

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	Dowlais	
LDZ	SW	
START DATE (actual)		
LAST GOOD DATE	12 th June 2013	
END DATE	4 th July 2014	
SIZE OF ERROR (No reconciliation required if under 0.1%)	0.7258% under-registration (41.56 GWh)	
ESTIMATE – Y/N?		
ROOT CAUSE	Failed validation checks for pressure ADC and temperature ADC and transmitter 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

Dowlais 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 1st July 2014 for stream B and stream A failed on 8th July 2014. The CP12 (temperature transmitter check) test failed on 3rd July 2014 for stream B and 10th July 2014 for stream A.

The annual validation of stream A and B temperature and pressure ADC's (CP4) took place on 12th June 2013. On 2nd July 2013 the stream B CP12 (temperature transmitter check) test was carried out, on 4th July 2013 the stream A CP12 (temperature transmitter check) test was carried out. Stream A was in use from this date until 4th July 2014 when stream B was in use and the error ended.

3. ERROR QUANTIFICATION AND IMPACT

The pressure measurements were corrected for 'As Found' errors shown in Table 1 for Stream A and Table 2 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 3 and 4 for Stream A and Table 5 and 6 for Stream B when the recorded measurement was in the appropriate range.

Pressure (barg)	CP4a Error (% span)
0	-0.0725
20	-0.1513
40	-0.2675
60	-0.4525
80	-0.7225

Table 1 – Pressure Errors, Stream A (12/06/13 – 08/07/14)

Pressure (barg)	CP4a Error (% span)
0	-0.0425
20	-0.0788
40	-0.1513
60	-0.2625
80	-0.4225

Table 2 – Pressure Errors, Stream B (12/06/13 – 01/07/14)

Temperature (°C)	CP4e Error (% span)
-10	-0.04
2.5	-0.1
15	-0.18
27.5	-0.3
40	-0.46

Table 3 – Temperature ADC Errors, Stream A (12/06/13 – 08/07/14)

Temperature (°C)	CP12 Error (% span)
-10	0.33755
2.5	0.3563
15	0.3469
27.5	0.30315
40	0.2688

Table 4 – Temperature transmitter Errors, Stream A (04/07/13 – 10/07/14)

Temperature (°C)	CP4e Error (% span)
-10	-0.06
2.5	-0.12
15	-0.2
27.5	-0.32
40	-0.48

Table 5 – Temperature ADC Errors, Stream B (12/06/13 – 01/07/14)

Temperature (°C)	CP12 Error (% span)
-10	0.32505
2.5	0.31565
15	0.3344
27.5	0.3094
40	0.2938

Table 6 – Temperature transmitter Errors, Stream B (02/07/13 – 03/07/14)

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 0.7258%. The error is equivalent to 41.56 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.

On 12th June 2013, 3rd July 2013, 5th – 9th July 2013, 19th July and 5th August there was missing RBD and audit data therefore a correction has been applied equal to the mean correction factor for the previous and subsequent day where possible.

REFERENCES

Dowlais_Data V1.xlsx – calculation spreadsheet

Dowlais_Summary V1.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>15/07/15</i>
1	<i>Final, extra RBD and audit data</i>	<i>C.Jones</i>	<i>30/09/15</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
12/06/2013	1.003425
13/06/2013	1.003425
14/06/2013	1.003350
15/06/2013	1.003359
16/06/2013	1.003272
17/06/2013	1.003272
18/06/2013	1.003290
19/06/2013	1.003310
20/06/2013	1.003397
21/06/2013	1.003366
22/06/2013	1.003378
23/06/2013	1.003329
24/06/2013	1.003245
25/06/2013	1.003224
26/06/2013	1.003199
27/06/2013	1.003177
28/06/2013	1.003174
29/06/2013	1.003178
30/06/2013	1.003185
01/07/2013	1.003116
02/07/2013	1.003109
03/07/2013	1.003107
04/07/2013	1.003105
05/07/2013	1.003341
06/07/2013	1.003341
07/07/2013	1.003341
08/07/2013	1.003341
09/07/2013	1.003341
10/07/2013	1.003577
11/07/2013	1.003578
12/07/2013	1.003636
13/07/2013	1.003601
14/07/2013	1.003614
15/07/2013	1.003588
16/07/2013	1.003607
17/07/2013	1.003630
18/07/2013	1.003601
19/07/2013	1.003624

Gas Day	Daily Correction Factor
20/07/2013	1.003647
21/07/2013	1.003649
22/07/2013	1.003600
23/07/2013	1.003595
24/07/2013	1.003591
25/07/2013	1.003577
26/07/2013	1.003599
27/07/2013	1.003575
28/07/2013	1.003612
29/07/2013	1.003628
30/07/2013	1.003634
31/07/2013	1.003669
01/08/2013	1.003626
02/08/2013	1.003608
03/08/2013	1.003569
04/08/2013	1.003587
05/08/2013	1.003572
06/08/2013	1.003557
07/08/2013	1.003532
08/08/2013	1.003603
09/08/2013	1.003622
10/08/2013	1.003594
11/08/2013	1.003599
12/08/2013	1.003572
13/08/2013	1.003530
14/08/2013	1.003565
15/08/2013	1.003616
16/08/2013	1.003598
17/08/2013	1.003620
18/08/2013	1.003592
19/08/2013	1.003530
20/08/2013	1.003526
21/08/2013	1.003601
22/08/2013	1.003576
23/08/2013	1.003577
24/08/2013	1.003546
25/08/2013	1.003559
26/08/2013	1.003531

27/08/2013	1.003563
28/08/2013	1.003581
29/08/2013	1.003592
30/08/2013	1.003580
31/08/2013	1.003603
01/09/2013	1.003566
02/09/2013	1.003543
03/09/2013	1.003565
04/09/2013	1.003548
05/09/2013	1.003548
06/09/2013	1.003552
07/09/2013	1.003561
08/09/2013	1.003575
09/09/2013	1.003558
10/09/2013	1.003579
11/09/2013	1.003585
12/09/2013	1.003582
13/09/2013	1.003547
14/09/2013	1.003513
15/09/2013	1.003475
16/09/2013	1.003571
17/09/2013	1.003543
18/09/2013	1.003568
19/09/2013	1.003569
20/09/2013	1.003569
21/09/2013	1.003622
22/09/2013	1.003581
23/09/2013	1.003561
24/09/2013	1.003581
25/09/2013	1.003586
26/09/2013	1.003563
27/09/2013	1.003570
28/09/2013	1.003589
29/09/2013	1.003596
30/09/2013	1.003585
01/10/2013	1.003604
02/10/2013	1.003590
03/10/2013	1.003624
04/10/2013	1.003583
05/10/2013	1.003628
06/10/2013	1.003668
07/10/2013	1.003603
08/10/2013	1.003588
09/10/2013	1.003611
10/10/2013	1.003640
11/10/2013	1.003628

12/10/2013	1.003616
13/10/2013	1.003624
14/10/2013	1.003600
15/10/2013	1.003650
16/10/2013	1.003630
17/10/2013	1.003649
18/10/2013	1.003620
19/10/2013	1.003611
20/10/2013	1.003662
21/10/2013	1.003632
22/10/2013	1.003627
23/10/2013	1.003630
24/10/2013	1.003643
25/10/2013	1.003675
26/10/2013	1.003644
27/10/2013	1.003649
28/10/2013	1.003648
29/10/2013	1.003630
30/10/2013	1.003645
31/10/2013	1.003658
01/11/2013	1.003657
02/11/2013	1.003726
03/11/2013	1.003705
04/11/2013	1.003825
05/11/2013	1.003695
06/11/2013	1.003830
07/11/2013	1.003708
08/11/2013	1.003716
09/11/2013	1.003819
10/11/2013	1.003827
11/11/2013	1.003720
12/11/2013	1.003699
13/11/2013	1.003650
14/11/2013	1.003669
15/11/2013	1.003746
16/11/2013	1.003723
17/11/2013	1.003716
18/11/2013	1.003817
19/11/2013	1.003872
20/11/2013	1.003795
21/11/2013	1.003736
22/11/2013	1.003784
23/11/2013	1.003754
24/11/2013	1.003753
25/11/2013	1.003755
26/11/2013	1.003786

27/11/2013	1.003723
28/11/2013	1.003772
29/11/2013	1.003831
30/11/2013	1.003829
01/12/2013	1.003778
02/12/2013	1.003619
03/12/2013	1.003651
04/12/2013	1.003672
05/12/2013	1.003664
06/12/2013	1.003629
07/12/2013	1.003682
08/12/2013	1.003649
09/12/2013	1.003702
10/12/2013	1.003712
11/12/2013	1.003620
12/12/2013	1.003638
13/12/2013	1.003645
14/12/2013	1.003643
15/12/2013	1.003691
16/12/2013	1.003680
17/12/2013	1.003600
18/12/2013	1.003645
19/12/2013	1.003694
20/12/2013	1.003673
21/12/2013	1.003697
22/12/2013	1.003650
23/12/2013	1.003629
24/12/2013	1.003717
25/12/2013	1.003708
26/12/2013	1.003688
27/12/2013	1.003705
28/12/2013	1.003694
29/12/2013	1.003672
30/12/2013	1.003698
31/12/2013	1.003761
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02/01/2014	1.003709
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05/01/2014	1.003683
06/01/2014	1.003667
07/01/2014	1.003690
08/01/2014	1.003658
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16/01/2014	1.003712
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22/01/2014	1.003691
23/01/2014	1.003666
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25/01/2014	1.003729
26/01/2014	1.003675
27/01/2014	1.003752
28/01/2014	1.003671
29/01/2014	1.003730
30/01/2014	1.003659
31/01/2014	1.003758
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02/02/2014	1.003709
03/02/2014	1.003657
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05/02/2014	1.003675
06/02/2014	1.003625
07/02/2014	1.003699
08/02/2014	1.003692
09/02/2014	1.003653
10/02/2014	1.003613
11/02/2014	1.003644
12/02/2014	1.003685
13/02/2014	1.003603
14/02/2014	1.003671
15/02/2014	1.003691
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19/02/2014	1.003746
20/02/2014	1.003723
21/02/2014	1.003739
22/02/2014	1.003813
23/02/2014	1.003832
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25/02/2014	1.003752
26/02/2014	1.003770

27/02/2014	1.003778
28/02/2014	1.003689
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02/03/2014	1.003824
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15/04/2014	1.003831
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05/07/2014	1.000000
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