



**Jim Bridger Plant Heat Rate Improvement Plan**  
**JB\_2010\_HRIP**

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**1. Revision History**

Version	Status	Author	Reason for Issue	Date
1			Original Submittal	March 31, 2010

**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 Jim Bridger unit 1. The dip in the Planned Net Heat Rate in the year 2011 is due to the work that is scheduled to take place during the planned outage in 2010 (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 Jim Bridger unit 2. The dip in the Planned Net Heat Rate in the year 2014 is due to the work that is scheduled to take place during the planned outage in 2013 (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 Jim Bridger unit 3. The dip in the Planned Net Heat Rate in the year 2012 is due to the work that is scheduled to take place during the planned outage in 2011 (see section 7).

4.4. Unit 4 - Goals for 10-year Plan

Figure 4, in the appendix, shows the ten-year heat rate plan for Jim Bridger unit 4. The dip in the Planned Net Heat Rate in the years 2013 is due to the work that is scheduled to take place during the planned outage in 2012 (see section 7).

**5. Performance against last year’s plan**

The 2009 accounting heat rates shown are markedly less than plan. This is a result of two accounting nuances related to how coal pile aerial survey adjustments are applied. In the first case, a survey adjustment which developed over a span of months between 2008 and 2009 was made completely in the first quarter of 2009, as the accounting books for 2008 had already been closed. In the second case, cleanup of the intermediate coal piles and movement to the dead storage pile resulted in a new baseline for volume calculations being used which was below the original datum. This resulted in “more” cubic feet of coal volume, which translated into more tons in the adjustment. Estimated actual heat rates are approximately 200 – 250 BTU/kWh higher than the accounting heat rates.

5.1. Unit 1

Planned Net Heat Rate			10,410
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	189	128	(61)
Turbine Losses	748	435	(313)
Other Losses	(47)	36	83
Actual Net Heat Rate			10,119

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

5.2. Unit 2

Planned Net Heat Rate			10,417
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	128	248	120
Turbine Losses	726	336	(390)
Other Losses	30	48	17
Actual Net Heat Rate			10,164

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

5.3. Unit 3

Planned Net Heat Rate			10,350
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	190	311	121
Turbine Losses	624	298	(326)
Other Losses	15	44	29
Actual Net Heat Rate			10,174

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

5.4. Unit 4

Planned Net Heat Rate			10,365
Reconciliation to Planned Net Heat Rate	Planned	Actual	
Boiler Losses	142	204	62
Turbine Losses	680	308	(372)
Other Losses	17	60	43
Actual Net Heat Rate			10,098

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	9,521
Boiler Losses	148
Turbine Losses	757
Other Losses	(67)
Planned Net Heat Rate	10,360

6.2. Unit 2

As-Built Net Heat Rate	9,542
Boiler Losses	139
Turbine Losses	673
Other Losses	94
Planned Net Heat Rate	10,448

6.3. Unit 3

As-Built Net Heat Rate	9,521
Boiler Losses	196
Turbine Losses	579
Other Losses	55
Planned Net Heat Rate	10,351

6.4. Unit 4

As-Built Net Heat Rate	9,526
Boiler Losses	152
Turbine Losses	640
Other Losses	48
Planned Net Heat Rate	10,366

**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.

7.4. Unit 4

Table 4 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.

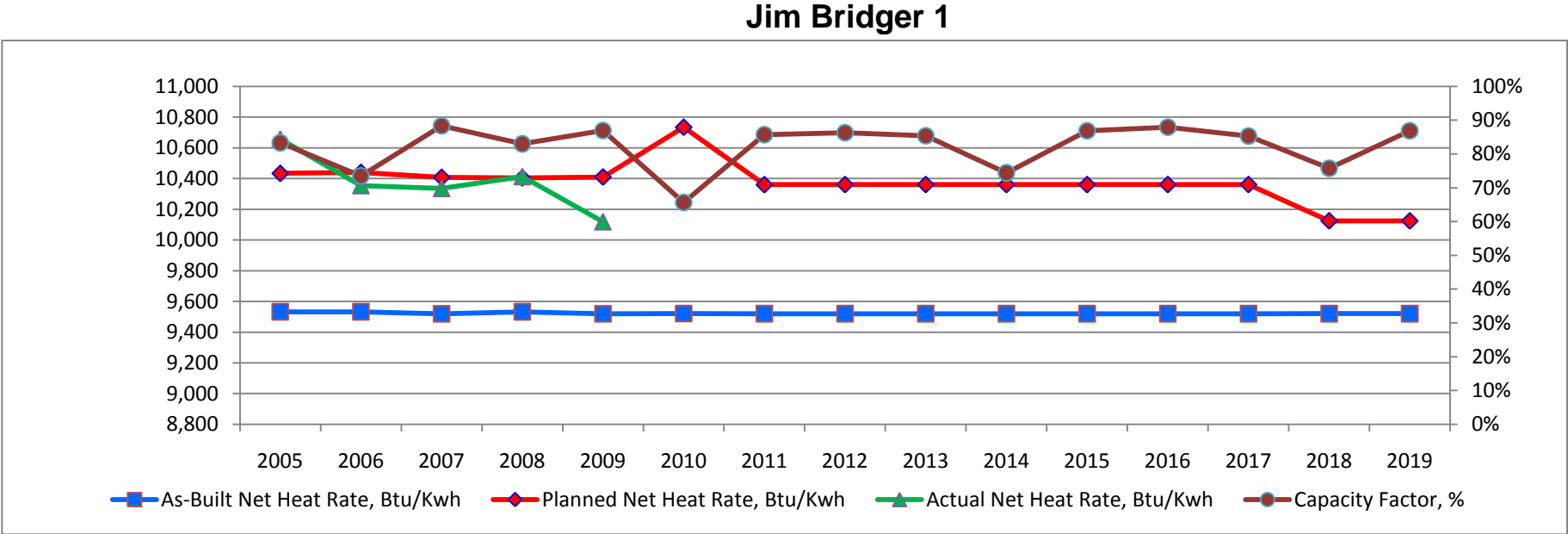
**8. Annual Review and Update**

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

**9. Appendix**

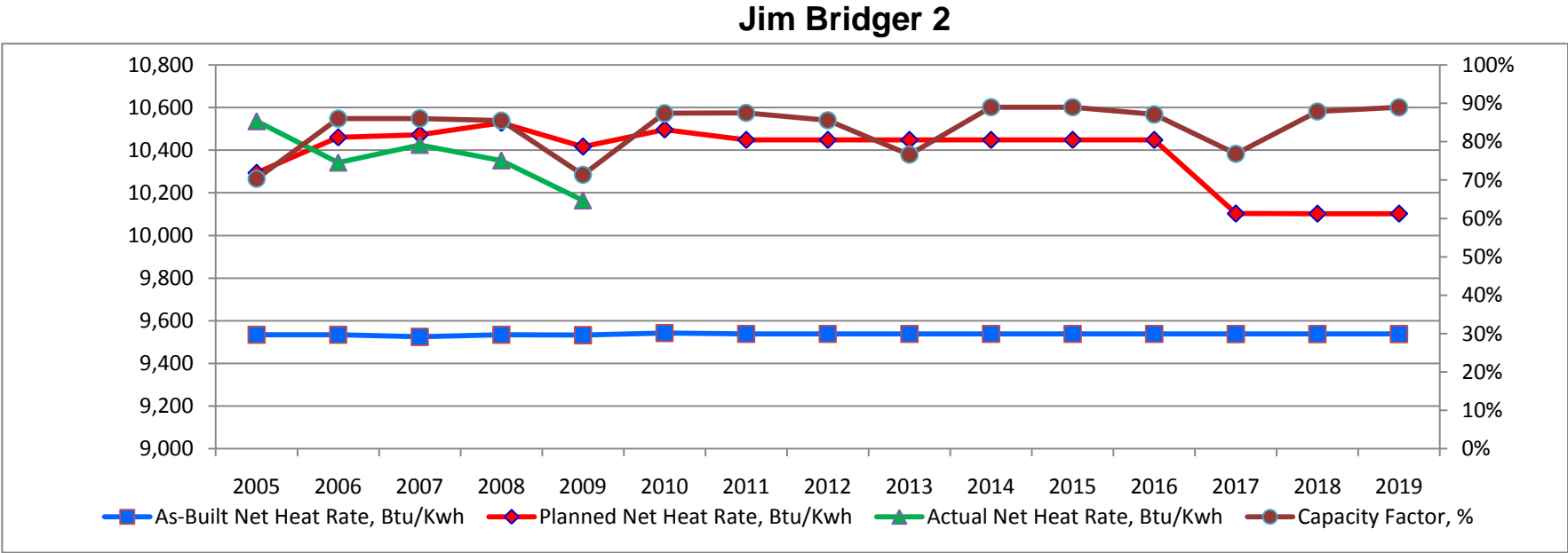


**Figure 1**  
**Jim Bridger Unit 1**  
**10-year Plan Heat Rate Goals**



Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
As-Built Net Heat Rate, Btu/Kwh	9,533	9,533	9,520	9,533	9,520	9,521	9,520	9,520	9,520	9,520	9,520	9,520	9,520	9,520	9,520
Planned Net Heat Rate, Btu/Kwh	10,434	10,440	10,408	10,404	10,410	10,734	10,360	10,360	10,361	10,360	10,360	10,361	10,361	10,125	10,124
Actual Net Heat Rate, Btu/Kwh	10,657	10,354	10,336	10,413	10,119										
Capacity Factor, %	83.3%	73.5%	88.3%	83.0%	86.9%	65.7%	85.7%	86.3%	85.4%	74.4%	86.9%	87.9%	85.3%	75.8%	86.8%
Annual Deviation from Plan, %	2.14%	-0.82%	-0.69%	0.09%	-2.80%										
Four-year Average Deviation from Plan, %	1.48%	0.72%	0.36%	0.18%	-1.06%										

**Figure 2**  
**Jim Bridger Unit 2**  
**10-year Plan Heat Rate Goals**

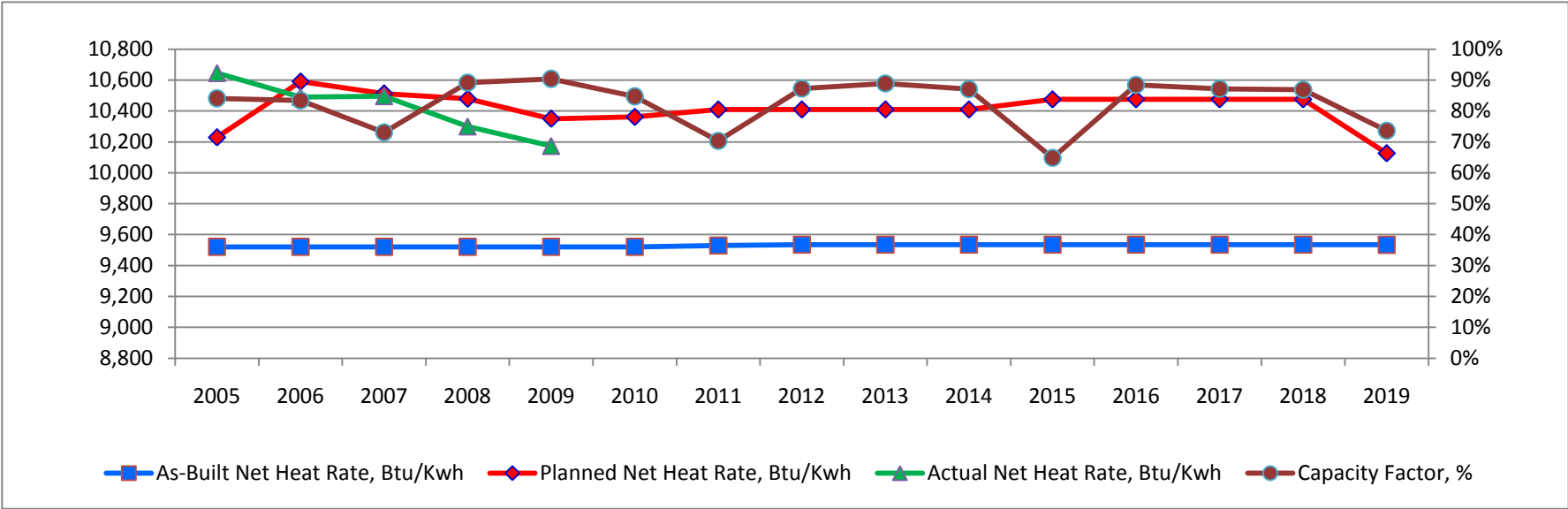


Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
As-Built Net Heat Rate, Btu/Kwh	9,535	9,535	9,525	9,535	9,533	9,542	9,538	9,538	9,538	9,538	9,538	9,538	9,538	9,538	9,538
Planned Net Heat Rate, Btu/Kwh	10,294	10,460	10,473	10,528	10,417	10,497	10,448	10,448	10,448	10,448	10,448	10,448	10,103	10,102	10,103
Actual Net Heat Rate, Btu/Kwh	10,536	10,342	10,425	10,352	10,164										
Capacity Factor, %	70.3%	86.0%	86.1%	85.5%	71.4%	87.4%	87.5%	85.6%	76.6%	89.0%	89.0%	87.1%	76.8%	87.8%	88.9%
Annual Deviation from Plan, %	2.35%	1.13%	0.46%	1.67%	2.42%										
Four-year Average Deviation from Plan, %	2.13%	1.04%	0.67%	0.23%	1.42%										

**Figure 3**

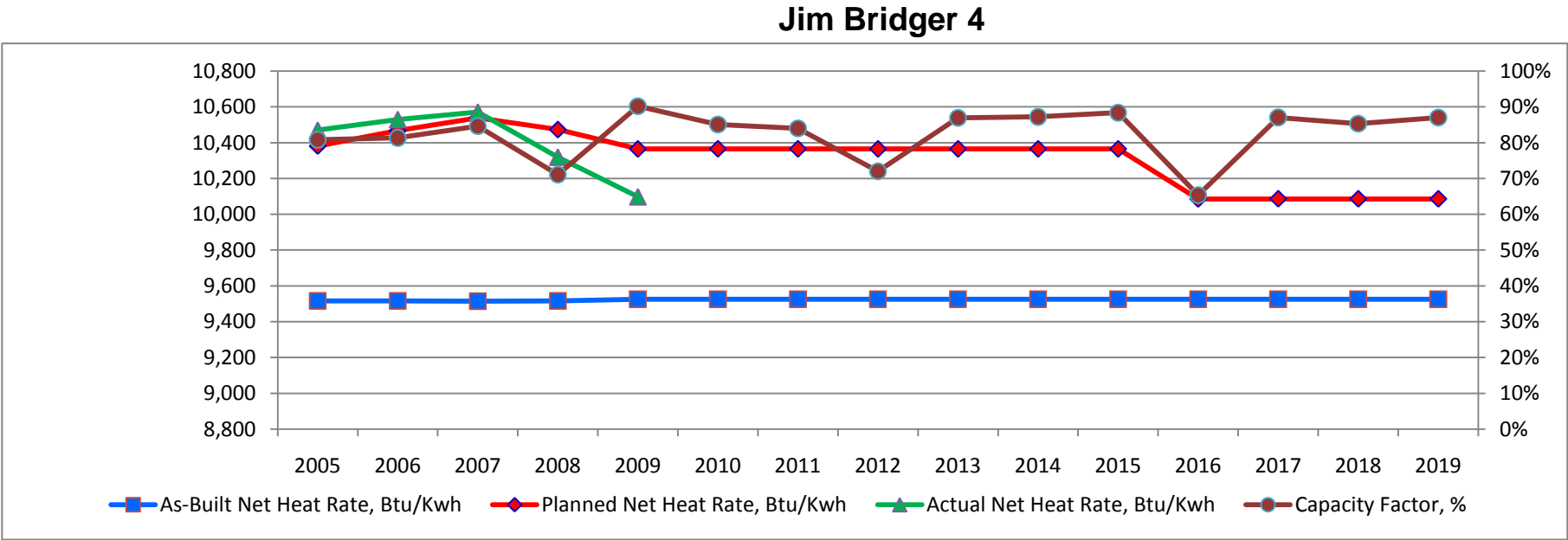
**Jim Bridger Unit 3  
10-year Plan Heat Rate Goals**

**Jim Bridger 3**



Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
As-Built Net Heat Rate, Btu/Kwh	9,521	9,521	9,521	9,521	9,521	9,521	9,529	9,535	9,535	9,535	9,535	9,535	9,535	9,535	9,534
Planned Net Heat Rate, Btu/Kwh	10,230	10,590	10,513	10,479	10,350	10,361	10,409	10,410	10,410	10,409	10,475	10,475	10,475	10,475	10,127
Actual Net Heat Rate, Btu/Kwh	10,646	10,491	10,496	10,300	10,174										
Capacity Factor, %	84.1%	83.4%	73.1%	89.2%	90.4%	84.7%	70.3%	87.3%	88.9%	87.1%	64.8%	88.4%	87.2%	86.9%	73.6%
Annual Deviation from Plan, %	4.07%	-0.94%	-0.16%	-1.70%	-1.70%										
Four-year Average Deviation from Plan, %	2.60%	1.42%	1.02%	0.32%	-1.13%										

**Figure 4**  
**Jim Bridger Unit 4**  
**10-year Plan Heat Rate Goals**



Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
As-Built Net Heat Rate, Btu/Kwh	9,516	9,516	9,515	9,516	9,526	9,526	9,526	9,526	9,526	9,526	9,526	9,526	9,526	9,526	9,526
Planned Net Heat Rate, Btu/Kwh	10,382	10,468	10,539	10,473	10,365	10,346	10,366	10,365	10,365	10,365	10,365	10,085	10,086	10,086	10,086
Actual Net Heat Rate, Btu/Kwh	10,470	10,530	10,571	10,319	10,098										
Capacity Factor, %	80.8%	81.3%	84.6%	71.1%	90.2%	85.1%	84.0%	72.0%	86.9%	87.2%	88.4%	65.3%	87.1%	85.3%	87.0%
Annual Deviation from Plan, %	0.85%	0.59%	0.30%	-1.47%	-2.57%										
Four-year Average Deviation from Plan, %	-0.01%	0.19%	0.22%	0.07%	-0.79%										

**Table 1**  
**Jim Bridger Unit 1**  
**10-year Plan Heat Rate Improvement Projects**

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative)</b>											
Controls Upgrade	Btu/kWh	-70	-70	-70	-70	-70	-70	-70	-70	-70	-70
Turbine Upgrade Dense Pack	Btu/kWh	-58	-100	-100	-100	-100	-100	-100	-100	-224	-313
Scrubber Upgrade	Btu/kWh	30	50.6	50.6	50.6	50.6	50.6	50.6	50.6	50.6	50.6
Total adjustments related to Capital Projects	Btu/kWh	-99	-119	-119	-119	-119	-119	-119	-119	-243	-332
<b>Budgeted / Planned Auxiliary Load Changes</b>											
Reduced auxiliary load benefit of Budgeted / Planned Heat Rate Changes	KW	-204	-204	-204	-204	-204	-204	-204	-204	-204	-204
Drag Chain conveyor	KW	-553	-553	-553	-553	-553	-553	-553	-553	-553	-553
Total Auxiliary Load Changes	KW	-757	-757	-757	-757	-757	-757	-757	-757	-757	-757
<b>Budgeted / Planned Net Dependable Rating Changes, (Net Basis)</b>											
Turbine Upgrade Dense Pack	MW	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	18	18.0
Scrubber Upgrade	MW	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1	-3.1
Total Capacity Changes	MW	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	14.9	14.9

**Table 2**  
**Jim Bridger Unit 2**  
**10-year Plan Heat Rate Improvement Projects**

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative)</b>											
Controls Upgrade	Btu/kWh	-17.5	-17.5	-17.5	-17.5	-17.5	-17.5	-17.5	-17.5	-17.5	-17.5
Turbine Upgrade Dense Pack	Btu/kWh								-184	-316	-316
Scrubber Upgrade	Btu/kWh	81.9	81.9	81.9	81.9	81.9	81.9	81.9	81.9	81.9	81.9
Total adjustments related to Capital Projects	Btu/kWh	64.4	64.4	64.4	64.4	64.4	64.4	64.4	-120	-252	-252
<b>Budgeted / Planned Auxiliary Load Changes</b>											
Reduced auxiliary load benefit of Budgeted / Planned Heat Rate Changes	KW	-53	-53	-53	-53	-53	-53	-53	-53	-53	-53
Drag Chain Conveyor	KW	-530	-530	-530	-530	-530	-530	-530	-530	-530	-530
Clean Air Initiative - WFGD (90%) LNB	KW	795	795	795	795	795	795	795	795	795	795
Total Auxiliary Load Changes	KW	211	211	211	211	211	211	211	211	211	211
<b>Budgeted / Planned Net Dependable Rating Changes, (Net Basis)</b>											
Turbine Upgrade Dense Pack	MW								18	18	18
Scrubber Upgrade	MW	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Total Capacity Changes	MW	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	15.0	15.0	15.0

**Table 3**  
**Jim Bridger Unit 3**  
**10-year Plan Heat Rate Improvement Projects**

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative)</b>											
Turbine Upgrade Dense Pack	Btu/kWh						0	0.0	0.0	0.0	-182
Scrubber upgrade	Btu/kWh		32	54.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1
SCR addition	Btu/kWh						34	57.5	57.5	57.5	57.5
Total adjustments related to Capital Projects	Btu/kWh	0	32	54	54	54	88	112	112	112	-71
<b>Budgeted / Planned Auxiliary Load Changes</b>											
Clean Air Initiative - WFGD (90%) LNB	KW		464	795	795	795	795	795	795	795	795
Total Auxiliary Load Changes	KW	0	464	795	795	795	795	795	795	795	795
<b>Budgeted / Planned Net Dependable Rating Changes, (Net Basis)</b>											
Turbine Upgrade Dense Pack	MW										18
Scrubber upgrade	MW	0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
SCR addition	MW						-3.2	-3.2	-3.2	-3.2	-3.2
Total Capacity Changes	MW	0	-3.0	-3.0	-3.0	-3.0	-6.2	-6.2	-6.2	-6.2	11.8

**Table 4**  
**Jim Bridger Unit 4**  
**10-year Plan Heat Rate Improvement Projects**

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Budgeted / Planned Heat Rate Changes, Net basis (Improvements are negative)</b>											
41 Feedwater heater replacement	Btu/kWh	-70	-70	-70	-70	-70	-70	-70	-70	-70	-70
Turbine Upgrade Dense Pack	Btu/kWh							-183	-313	-313	-313
SCR	Btu/kWh							30	60	60	60
Total adjustments related to Capital Projects	Btu/kWh	-70	-70	-70	-70	-70	-70	-223	-323	-323	-323
<b>Budgeted / Planned Auxiliary Load Changes</b>											
Reduced auxiliary load benefit of Budgeted / Planned Heat Rate Changes	KW	-223	-223	-223	-223	-223	-223	-223	-223	-223	-223
Clean Air Initiative - WFGD (90%) LNB	KW	795	795	795	795	795	795	795	795	795	795
Total Auxiliary Load Changes	KW	572	572	572	572	572	572	572	572	572	572
<b>Budgeted / Planned Net Dependable Rating Changes, (Net Basis)</b>											
Turbine Upgrade Dense Pack	MW							18	18	18	18
SCR	MW							-3.3	-3.3	-3.3	-3.3
Total Capacity Changes	MW	0	0	0	0	0	0.00	14.70	14.70	14.70	14.70



**10. Required Signatures**

Performance Engineer – Jim Bridger Plant		Bernie Caulfield	
Signature:	(on file)	Date:	16 April 2010

Engineering Manager – Jim Bridger Plant		Paul Fahlsing	
Signature:	(on file)	Date:	16 April 2010

Managing Director – Jim Bridger Plant		Bob Arambel	
Signature:	(on file)	Date:	16 April 2010