

METER ERROR REPORT**FINAL**

Reconcile?	Y
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Safety Issue?	N
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Thesis Report No.	N/A
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1. EXECUTIVE SUMMARY

SITE NAME	BALGRAY OFFTAKE
LDZ	SCOTLAND
LAST GOOD DATE	22 April 2009
START DATE	Unknown
END DATE	6 April 2010
SIZE OF ERROR (No reconciliation required if under 0.1%)	-0.23%
ESTIMATE – Y/N?	N
ROOT CAUSE	Low dp transmitter calibration shift
ANALYSIS	HPMIS rbd data
METER TYPE	Orifice
AUTHOR	T Roberts
CHECKED BY	S Howells

2. BACKGROUND

Gas is supplied to part of the Scotland network at Balgray Offtake which employs an orifice meter to measure the volumetric flow rate. Site maximum flowrate is 2.16 mscm/d. The 2010 ME2 revalidation report recorded errors exceeding tolerance on the low dp transmitter.

3. ERROR QUANTIFICATION AND IMPACT

The combined transmitter and ADC errors amounted to an average shift of -0.138977 mbar. This error has been divided by two for the recalculations as the timescale for the calibration shift between the 2009 and 2010 ME2 revalidations is unknown. All 4 minute HPMIS rbd data sets between low flow cut-off and dp transmitter switch point have been recalculated to provide correction factors that have been applied to the Gemini daily volumes supplied by National Grid. Data for each Gasday during the period has been entered in Appendix A.

Combined errors from the 2010 ME2 revalidation report

% span (0-50 mbar)	LDP %	ADC %	Combined %	
0	-0.270625	0.001775	-0.26885	
25	-0.263838716	0.000225	-0.263614	
50	-0.284002027	0.00375	-0.280252	
75	-0.291278244	0.00905	-0.282228	
100	-0.296129055	0.0013	-0.294829	
			-0.277955	Average %
		=	-0.138977	Mbar

4. CAUSES

No specific cause for the calibration shift can be determined.

5. RECOMMENDATIONS AND LEARNING

It is a recommendation of this report that the corrections detailed in Appendix A are applied to reconcile the daily errors.

REFERENCES

HPMIS data

ME2 report for 2010

VERSION HISTORY

Version	Changes	Author	Date
Rev 1	Final	T Roberts	06/12/12

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DISTRIBUTION

NG UKT Data assurance and Quality Team

SGN S Skipp

SGN E Melen

SGN S Howells

Joint Office of Gas Transporters

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Appendix A

Gas Day	Gemini volume	CF	Corrected volume
22-Apr-09	353,800	1.0031	354,886
23-Apr-09	317,200	1.0031	318,186
24-Apr-09	338,800	1.0037	340,038
25-Apr-09	261,900	1.0043	263,027
26-Apr-09	308,200	1.0035	309,280
27-Apr-09	414,400	1.0029	415,617
28-Apr-09	482,400	1.0025	483,616
29-Apr-09	421,500	1.0031	422,824
30-Apr-09	396,000	1.0021	396,845
01-May-09	376,300	1.0023	377,184
02-May-09	300,400	1.0034	301,429
03-May-09	360,500	1.0043	362,046
04-May-09	469,600	1.0026	470,825
05-May-09	445,100	1.0027	446,320
06-May-09	465,100	1.0025	466,255
07-May-09	493,500	1.0022	494,601
08-May-09	420,600	1.0021	421,466
09-May-09	406,700	1.0023	407,640
10-May-09	417,400	1.0035	418,866
11-May-09	378,300	1.0026	379,299
12-May-09	395,300	1.0043	396,992
13-May-09	351,300	1.0029	352,310
14-May-09	300,000	1.0036	301,086
15-May-09	508,600	1.0021	509,676
16-May-09	429,800	1.0038	431,433
17-May-09	331,600	1.0045	333,097
18-May-09	381,600	1.0039	383,094
19-May-09	332,000	1.0057	333,887
20-May-09	242,900	1.0044	243,962
21-May-09	150,400	1.0074	151,514
22-May-09	48,400	1.0032	48,555
23-May-09	212,400	1.0062	213,722
24-May-09	282,700	1.0068	284,611
25-May-09	267,600	1.0041	268,693
26-May-09	253,700	1.0065	255,341
27-May-09	327,000	1.0049	328,617
28-May-09	278,600	1.0073	280,622
29-May-09	245,100	1.0084	247,160
30-May-09	198,000	1.0129	200,545
31-May-09	196,900	1.0128	199,423
01-Jun-09	221,600	1.0103	223,872
02-Jun-09	251,900	1.0077	253,851
03-Jun-09	268,500	1.0065	270,257
04-Jun-09	269,200	1.0070	271,087
05-Jun-09	272,200	1.0067	274,026
06-Jun-09	262,800	1.0076	264,795
07-Jun-09	254,000	1.0074	255,870
08-Jun-09	279,200	1.0066	281,038
09-Jun-09	319,900	1.0053	321,603
10-Jun-09	363,700	1.0043	365,251
11-Jun-09	348,200	1.0047	349,840

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12-Jun-09	288,100	1.0071	290,148
13-Jun-09	217,800	1.0112	220,234
14-Jun-09	253,200	1.0101	255,749
15-Jun-09	341,800	1.0055	343,678
16-Jun-09	291,000	1.0076	293,218
17-Jun-09	331,500	1.0053	333,257
18-Jun-09	332,700	1.0050	334,368
19-Jun-09	289,800	1.0069	291,804
20-Jun-09	230,700	1.0120	233,460
21-Jun-09	223,100	1.0121	225,810
22-Jun-09	221,700	1.0129	224,566
23-Jun-09	211,600	1.0120	214,135
24-Jun-09	219,000	1.0108	221,363
25-Jun-09	214,900	1.0117	217,424
26-Jun-09	202,900	1.0130	205,537
27-Jun-09	188,300	1.0153	191,190
28-Jun-09	195,200	1.0135	197,834
29-Jun-09	228,300	1.0107	230,738
30-Jun-09	222,100	1.0108	224,501
01-Jul-09	193,500	1.0133	196,077
02-Jul-09	182,400	1.0147	185,090
03-Jul-09	179,200	1.0150	181,886
04-Jul-09	119,700	1.0174	121,780
05-Jul-09	111,400	1.0213	113,776
06-Jul-09	149,300	1.0168	151,807
07-Jul-09	201,300	1.0119	203,689
08-Jul-09	218,400	1.0106	220,705
09-Jul-09	221,000	1.0111	223,450
10-Jul-09	206,100	1.0131	208,807
11-Jul-09	163,600	1.0165	166,297
12-Jul-09	165,700	1.0179	168,660
13-Jul-09	189,600	1.0144	192,332
14-Jul-09	199,200	1.0139	201,961
15-Jul-09	206,200	1.0134	208,958
16-Jul-09	200,300	1.0115	202,598
17-Jul-09	204,500	1.0123	207,014
18-Jul-09	188,400	1.0140	191,034
19-Jul-09	172,500	1.0158	175,229
20-Jul-09	218,900	1.0116	221,444
21-Jul-09	232,700	1.0099	235,009
22-Jul-09	224,700	1.0112	227,208
23-Jul-09	211,300	1.0128	214,015
24-Jul-09	210,300	1.0131	213,045
25-Jul-09	164,400	1.0158	166,993
26-Jul-09	181,000	1.0142	183,561
27-Jul-09	192,600	1.0138	195,266
28-Jul-09	199,000	1.0132	201,632
29-Jul-09	205,400	1.0130	208,077
30-Jul-09	210,700	1.0112	213,056
31-Jul-09	198,900	1.0132	201,521
01-Aug-09	173,300	1.0167	176,187
02-Aug-09	162,300	1.0177	165,170
03-Aug-09	178,300	1.0151	180,986
04-Aug-09	194,800	1.0133	197,399

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05-Aug-09	186,000	1.0146	188,712
06-Aug-09	194,000	1.0136	196,643
07-Aug-09	175,800	1.0150	178,431
08-Aug-09	136,900	1.0195	139,566
09-Aug-09	151,500	1.0211	154,694
10-Aug-09	200,600	1.0127	203,151
11-Aug-09	211,300	1.0112	213,675
12-Aug-09	208,700	1.0111	211,013
13-Aug-09	220,400	1.0104	222,697
14-Aug-09	244,500	1.0090	246,695
15-Aug-09	203,300	1.0122	205,771
16-Aug-09	206,900	1.0118	209,347
17-Aug-09	237,800	1.0091	239,973
18-Aug-09	251,700	1.0086	253,855
19-Aug-09	227,600	1.0102	229,918
20-Aug-09	233,400	1.0096	235,639
21-Aug-09	248,700	1.0085	250,818
22-Aug-09	217,300	1.0113	219,758
23-Aug-09	240,500	1.0093	242,728
24-Aug-09	233,100	1.0100	235,437
25-Aug-09	235,700	1.0099	238,023
26-Aug-09	275,900	1.0071	277,855
27-Aug-09	259,900	1.0078	261,927
28-Aug-09	302,700	1.0055	304,377
29-Aug-09	253,100	1.0082	255,168
30-Aug-09	249,700	1.0087	251,879
31-Aug-09	253,200	1.0082	255,274
01-Sep-09	261,900	1.0075	263,855
02-Sep-09	264,400	1.0076	266,404
03-Sep-09	336,300	1.0048	337,904
04-Sep-09	329,800	1.0052	331,521
05-Sep-09	306,500	1.0058	308,284
06-Sep-09	301,500	1.0062	303,362
07-Sep-09	286,100	1.0066	287,987
08-Sep-09	302,300	1.0059	304,080
09-Sep-09	287,300	1.0064	289,129
10-Sep-09	281,300	1.0065	283,132
11-Sep-09	269,600	1.0074	271,599
12-Sep-09	220,400	1.0112	222,876
13-Sep-09	226,000	1.0103	228,323
14-Sep-09	302,000	1.0062	303,862
15-Sep-09	286,400	1.0066	288,292
16-Sep-09	291,100	1.0063	292,921
17-Sep-09	288,700	1.0065	290,569
18-Sep-09	322,200	1.0053	323,921
19-Sep-09	283,700	1.0065	285,555
20-Sep-09	309,500	1.0057	311,254
21-Sep-09	343,800	1.0048	345,460
22-Sep-09	327,500	1.0052	329,197
23-Sep-09	353,000	1.0045	354,586
24-Sep-09	323,400	1.0052	325,078
25-Sep-09	317,700	1.0054	319,422
26-Sep-09	256,500	1.0086	258,704
27-Sep-09	280,400	1.0068	282,319

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28-Sep-09	312,300	1.0058	314,120
29-Sep-09	380,800	1.0040	382,305
30-Sep-09	358,000	1.0045	359,611
01-Oct-09	417,000	1.0035	418,440
02-Oct-09	446,400	1.0030	447,751
03-Oct-09	385,000	1.0038	386,482
04-Oct-09	381,200	1.0037	382,607
05-Oct-09	484,600	1.0024	485,751
06-Oct-09	431,400	1.0028	432,621
07-Oct-09	426,200	1.0029	427,444
08-Oct-09	439,500	1.0029	440,760
09-Oct-09	466,700	1.0026	467,923
10-Oct-09	352,600	1.0047	354,260
11-Oct-09	370,600	1.0038	372,014
12-Oct-09	413,400	1.0033	414,772
13-Oct-09	388,000	1.0038	389,472
14-Oct-09	321,800	1.0052	323,489
15-Oct-09	324,800	1.0047	326,324
16-Oct-09	399,100	1.0032	400,381
17-Oct-09	403,500	1.0033	404,827
18-Oct-09	439,100	1.0027	440,283
19-Oct-09	489,100	1.0022	490,163
20-Oct-09	514,100	1.0021	515,162
21-Oct-09	482,400	1.0025	483,605
22-Oct-09	440,200	1.0031	441,561
23-Oct-09	425,500	1.0032	426,869
24-Oct-09	430,300	1.0036	431,841
25-Oct-09	416,000	1.0032	417,332
26-Oct-09	461,200	1.0028	462,482
27-Oct-09	484,000	1.0026	485,242
28-Oct-09	384,600	1.0039	386,105
29-Oct-09	399,100	1.0037	400,585
30-Oct-09	406,200	1.0036	407,642
31-Oct-09	332,900	1.0058	334,816
01-Nov-09	459,900	1.0027	461,155
02-Nov-09	510,600	1.0023	511,793
03-Nov-09	557,800	1.0018	558,819
04-Nov-09	583,000	1.0017	584,005
05-Nov-09	614,700	1.0014	615,560
06-Nov-09	656,100	1.0013	656,978
07-Nov-09	616,500	1.0015	617,444
08-Nov-09	668,300	1.0012	669,075
09-Nov-09	734,800	1.0009	735,464
10-Nov-09	674,100	1.0011	674,846
11-Nov-09	647,700	1.0012	648,470
12-Nov-09	601,100	1.0015	601,994
13-Nov-09	589,700	1.0017	590,719
14-Nov-09	551,600	1.0021	552,736
15-Nov-09	565,400	1.0019	566,492
16-Nov-09	623,200	1.0015	624,141
17-Nov-09	622,100	1.0014	622,995
18-Nov-09	655,200	1.0014	656,123
19-Nov-09	534,500	1.0023	535,704
20-Nov-09	541,000	1.0020	542,107

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21-Nov-09	557,300	1.0022	558,538
22-Nov-09	562,100	1.0019	563,194
23-Nov-09	637,000	1.0014	637,863
24-Nov-09	652,500	1.0014	653,392
25-Nov-09	716,000	1.0010	716,708
26-Nov-09	724,700	1.0009	725,385
27-Nov-09	702,500	1.0010	703,185
28-Nov-09	693,800	1.0009	694,438
29-Nov-09	796,200	1.0005	796,601
30-Nov-09	848,000	1.0005	848,424
01-Dec-09	912,900	1.0004	913,254
02-Dec-09	780,700	1.0008	781,286
03-Dec-09	774,700	1.0007	775,217
04-Dec-09	778,500	1.0006	778,993
05-Dec-09	676,700	1.0010	677,356
06-Dec-09	664,000	1.0010	664,694
07-Dec-09	740,400	1.0007	740,927
08-Dec-09	742,300	1.0009	742,943
09-Dec-09	682,700	1.0010	683,356
10-Dec-09	777,600	1.0006	778,064
11-Dec-09	861,600	1.0004	861,948
12-Dec-09	833,600	1.0005	833,979
13-Dec-09	902,600	1.0003	902,906
14-Dec-09	848,600	1.0005	849,004
15-Dec-09	804,900	1.0006	805,411
16-Dec-09	807,100	1.0006	807,603
17-Dec-09	949,800	1.0003	950,096
18-Dec-09	986,600	1.0003	986,921
19-Dec-09	969,500	1.0003	969,776
20-Dec-09	976,400	1.0003	976,714
21-Dec-09	956,500	1.0004	956,856
22-Dec-09	975,600	1.0003	975,918
23-Dec-09	1,023,400	1.0003	1,023,672
24-Dec-09	1,064,600	1.0003	1,064,876
25-Dec-09	963,400	1.0003	963,696
26-Dec-09	1,008,500	1.0003	1,008,758
27-Dec-09	992,400	1.0003	992,681
28-Dec-09	1,094,400	1.0002	1,094,621
29-Dec-09	1,124,700	1.0002	1,124,954
30-Dec-09	1,062,500	1.0002	1,062,765
31-Dec-09	1,075,000	1.0002	1,075,207
01-Jan-10	975,300	1.0003	975,551
02-Jan-10	1,013,600	1.0002	1,013,846
03-Jan-10	1,083,900	1.0002	1,084,084
04-Jan-10	1,103,900	1.0002	1,104,132
05-Jan-10	1,131,300	1.0002	1,131,509
06-Jan-10	1,156,500	1.0002	1,156,714
07-Jan-10	1,189,400	1.0001	1,189,554
08-Jan-10	1,201,700	1.0002	1,201,910
09-Jan-10	1,083,900	1.0002	1,084,119
10-Jan-10	1,053,600	1.0002	1,053,849
11-Jan-10	1,049,400	1.0003	1,049,676
12-Jan-10	1,042,300	1.0003	1,042,580
13-Jan-10	1,040,200	1.0002	1,040,455

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14-Jan-10	1,010,100	1.0003	1,010,362
15-Jan-10	981,900	1.0003	982,199
16-Jan-10	900,000	1.0004	900,332
17-Jan-10	867,100	1.0004	867,435
18-Jan-10	918,800	1.0003	919,095
19-Jan-10	1,004,800	1.0003	1,005,067
20-Jan-10	1,022,400	1.0003	1,022,690
21-Jan-10	1,011,400	1.0003	1,011,726
22-Jan-10	948,600	1.0004	948,971
23-Jan-10	917,900	1.0004	918,290
24-Jan-10	923,700	1.0004	924,079
25-Jan-10	991,600	1.0003	991,878
26-Jan-10	990,200	1.0003	990,516
27-Jan-10	871,900	1.0005	872,296
28-Jan-10	902,000	1.0004	902,340
29-Jan-10	982,200	1.0003	982,485
30-Jan-10	947,500	1.0003	947,787
31-Jan-10	968,700	1.0003	968,943
01-Feb-10	1,034,300	1.0003	1,034,571
02-Feb-10	985,000	1.0002	985,224
03-Feb-10	1,058,700	1.0002	1,058,950
04-Feb-10	951,900	1.0003	952,224
05-Feb-10	914,300	1.0003	914,604
06-Feb-10	843,200	1.0005	843,580
07-Feb-10	858,500	1.0004	858,828
08-Feb-10	980,800	1.0003	981,069
09-Feb-10	942,900	1.0003	943,170
10-Feb-10	950,300	1.0003	950,582
11-Feb-10	967,200	1.0003	967,512
12-Feb-10	911,900	1.0004	912,237
13-Feb-10	883,300	1.0004	883,670
14-Feb-10	843,500	1.0004	843,846
15-Feb-10	898,400	1.0003	898,698
16-Feb-10	923,300	1.0003	923,562
17-Feb-10	916,700	1.0003	917,003
18-Feb-10	934,200	1.0003	934,466
19-Feb-10	980,900	1.0003	981,198
20-Feb-10	929,300	1.0003	929,606
21-Feb-10	950,700	1.0002	950,935
22-Feb-10	980,300	1.0003	980,563
23-Feb-10	981,800	1.0003	982,118
24-Feb-10	1,040,400	1.0003	1,040,682
25-Feb-10	1,076,500	1.0003	1,076,806
26-Feb-10	998,100	1.0003	998,406
27-Feb-10	925,200	1.0003	925,514
28-Feb-10	941,100	1.0003	941,370
01-Mar-10	967,600	1.0003	967,873
02-Mar-10	951,400	1.0003	951,678
03-Mar-10	1,027,600	1.0002	1,027,811
04-Mar-10	962,700	1.0003	962,981
05-Mar-10	919,800	1.0004	920,134
06-Mar-10	801,900	1.0006	802,353
07-Mar-10	824,300	1.0004	824,659
08-Mar-10	881,500	1.0004	881,847

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09-Mar-10	826,600	1.0005	827,054
10-Mar-10	826,500	1.0006	826,961
11-Mar-10	778,500	1.0007	779,008
12-Mar-10	763,300	1.0007	763,852
13-Mar-10	684,200	1.0010	684,858
14-Mar-10	684,810	1.0009	685,431
15-Mar-10	751,000	1.0008	751,564
16-Mar-10	755,100	1.0008	755,696
17-Mar-10	663,200	1.0011	663,947
18-Mar-10	651,100	1.0011	651,832
19-Mar-10	621,300	1.0013	622,093
20-Mar-10	595,900	1.0014	596,720
21-Mar-10	670,400	1.0010	671,045
22-Mar-10	716,500	1.0009	717,158
23-Mar-10	718,500	1.0009	719,176
24-Mar-10	708,200	1.0010	708,890
25-Mar-10	752,100	1.0008	752,667
26-Mar-10	742,800	1.0007	743,353
27-Mar-10	607,400	1.0013	608,179
28-Mar-10	628,300	1.0013	629,138
29-Mar-10	833,600	1.0006	834,077
30-Mar-10	1,031,300	1.0003	1,031,562
31-Mar-10	1,021,000	1.0003	1,021,273
01-Apr-10	862,700	1.0005	863,095
02-Apr-10	769,300	1.0006	769,754
03-Apr-10	651,700	1.0009	652,317
04-Apr-10	682,400	1.0008	682,924
05-Apr-10	724,500	1.0006	724,963
06-Apr-10	722,400	1.0006	722,828