

METER ERROR REPORT**FINAL**

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

SITE NAME	Easton Grey	
LDZ	SW	
START DATE (actual)		
LAST GOOD DATE	10 th December 2012	
END DATE	1 st October 2014	
SIZE OF ERROR (No reconciliation required if under 0.1%)	0.3115% under-registration (5.86 GWh)	
ESTIMATE – Y/N?		
ROOT CAUSE	Failed validation checks for pressure ADC and temperature ADC on both streams.	
ANALYSIS	Recalculation of volumes using corrected pressure and temperature	
METER TYPE	USM	
AUTHOR	C Jones	
CHECKED BY	H Richardson	
ACCEPTED BY WWU NETWORK		
RECONCILIATION	Distribution	Transportation

2. BACKGROUND

Easton Grey has a duty/standby Ultrasonic meter stream using a gas chromatograph for CV determination and PTZ correction.

During the annual validation the CP4a (ADC Pressure Check) and the CP4e (ADC Temperature Check) tests failed on 12th June 2013 for stream 1 and stream 2. The CP4a (ADC Pressure Check) and the CP4e (ADC Temperature Check) tests failed during the annual validation again on 9th June 2014 for stream 1 and stream 2.

The annual validation of stream 2 took place on 11th December 2012. On 21st January 2013 the annual validation took place for stream 1. Stream 1 was in use from this date until 1st October 2014 when the error ended.

3. ERROR QUANTIFICATION AND IMPACT

The pressure measurements were corrected for 'As Found' errors shown in Table 1 and 2 for Stream A and Table 3 and 4 for Stream B when the recorded measurement was in the appropriate range.

The temperature measurements were corrected for the 'As Found' errors shown in Table 5 and 6 for Stream A and Table 7 and 8 for Stream B when the recorded measurement was in the appropriate range.

Pressure (barg)	CP4a Error (% span)	CP10 Error (% span)	Combined error (% span)
0	-0.049	0.00315	-0.04585
25	-0.103	-0.00265	-0.10565
50	-0.189	-0.0241	-0.2131
75	-0.318	-0.0267	-0.3447
100	-0.547	-0.045	-0.592

Table 1 – Pressure Errors, Stream A (21/01/13 – 12/06/13)

Pressure (barg)	CP4a Error (% span)	CP10 Error (% span)	Combined error (% span)
0	0.001	-0.0063	-0.0053
25	0.072	-0.0176	0.0544
50	0.111	-0.029	0.082
75	0.089	-0.0466	0.0424
100	-0.002	-0.1079	-0.1099

Table 2 – Pressure Errors, Stream A (09/06/14 – 01/10/14)

Pressure (barg)	CP4a Error (% span)	CP10 Error (% span)	Combined error (% span)
0	0.001	0.02505	0.02605
25	0.065	0.0255	0.0905
50	0.115	-0.05835	0.05665
75	0.102	-0.0891	0.0129
100	0.006	-0.0292	-0.0232

Table 3 – Pressure Errors, Stream B (21/01/13 – 12/06/13)

Pressure (barg)	CP4a Error (% span)	CP10 Error (% span)	Combined error (% span)
0	0.001	-0.0063	-0.0053
25	0.086	-0.019	0.067
50	0.145	-0.038	0.107
75	0.141	-0.0508	0.0902
100	0.001	-0.0636	-0.0626

Table 4 – Pressure Errors, Stream B (09/06/14 – 01/10/14)

Temperature (°C)	CP4e Error (% span)	CP10 Error (% span)	Combined error (% span)
-10	-0.06	0.12815	0.06815
2.5	-0.1	0.11875	0.01875
15	-0.18	-0.11565	-0.29565
27.5	-0.3	-0.15315	-0.45315
40	-0.5	-0.1	-0.6

Table 5 – Temperature Errors, Stream A (21/01/13 – 12/06/13)

Temperature (°C)	CP4e Error (% span)	CP10 Error (% span)	Combined error (% span)
-10	0	0.0875	0.0875
2.5	0.06	0.02815	0.08815
15	0.1	0.0625	0.1625
27.5	0.1	0.0625	0.1625
40	0	-0.0625	-0.0625

Table 6 – Temperature Errors, Stream A (09/06/14 – 01/10/14)

Temperature (°C)	CP4e Error (% span)	CP10 Error (% span)	Combined error (% span)
-10	-0.04	0.1219	0.0819
2.5	-0.1	0.125	0.025
15	-0.14	-0.0969	-0.2369
27.5	-0.24	-0.13755	-0.37755
40	-0.38	-0.0938	-0.4738

Table 7 – Temperature Errors, Stream B (21/01/13 – 12/06/13)

Temperature (°C)	CP4e Error (% span)	CP10 Error (% span)	Combined error (% span)
-10	0	0.02815	0.02815
2.5	0	0	0
15	0.04	0.06875	0.10875
27.5	0	0.0188	0.0188
40	0.02	-0.0438	-0.0238

Table 8 – Temperature ADC Errors, Stream B (21/01/13 – 12/06/13)

The density, flow rate and daily volumes were recalculated from the corrected pressure and temperature readings. The error was calculated on a daily basis as the difference between volume totals using measured and corrected inputs.

The overall error is an under-registration of 0.3115%. The error is equivalent to 5.86 GWh.

4. CAUSES

Pressure ADC checks and temperature ADC and transmitter checks failed during routine validation for both streams.

5. RECOMMENDATIONS AND LEARNING

Failures of this type will occur occasionally, if the same checks fail regularly then it suggests a fundamental problem with the equipment being tested and repairs or replacements should be made.

The start of the error cannot be identified therefore the total error to be reconciled should be halved in accordance with the Offtake Arrangements Document. Appendix A shows the daily correction factors, which have already been halved between 12th December 2012 and 12th June 2013. It should be noted that there was no metering data available between 12th December 2012 and 21st January 2013. A correction factor has been applied to these days equal to the mean correction for the subsequent month.

REFERENCES

Easton Grey_Data.xlsx – calculation spreadsheet

Easton Grey_Summary.xlsx – results spreadsheet

VERSION HISTORY

<i>Version</i>	<i>Changes</i>	<i>Author</i>	<i>Date</i>
0	<i>Original</i>	<i>C.Jones</i>	<i>16/07/15</i>

DISTRIBUTION

Wales and West Utilities

APPENDIX A – Daily Correction Factors

The table below gives the daily correction factors which should be used to reconcile the error.

Gas Day	Daily Correction Factor
12/12/2012	1.002395
13/12/2012	1.002395
14/12/2012	1.002395
15/12/2012	1.002395
16/12/2012	1.002395
17/12/2012	1.002395
18/12/2012	1.002395
19/12/2012	1.002395
20/12/2012	1.002395
21/12/2012	1.002395
22/12/2012	1.002395
23/12/2012	1.002395
24/12/2012	1.002395
25/12/2012	1.002395
26/12/2012	1.002395
27/12/2012	1.002395
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29/12/2012	1.002395
30/12/2012	1.002395
31/12/2012	1.002395
01/01/2013	1.002395
02/01/2013	1.002395
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04/01/2013	1.002395
05/01/2013	1.002395
06/01/2013	1.002395
07/01/2013	1.002395
08/01/2013	1.002395
09/01/2013	1.002395
10/01/2013	1.002395
11/01/2013	1.002395
12/01/2013	1.002395
13/01/2013	1.002395
14/01/2013	1.002395
15/01/2013	1.002395
16/01/2013	1.002395
17/01/2013	1.002395
18/01/2013	1.002395

Gas Day	Daily Correction Factor
19/01/2013	1.002395
20/01/2013	1.002395
21/01/2013	1.002395
22/01/2013	1.002388
23/01/2013	1.002446
24/01/2013	1.002452
25/01/2013	1.002439
26/01/2013	1.002417
27/01/2013	1.002394
28/01/2013	1.002395
29/01/2013	1.002392
30/01/2013	1.002413
31/01/2013	1.002385
01/02/2013	1.002362
02/02/2013	1.002383
03/02/2013	1.002393
04/02/2013	1.002385
05/02/2013	1.002374
06/02/2013	1.002358
07/02/2013	1.002379
08/02/2013	1.002344
09/02/2013	1.002378
10/02/2013	1.002430
11/02/2013	1.002391
12/02/2013	1.002367
13/02/2013	1.002380
14/02/2013	1.002429
15/02/2013	1.002383
16/02/2013	1.002380
17/02/2013	1.002375
18/02/2013	1.002378
19/02/2013	1.002435
20/02/2013	1.002388
21/02/2013	1.002381
22/02/2013	1.002442
23/02/2013	1.002422
24/02/2013	1.002409
25/02/2013	1.002417

26/02/2013	1.002424
27/02/2013	1.002497
28/02/2013	1.002399
01/03/2013	1.002495
02/03/2013	1.002420
03/03/2013	1.002416
04/03/2013	1.002438
05/03/2013	1.002371
06/03/2013	1.002415
07/03/2013	1.002430
08/03/2013	1.002377
09/03/2013	1.002395
10/03/2013	1.002421
11/03/2013	1.002442
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22/03/2013	1.002365
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24/03/2013	1.002415
25/03/2013	1.002469
26/03/2013	1.002492
27/03/2013	1.002497
28/03/2013	1.002471
29/03/2013	1.002398
30/03/2013	1.002460
31/03/2013	1.002490
01/04/2013	1.002447
02/04/2013	1.002454
03/04/2013	1.002474
04/04/2013	1.002486
05/04/2013	1.002474
06/04/2013	1.002468
07/04/2013	1.002456
08/04/2013	1.002437
09/04/2013	1.002472
10/04/2013	1.002465
11/04/2013	1.002457
12/04/2013	1.002408

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25/03/2014	1.001746
26/03/2014	1.001842
27/03/2014	1.001767
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07/04/2014	1.001910
08/04/2014	1.000000
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10/04/2014	1.001916
11/04/2014	1.001856
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13/04/2014	1.000000
14/04/2014	1.001470
15/04/2014	1.001935

16/04/2014	1.001931
17/04/2014	1.001777
18/04/2014	1.000000
19/04/2014	1.000000
20/04/2014	1.001884
21/04/2014	1.001846
22/04/2014	1.001799
23/04/2014	1.001880
24/04/2014	1.001801
25/04/2014	1.001856
26/04/2014	1.001891
27/04/2014	1.001800
28/04/2014	1.001815
29/04/2014	1.001657
30/04/2014	1.001717
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01/10/2014	1.000000