Naughton Plan Heat Rate Improvement Plan

Ntn_2009_HRIP

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1. Revision History

Version	Status	Author	Reason for Issue	Date
1			2009 Plan Issue	March 31, 2009

2. Revision Control

This document is maintained by the PacifiCorp Energy Asset Management group.

3. Glossary of Terms

3.1. Actual Net Heat Rate (Btu/kWh)

Total actual heat input in Btu's divided by actual net generation.

3.2. As-built Net Heat Rate (Btu/kWh)

Total guaranteed heat input, from the design heat balances in Btu's divided by the guaranteed net generation, corrected for changes in equipment from design. This is the baseline number for the plant personnel when they make their annual reconciliation.

3.3. British thermal unit (Btu)

British thermal unit is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

3.4. Gross Heat Rate (Btu/kWh)

Total actual heat input in Btu's divided by actual gross generation.

3.5. Net Generation (kWh)

Gross generation minus auxiliary or station usage

3.6. Planned Net Heat Rate (Btu/kWh)

Total budgeted heat input in Btu's divided by the budgeted net generation. This number is the annual goal for the plant personnel to achieve.

4. Overall Plan and Objectives

4.1. Unit 1- Goals for 10-year plan

Figure 1, in the appendix, shows the ten-year heat rate plan for Naughton Unit 1. The dips in the Planned Net Heat Rate in the years 2012 and 2016 are due to the work that is scheduled to take place during the planned outages in 2012 and 2016 (see section 7).

4.2. Unit 2- Goals for 10-year plan

Figure 2, in the appendix, shows the ten-year heat rate plan for Naughton Unit 2. The dips in the Planned Net Heat Rate in the years 2011 and 2015

are due to the work that is scheduled to take place during the planned outages in 2011 and 2015 (see section 7).

4.3. Unit 3- Goals for 10-year plan

Figure 3, in the appendix, shows the ten-year heat rate plan for Naughton Unit 3. The dips in the Planned Net Heat Rate in the years 2009 and 2014 are due to the work that is scheduled to take place during the planned outages in 2010 and 2014 (see section 7).

5. Performance against last year's plan

5.1. Unit 1

Planned Net Heat Rate			10,219
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	(10)	(60)	(50)
Turbine Losses	332	457	126
Other Losses	(64)	59	123
Actual Net Heat Rate			10,417

Negative numbers in the table above are improvements to heat rate.

5.2. Unit 2

Planned Net Heat Rate			10,364
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	(2)	18	21
Turbine Losses	506	733	227
Other Losses	(94)	142	236
Actual Net Heat Rate			10,848

Negative numbers in the table above are improvements to heat rate.

5.3. Unit 3

Planned Net Heat Rate			10,393
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	61	44	(16)
Turbine Losses	469	714	245
Other Losses	0	61	61
Actual Net Heat Rate			10,683

Negative numbers in the table above are improvements to heat rate.

6. Major Losses for Current Planned Net Heat Rate

This section of the heat rate plan identifies the reconciliation of the items that have the most impact between the As-built Net Heat Rate and the Planned Net Heat Rate.

6.1. Unit 1

As-Built Net Heat Rate	9,960
Boiler Losses	-10
Turbine Losses	481
Other Losses	-36
Planned Net Heat Rate	10,396

6.2. Unit 2

As-Built Net Heat Rate	9,955
Boiler Losses	-2
Turbine Losses	581
Other Losses	-31
Planned Net Heat Rate	10,503

6.3. Unit 3

As-Built Net Heat Rate	9,863
Boiler Losses	61
Turbine Losses	446
Other Losses	-66
Planned Net Heat Rate	10,304

7. Major Unit Specific Initiatives

This section identifies the major planned capital and operational activities to improve or regain lost heat rate for the current 10-year plan.

7.1. Unit 1

Table 1 shows the capital projects included in the 10-year plan that contribute to the recovery of lost heat rate. Numbers inside parentheses are negative impact on heat rate and represent improvement to the overall unit efficiency.

7.2. Unit 2

Table 2 shows the capital projects included in the 10-year plan that contribute to the recovery of lost heat rate. Numbers inside parentheses are negative impact on heat rate and represent improvement to the overall unit efficiency.

7.3. Unit 3

Table 3 shows the capital projects included in the 10-year plan that contribute to the recovery of lost heat rate. Numbers inside parentheses are negative impact on heat rate and represent improvement to the overall unit efficiency.

8. Annual Review and Update

This plan will be reviewed and updated annually by the Naughton plant management team by March 31.

9. Appendix

Figure 1
Naughton Unit 1
10-year Plan Heat Rate Goals

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
As-Built Net Heat Rate - Btu/kWh	9,960	9,960	9,960	9,959	9,960	9,959	9,957	9,957	10,070	9,949	9,949	9,949	9,949	9,949	9,949	9,949
Planned Net Heat Rate - Btu/kWh	10,702	10,814	10,720	10,332	10,219	10,396	10,397	10,399	10,178	10,127	10,197	10,228	10,121	10,122	10,187	10,247
Actual Net Heat Rate - Btu/kWh	10,781	10,550	10,740	10,206	10,417											
Capacity Factor	83%	89%	78%	80%	89%	89%	87%	87%	76%	91%	90%	90%	81%	91%	90%	90%
Annual Deviation from Plan - %	0.74%	-2.44%	0.19%	-1.22%	1.94%											
Four-year Average Deviation from Plan - %	0.74%	-0.85%	-0.50%	-0.68%	-0.38%											

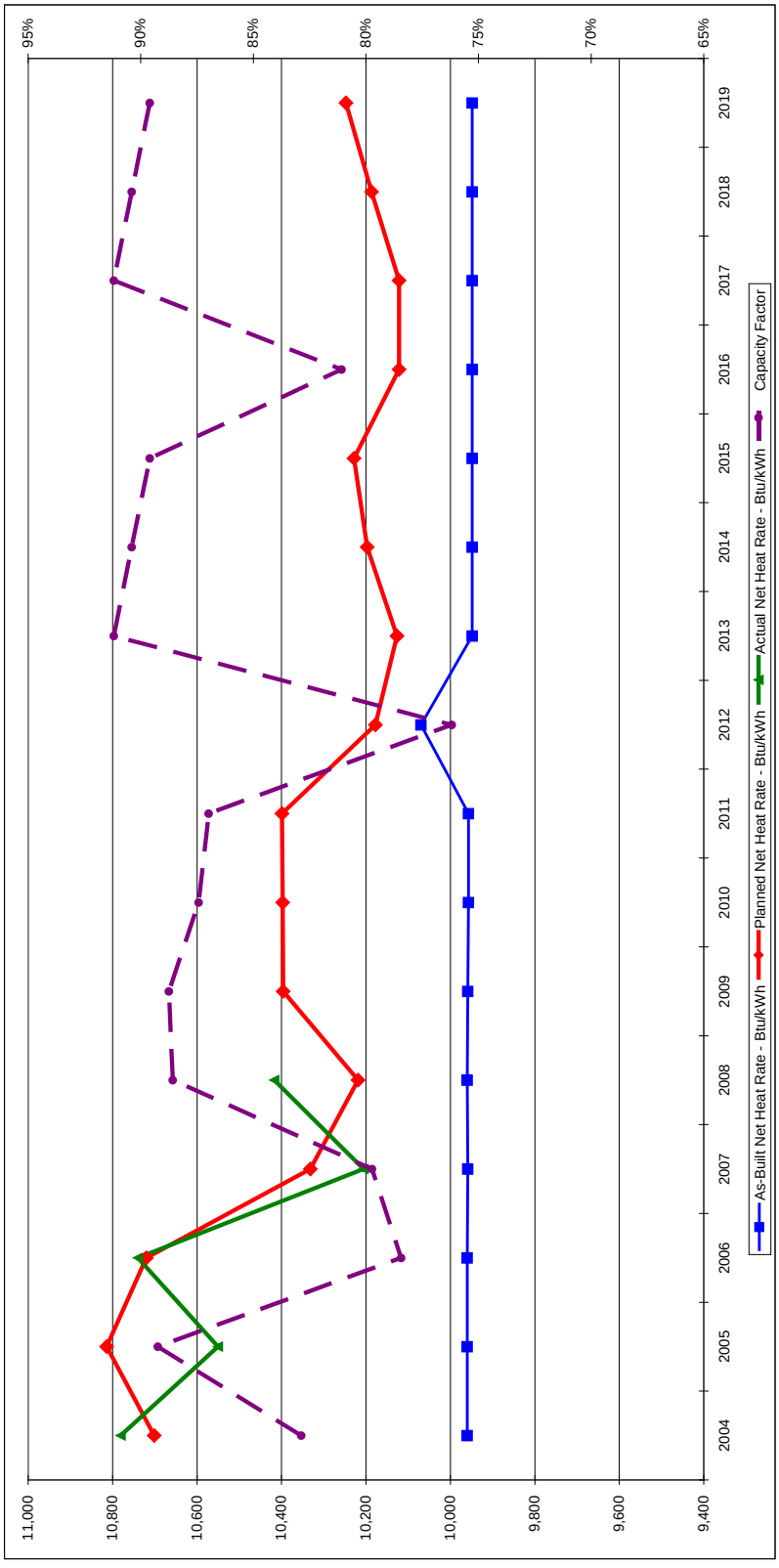

Figure 2
Naughton Unit 2
10-year Plan Heat Rate Goals

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
As-Built Net Heat Rate - Btu/kWh	9,958	9,958	9,958	9,958	9,955	9,950	9,948	9,948	9,947	9,947	9,947	9,947	9,947	9,947	9,947	9,947
Planned Net Heat Rate - Btu/kWh	10,606	10,693	10,480	10,350	10,364	10,503	10,506	10,538	10,454	10,489	10,514	10,416	10,396	10,447	10,484	10,454
Actual Net Heat Rate - Btu/kWh	10,653	10,487	10,672	10,810	10,848											
Capacity Factor	83%	87%	74%	89%	85%	88%	88%	73%	90%	89%	88%	78%	90%	89%	88%	78%
Annual Deviation from Plan - %	0.44%	-1.93%	1.83%	4.45%	4.67%											
Four-year Average Deviation from Plan - %	0.44%	-0.74%	0.11%	1.20%	2.26%											

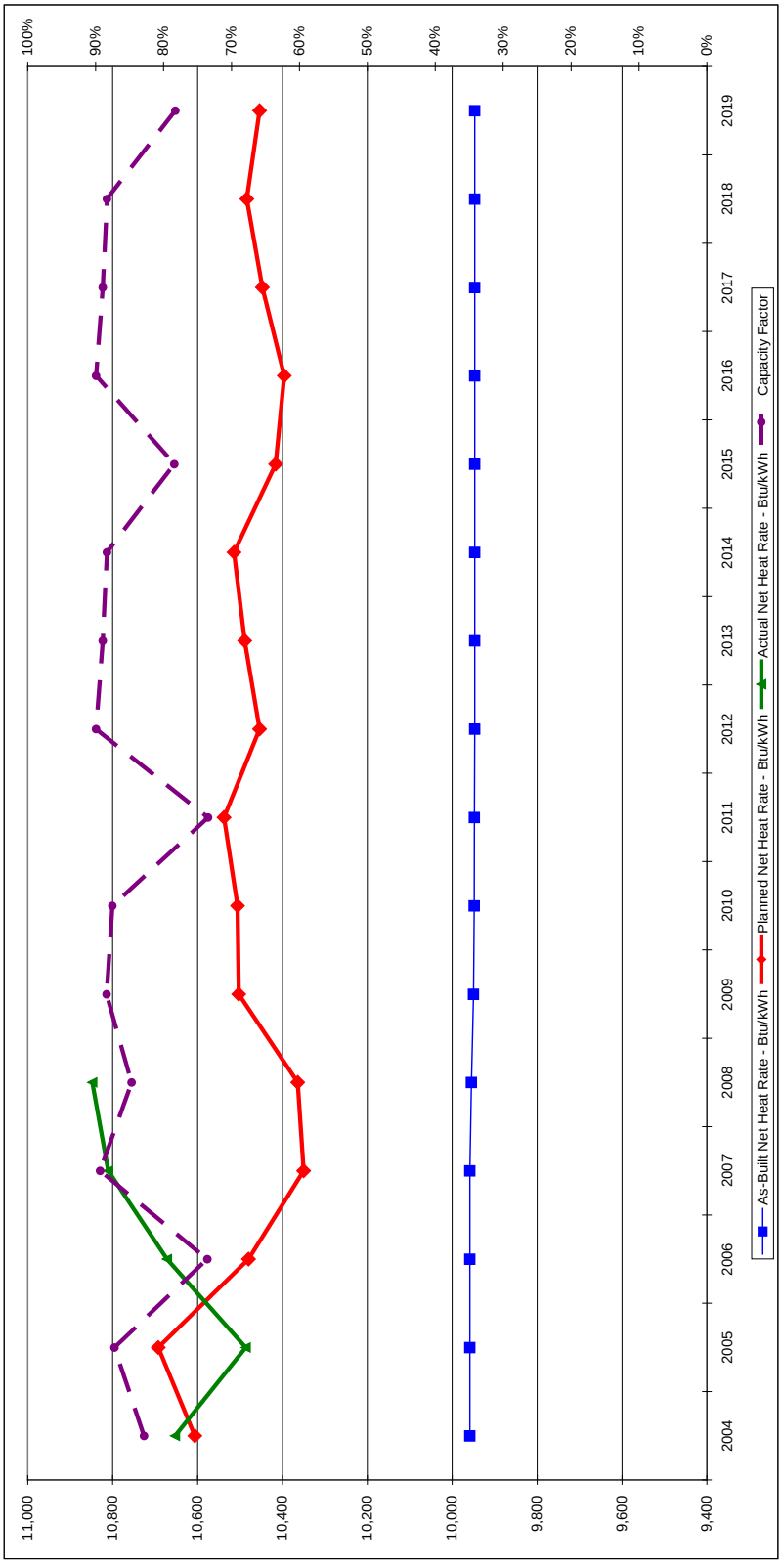

Figure 3
Naughton Unit 3
10-year Plan Heat Rate Goals

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
As-Built Net Heat Rate - Btu/kWh	9,863	9,863	9,863	9,863	9,863	9,806	9,784	9,784	9,784	9,784	9,770	9,760	9,760	9,760	9,760	9,760
Planned Net Heat Rate - Btu/kWh	10,503	10,411	10,350	10,366	10,393	10,304	10,122	10,169	10,197	10,101	9,869	9,781	9,822	9,783	9,800	9,851
Actual Net Heat Rate - Btu/kWh	10,246	10,276	10,198	10,506	10,683											
Capacity Factor	88%	82%	86%	85%	80%	78%	90%	86%	89%	65%	90%	87%	89%	79%	87%	83%
Annual Deviation from Plan - %	-2.45%	-1.30%	-1.47%	1.35%	2.79%											
Four-year Average Deviation from Plan - %	-2.45%	-1.87%	-1.74%	-0.97%	0.34%											

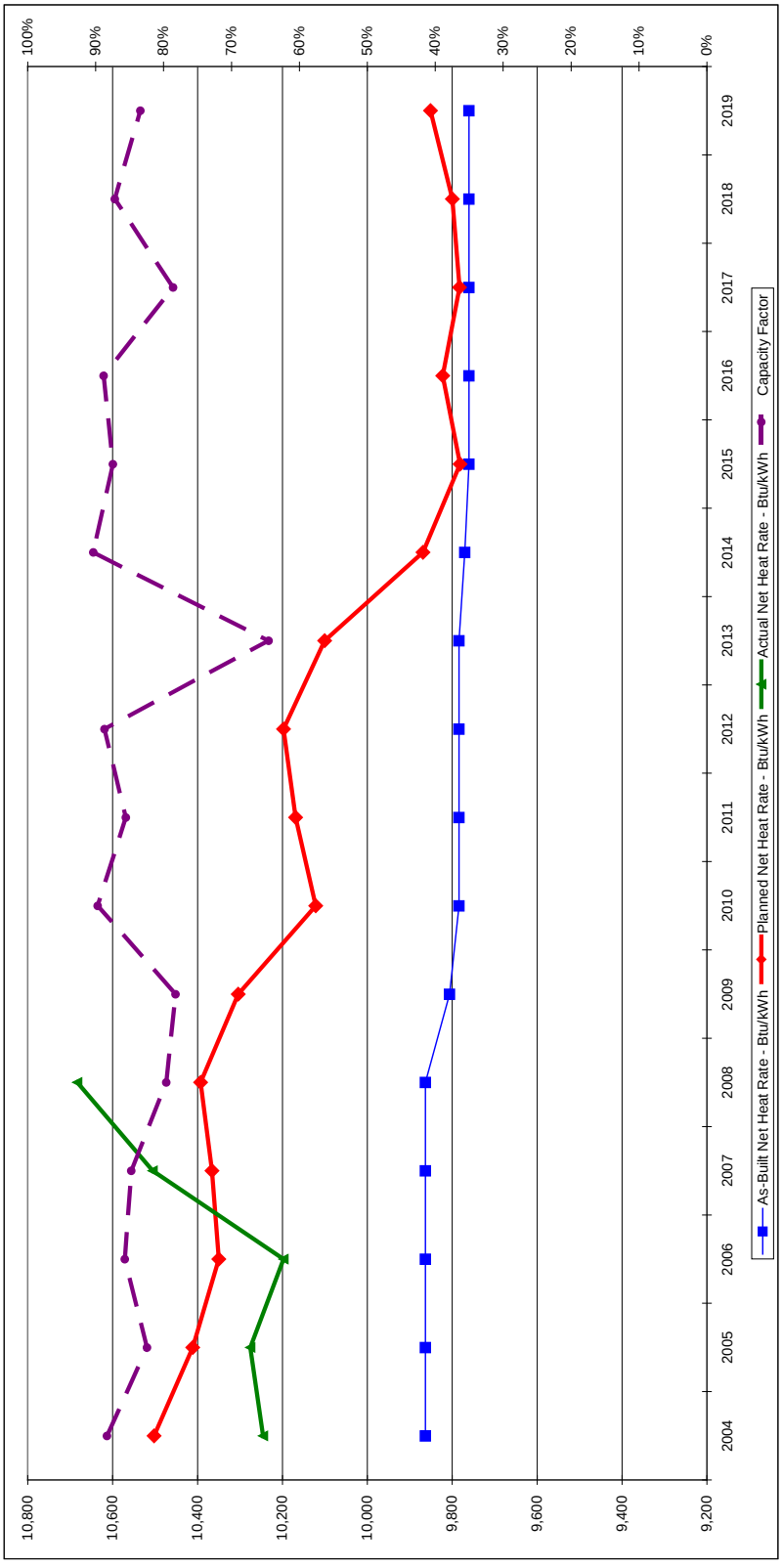

Table 1
Naughton Unit 1
10-year Plan Heat Rate Improvement Projects

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative)												
Install Intelligent soot blowing (2012)	Btu/kWh				-25	-25	-25	-25	-25	-25	-25	-25
CO&O2 Grid (2012)	Btu/kWh				-13	-13	-13	-13	-13	-13	-13	-13
Condenser Replacement (2012)	Btu/kWh				-20	-30	-30	-30	-30	-30	-30	-30
SO3 Injection System (2010)	Btu/kWh		-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
Total adjustments related to Capital Proje	Btu/kWh	0	-25	-25	-83	-93	-93	-93	-93	-93	-93	-93
Budgeted / Planned Auxiliary Load Changes												
Reduced auxiliary load benefit of Budgete	KW	0	-26	-26	-88	-98	-98	-98	-98	-98	-98	-98
Cooling Tower VFD's (2012)	KW				-38	-75	-75	-75	-75	-75	-75	-75
Air Compressor Upgrade (2009)	KW	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27
Total Auxiliary Load Changes	KW	-27	-53	-53	-152	-200	-200	-200	-200	-200	-200	-200
Budgeted / Planned Net Dependable Rating Changes, (Net Basis)												
Scrubber Addition (+1.74Mw Aux Load) (4	MW				-2	-2	-2	-2	-2	-2	-2	-2
Total Capacity Changes	MW	0	0	0	-2	-2	-2	-2	-2	-2	-2	-2

Table 2
Naughton Unit 2
10-year Plan Heat Rate Improvement Projects

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative)												
Install intelligent soot blowing (2008)	Btu/kWh	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
CO&O2 grid (2011)	Btu/kWh			-5	-13	-13	-13	-13	-13	-13	-13	-13
SO3 Injection System (2010)	Btu/kWh		-25	-25	-25	-25	-25	-25	-25	-25	-25	-25
Total adjustments related to Capital Proje	Btu/kWh	-25	-50	-55	-63	-63	-63	-63	-63	-63	-63	-63
Budgeted / Planned Auxiliary Load Changes												
Reduced auxiliary load benefit of Budgete	KW	-37	-75	-82	-94	-94	-94	-94	-94	-94	-94	-94
Cooling Tower VFD's (2008)	KW	-134	-134	-134	-134	-134	-134	-134	-134	-134	-134	-134
Air Compressor Upgrade (2009)	KW	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27
Total Auxiliary Load Changes	KW	-198	-236	-243	-255	-255	-255	-255	-255	-255	-255	-255
Budgeted / Planned Net Dependable Rating Changes, (Net Basis)												
Scrubber Addition (2011 -2.35MW)	MW			-2	-2	-2	-2	-2	-2	-2	-2	-2
Total Capacity Changes	MW	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2

Table 3
Naughton Unit 3
10-year Plan Heat Rate Improvement Projects

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative)												
New HP-IP-LP Inner Cylinders & Rotors (1	Btu/kWh						6	10	10	10	10	10
New HP-IP-LP Inner Cylinders & Rotors (2	Btu/kWh						-191	-327	-327	-327	-327	-327
CO&O2 grid (2014)	Btu/kWh						-12	-25	-25	-25	-25	-25
Install intelligent soot blowing (2009)	Btu/kWh	-12	-12	-25	-25	-25	-25	-25	-25	-25	-25	-25
Total adjustments related to Capital Proje	Btu/kWh	-10	-10	-23	-22	-22	-220	-365	-364	-364	-363	-365
Budgeted / Planned Auxiliary Load Changes												
Reduced auxiliary load benefit of Budgete	KW	-20	-20	-45	-44	-43	-42	-430	-713	-712	-711	-710	-712
Cooling Tower VFD's (2014)	KW							-90	-180	-180	-180	-180	-180
Condensate Pump Upgrade (2008)	KW	-160	-160	-160	-160	-160	-160	-160	-160	-160	-160	-160	-160
Air Compressor Upgrade (2009)	KW	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27	-27
Total Auxiliary Load Changes	KW	-206	-206	-231	-230	-230	-229	-707	-1080	-1079	-1078	-1077	-1079
Budgeted / Planned Net Dependable Rating Changes, (Net Basis)												
New HP-IP-LP Inner Cylinders & Rotors (1	MW						10	17	17	17	17	17	17
Increased CAI load (-2.49MW 2014)	MW						-4	-5	-5	-5	-5	-5	-5
Total Capacity Changes	MW	0	0	0	0	0	6	12	12	12	12	12	12

10. Required Signatures

Performance Engineer – Naughton Plant			
Signature:		Date:	

Manager, Engineering – Naughton Plant			
Signature:		Date:	

Managing Director – Naughton Plant			
Signature:		Date:	