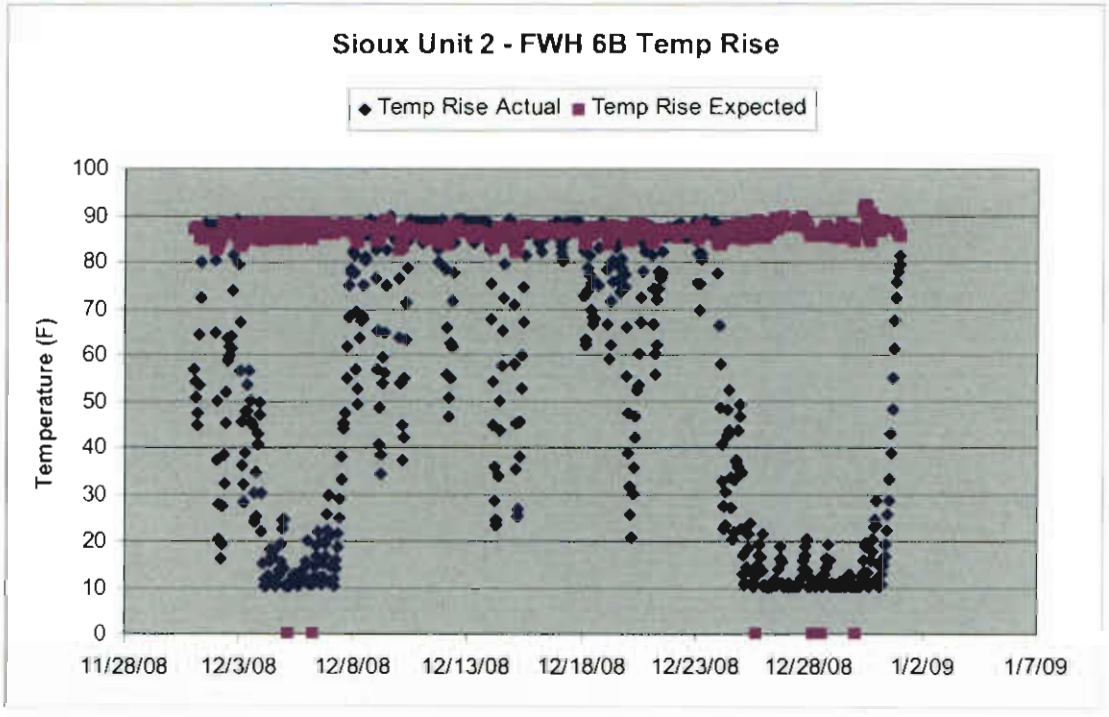


This plot compares the Net Unit Heat Rate on Unit 2 from December 2007 and December 2008. As shown, the heat rate over the entire load range was 2 to 4% higher in 2008 as compared to 2007.

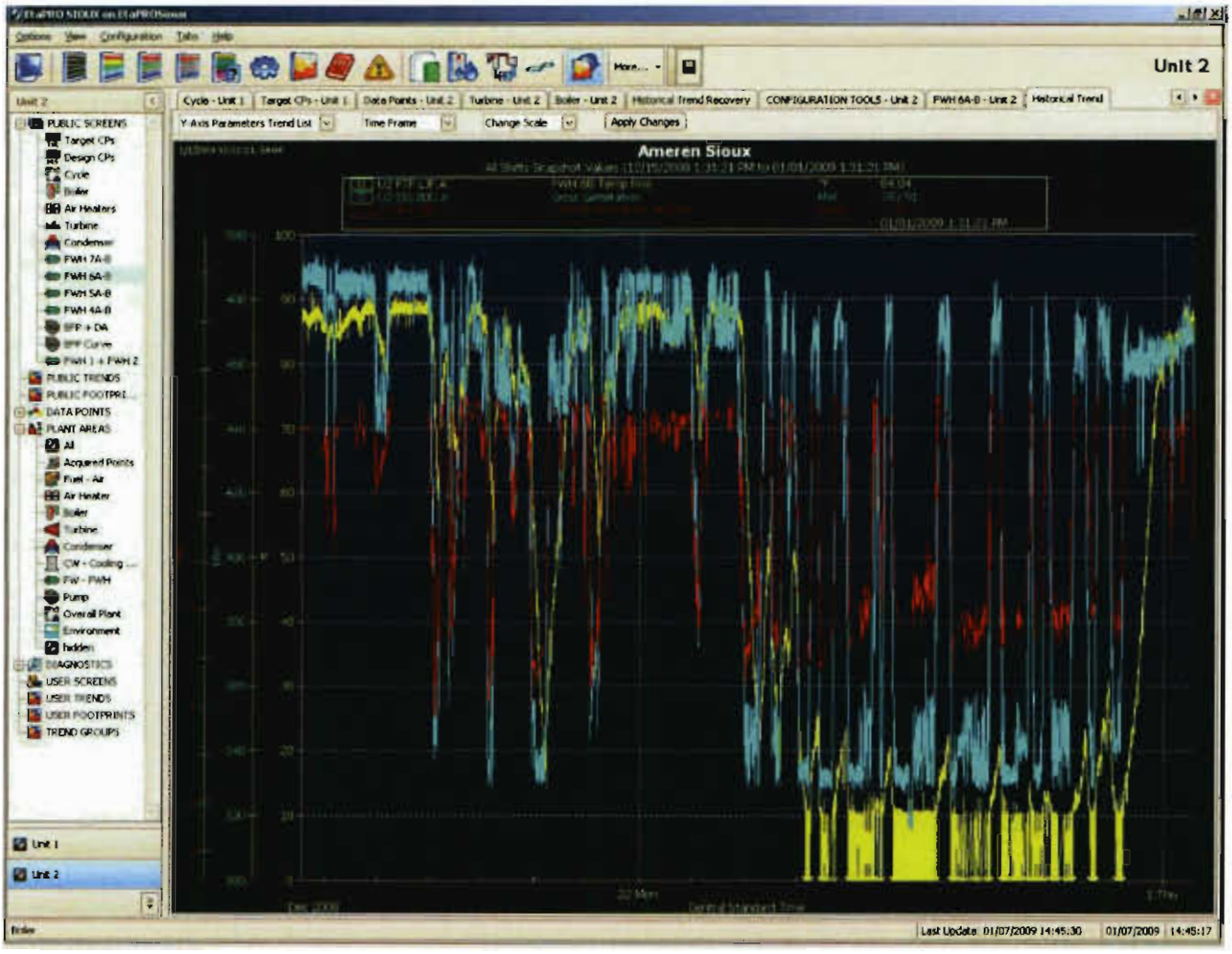
Summary of Performance Report for:

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 Gilberston, 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

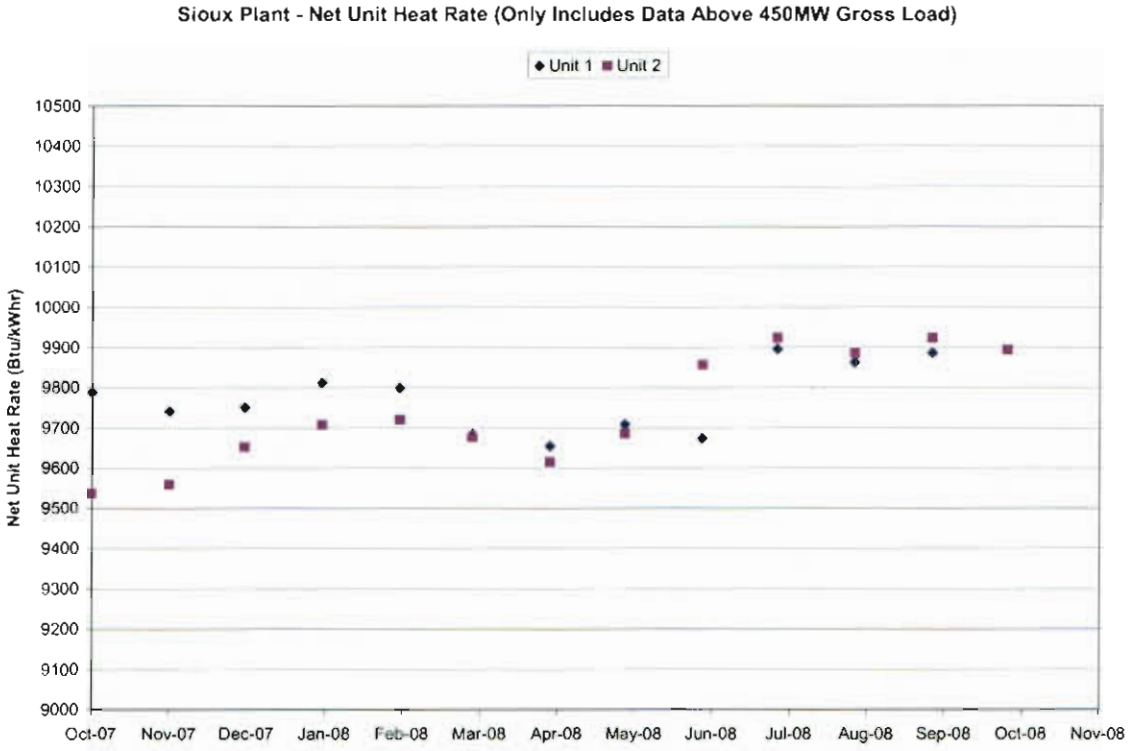
Detailed Observations

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

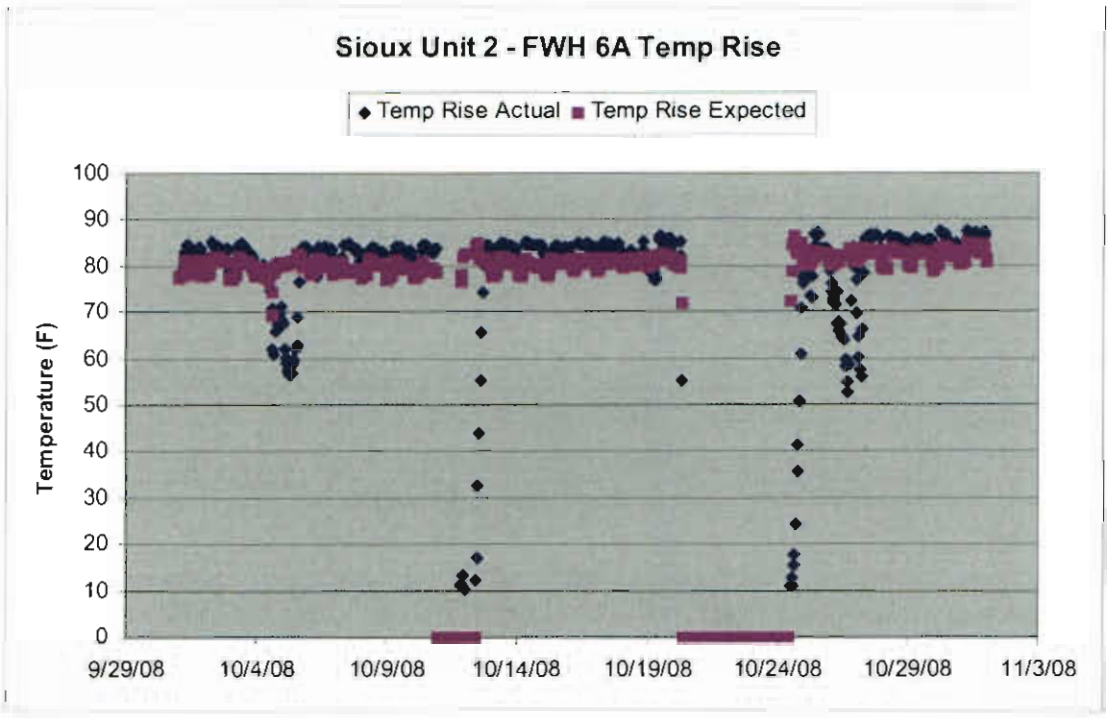
The following observations were made regarding Unit 2 operation and performance:

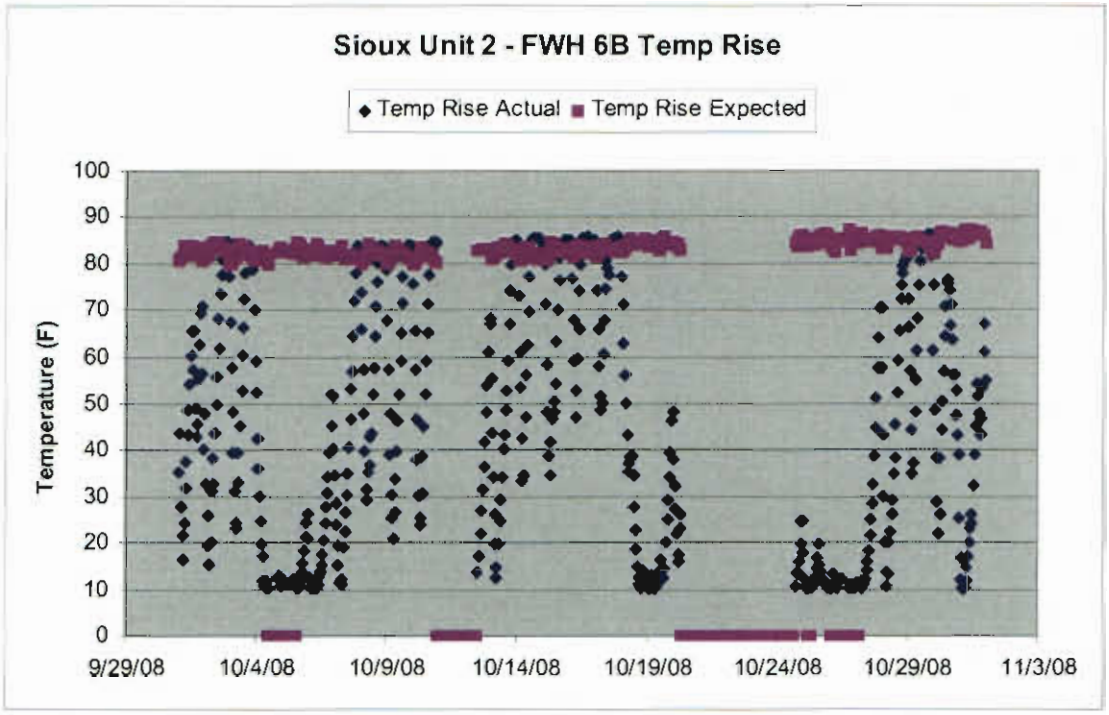
- The heat rate for Unit 2 is generally trending up. For example, Unit 2's heat rate in October 2008 was almost 400 Btu/kWhr higher than in October 2007. Some of this difference is attributable to carrying the entire plant auxiliary load this fall and would account for about 70 Btu/kWhr of the difference. 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

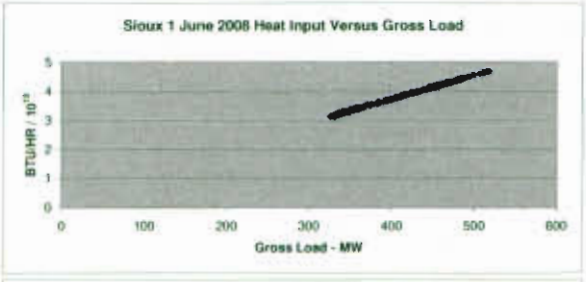

Sioux Unit 2 - FWH 6B Temp Rise
Temp Rise Actual
Temp Rise Expected
Temperature (F)
100
90
80
70
60
50
40
30
20
10
0
9/29/08
10/4/08
10/9/08
10/14/08
10/19/08
10/24/08
10/29/08
11/3/08

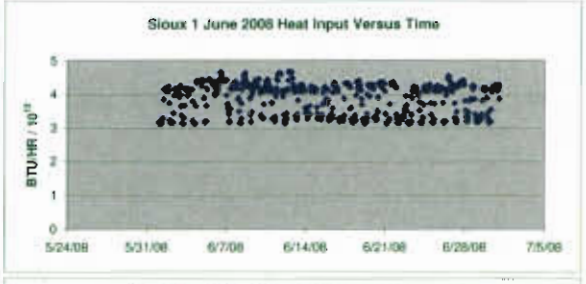
Summary of Performance Report for:

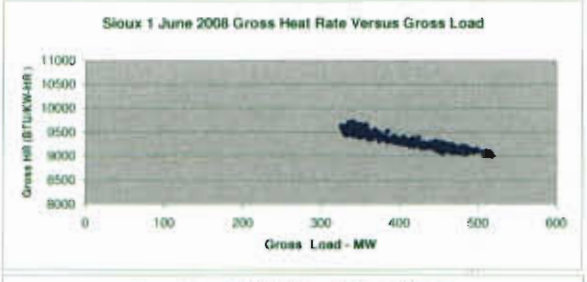
Plant	Sioux		
Unit	1		
Period	6/1/08	to	7/1/08

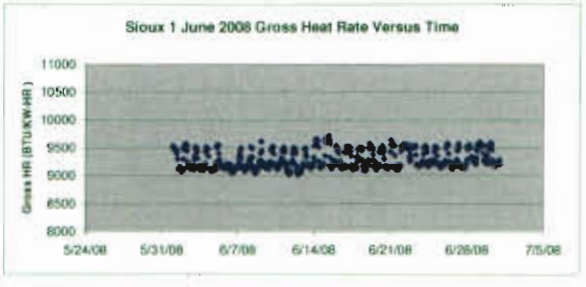
Full Load Performance

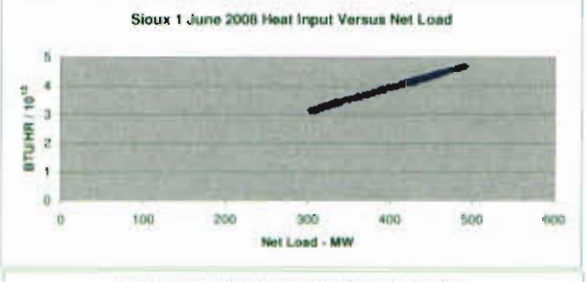
Hours of Data (Gross load>450 MW)	339	
	Averages	
GENERATOR MEGAWATTS	470.6	MW
AUX POWER	27.4	MW
Net Unit Heat Rate Actual (GPHR)	9673.1	BTU/KW-HR
Boiler Efficiency Actual	86.7	%
CONTROL VALVE POSITION LVDT	31.5	%
FEEDWATER TEMP TO ECON	471.5	degF
FEEDWATER TEMP TO HTR 1	404.7	degF
HP Turbine Efficiency Actual	82.8	%
IP Turbine Efficiency Corrected	93.1	%
Condenser Pressure	2.1	inHga
AIRHTR A GAS OUTLET TEMP	300.8	degF
AIRHTR B GAS OUTLET TEMP	306.0	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

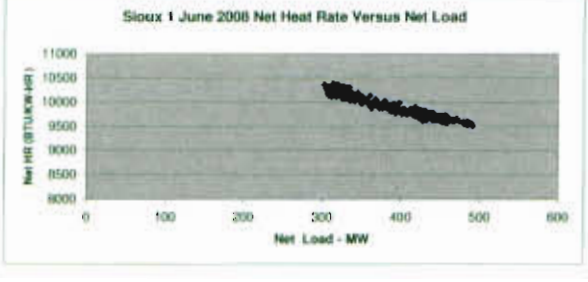


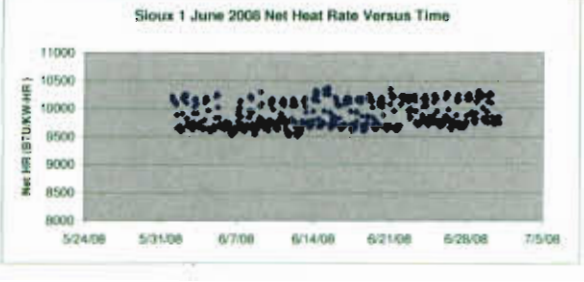












Sioux Unit 1 Rollup, June 2008

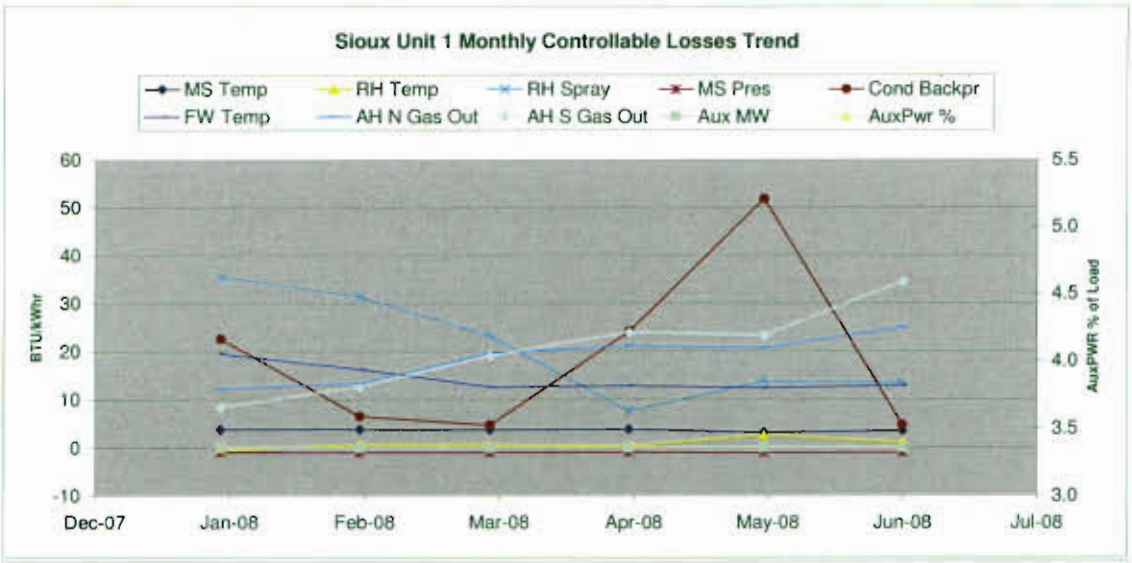
Notable Deviations in Plant Performance Data / Discussion Topics, etc.

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?

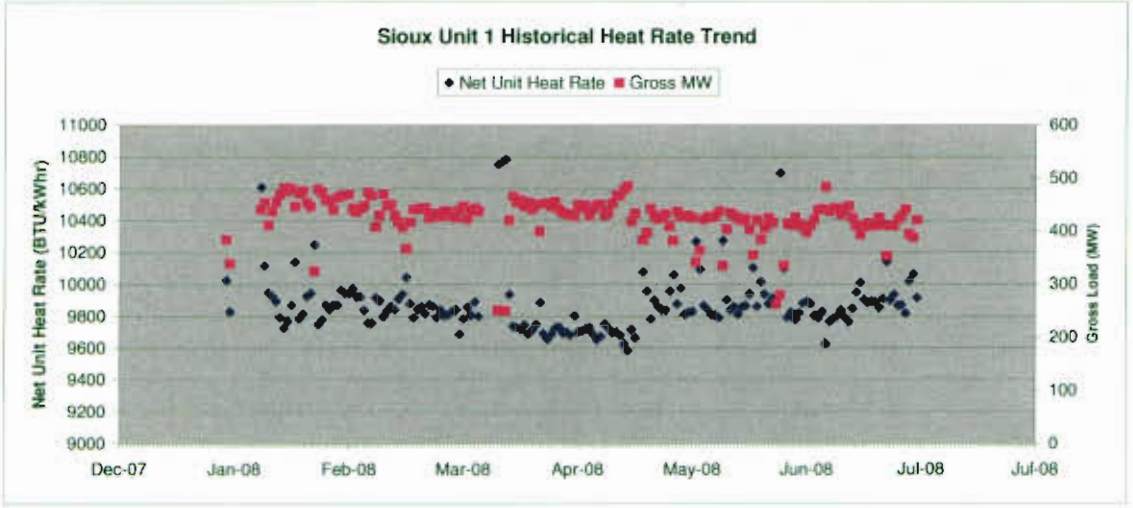
Top Priority Engineering Action Items	JR#	Priority	Resp Pty

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:

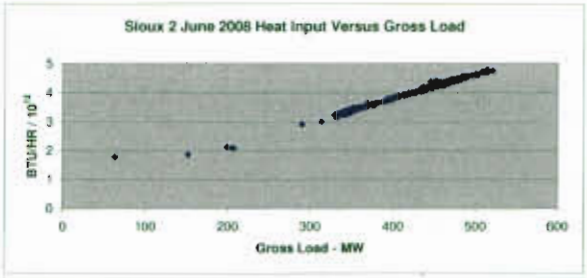
Summary of Performance Report for:

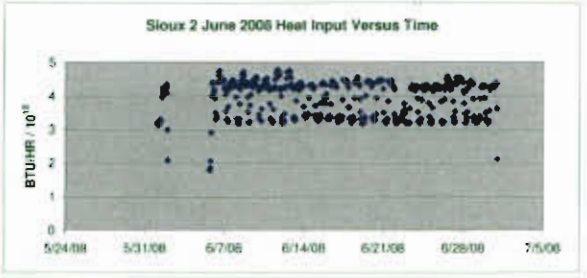
Plant	Sioux		
Unit	2		
Period	6/1/08	to	7/1/08

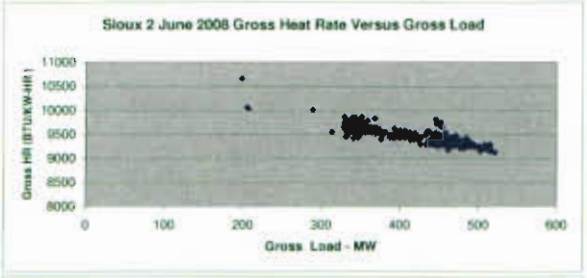
Full Load Performance

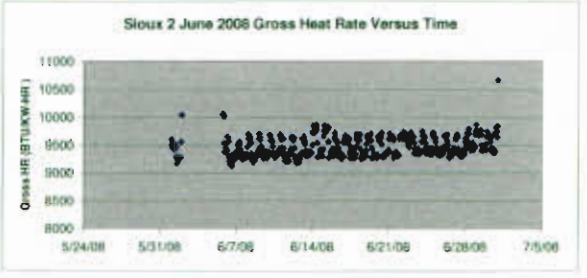
Hours of Data (Gross load>450 MW) 317

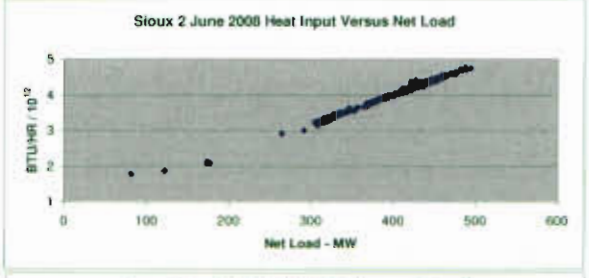
	Averages	
GENERATOR MEGAWATTS	471.7	MW
AUX POWER	25.3	MW
Net Unit Heat Rate Actual (GPHI)	9857.4	BTU/KW-HR
Boiler Efficiency Actual	87.0	%
CONTROL VALVE POSITION LVDT	28.5	%
FEEDWATER TEMP TO ECON	473.6	degF
FEEDWATER TEMP TO HTR 1	407.1	degF
HP Turbine Efficiency Actual	83.9	%
IP Turbine Efficiency 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

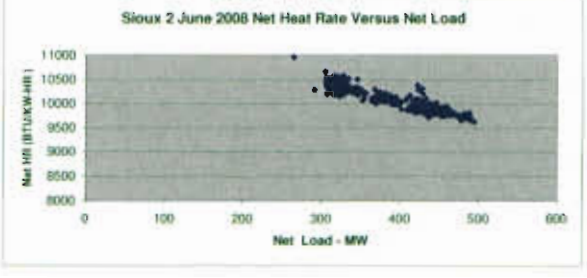


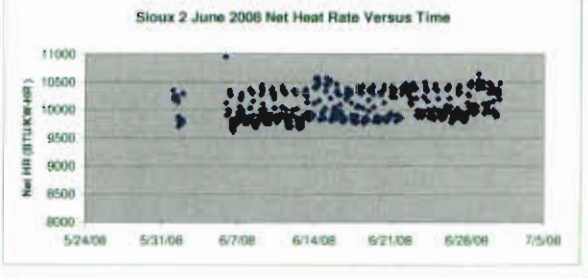












Sioux Unit 2 Rollup, June 2008

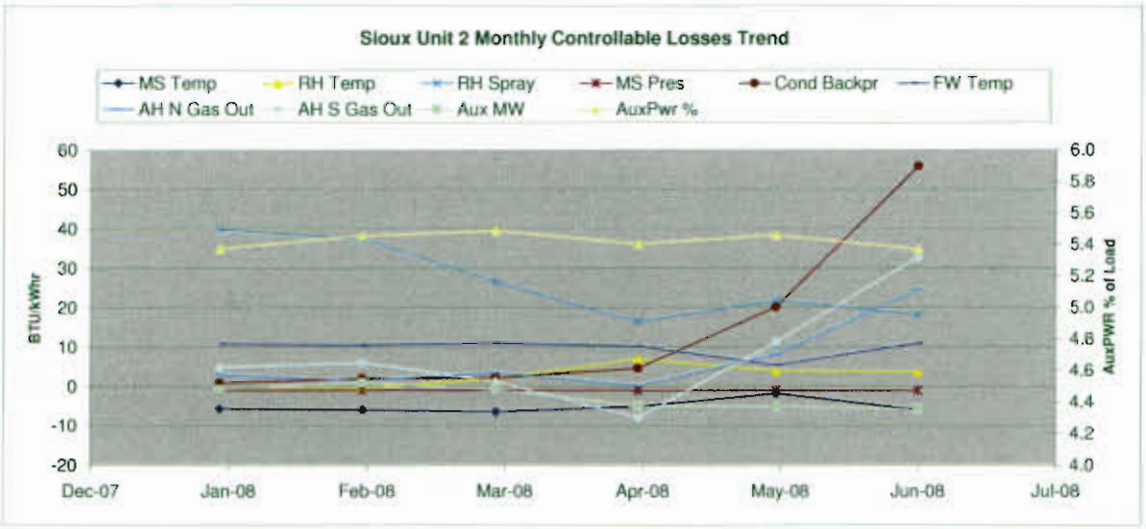
Notable Deviations in Plant Performance Data / Discussion Topics, etc

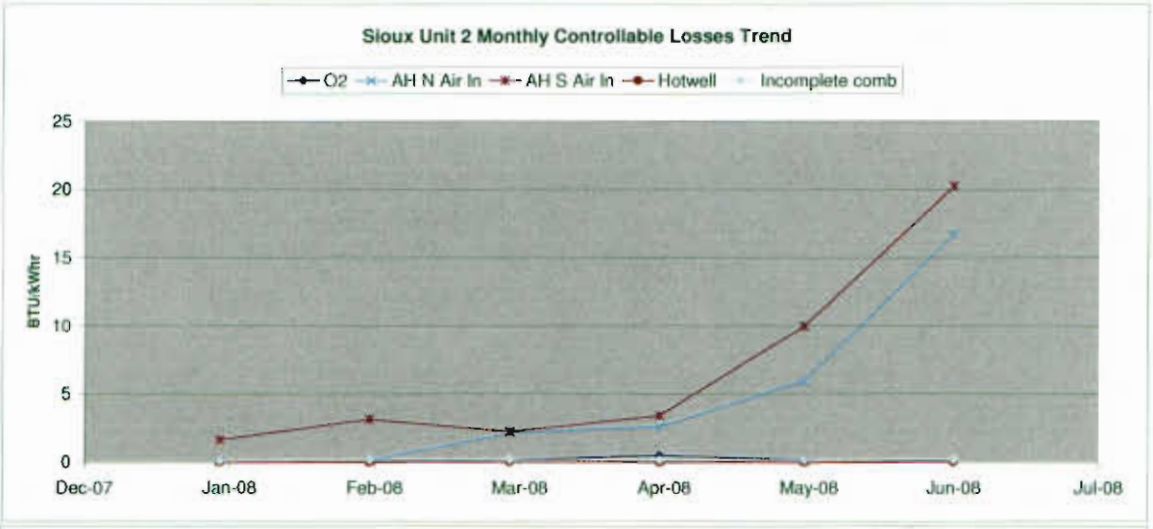
1. The controllable loss parameter target values need to updated to reflect current plant operation. The target values for all controllable loss parameters have been reviewed using actual 2007 unit data.

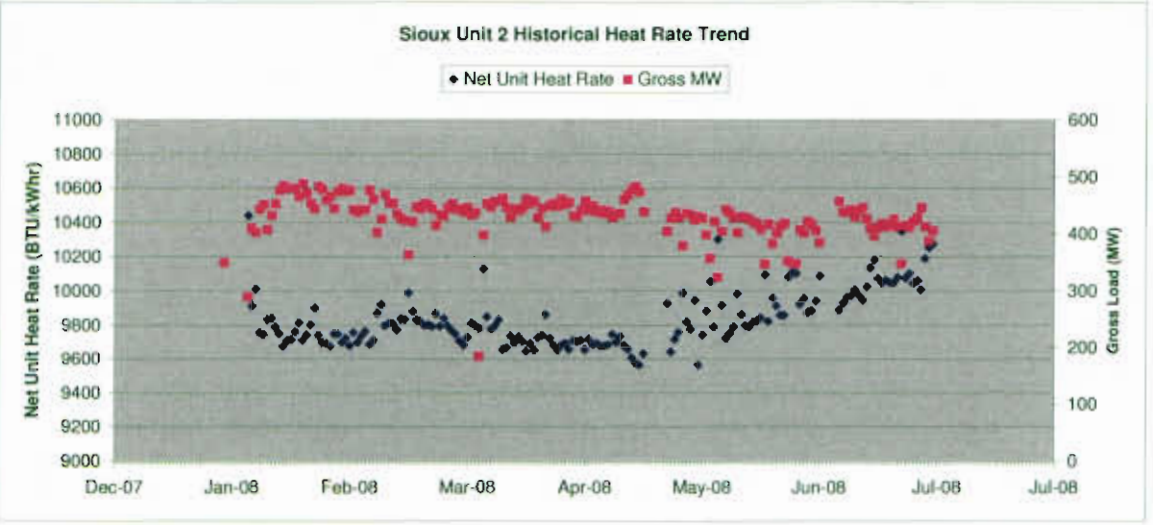
Top Priority Engineering Action Items	JR#	Priority	Resp Pty

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: