

**METER ERROR REPORT****FINAL**

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

SITE NAME	Maelor	
LDZ	WN	
START DATE (actual)	Not known	
LAST GOOD DATE	10th July 2008	
END DATE	7 <sup>th</sup> October 2017	
SIZE OF ERROR (No reconciliation required if under 0.1%)	0.171% under read / (10GWh / 910249 sm <sup>3</sup> )	
ESTIMATE – Y/N?	N	
ROOT CAUSE	A faulty ultrasonic meter	
ANALYSIS	In the attached spreadsheets	
METER TYPE	Ultrasonic	
AUTHOR	Piers Eldridge	
CHECKED BY	Catherine Jones	
ACCEPTED BY NGN NETWORK		
RECONCILIATION	Distribution	Transportation

## 2. BACKGROUND

Gas is supplied to part of the Wales North Network at Maelor FWACV offtake. The metering system comprises two ultrasonic meters and uses a gas chromatograph for CV determination and PTZ correction.

A fault was discovered when the meter from stream A (MT1) was at the DNVGL flow centre for calibration. The meter was calibrated in its as found condition on 27 October 2016 and the results of the calibration was used in this error report. The meter was repaired by Emersons and was calibrated in its fixed condition. The repaired meter was installed in stream A (MT1) on 7<sup>th</sup> October 2017 at Maelor offtake.

The last good date is 10th July 2008 when the meter was installed prior to the calibration in 2018.

## 3. ERROR QUANTIFICATION AND IMPACT

The volume that flowed between each DANINT cycle was corrected by applying a correction factor calculated from the 'As Found' errors taken from the calibration on 27 October 2016 shown in Table 1. The meter error would have no effect on the calculated gas density therefore the correction factor from the flow rate at operating conditions can be applied to the flow rate at standard conditions.

The correction factors at flowrates between the calibration points were calculated by interpolating between the points.

As the start of the meter error cannot be determined the half the error has been applied to the period between the last good date and the date the meter was removed.

The volumes have been corrected for the as found error recorded at the October 2016 calibration between 1 January 2015 and 7 October 2016. No gas flowed through stream A (MT1) until 29 October 2015.

$Q_{ref}$ (am <sup>3</sup> /h)	$Q_{ind}$ (am <sup>3</sup> /h)	Error (%)	Correction factor
397.49	406.05	2.15	0.978919
835.14	816.05	-2.29	1.023393
1950.43	1968.68	0.94	0.990730
2965.61	2997.59	1.08	0.989331
5372.83	5378.35	0.1	0.998992
7407.72	7447.74	0.54	0.994627

Table 1 – Flow rate As Found errors (27<sup>th</sup> October 2016)

The overall error is an under-registration of 0.171%. The error is equivalent to 910249 sm<sup>3</sup> and 10.03GWh.

#### 4. CAUSES

The cause of the meter failure is not known.

#### 5. RECOMMENDATIONS AND LEARNING

Fault of this type will occur occasionally, if warnings and alarms levels are set correctly in the meter and these alarms are relayed back to system control the meter error can be minimised by switching streams. Degradation in performance can be monitored by collecting and analysing diagnostic data. Failure can be anticipated and repairs can be done before the meter reaches a condition where it causes an error.

Appendix A shows the daily correction factors, in which the errors have already been halved.

#### REFERENCES

MER Data.xls

#### VERSION HISTORY

<i>Version</i>	<i>Changes</i>	<i>Author</i>	<i>Date</i>
<i>0</i>	<i>First draft</i>	<i>Piers Eldridge</i>	<i>15/03/2019</i>

#### DISTRIBUTION

*Asset Owner*

*Energy Performance*

*Network Lead Group*

*Asset Strategy*

**Appendix A**

<b>Gas Day</b>	<b>Daily Correction Factor</b>
29/10/2015	1.001863
30/10/2015	1.008989
31/10/2015	1.008747
01/11/2015	1.009796
02/11/2015	1.007967
03/11/2015	1.008256
06/11/2015	1.004405
07/11/2015	1.009825
08/11/2015	1.008062
09/11/2015	1.008031
10/11/2015	1.009264
11/11/2015	1.009324
12/11/2015	1.008814
13/11/2015	1.005362
14/11/2015	1.006440
15/11/2015	1.010088
16/11/2015	1.007920
17/11/2015	1.005226
18/11/2015	1.006524
19/11/2015	1.004291
20/11/2015	1.003752
21/11/2015	1.002023
22/11/2015	1.002017
23/11/2015	0.998421
24/11/2015	1.002913
25/11/2015	1.003338
26/11/2015	1.004489
27/11/2015	1.006261
28/11/2015	1.001871
29/11/2015	1.003964
03/12/2015	1.006960
04/12/2015	1.005591
05/12/2015	1.006175
06/12/2015	1.006854
07/12/2015	1.007502
08/12/2015	1.006212
09/12/2015	1.004083
10/12/2015	1.005080
11/12/2015	1.003662
12/12/2015	1.003938
13/12/2015	1.003173

14/12/2015	1.004722
15/12/2015	1.005439
17/12/2015	1.008082
18/12/2015	1.007732
19/12/2015	1.009799
20/12/2015	1.007765
21/12/2015	1.005975
22/12/2015	1.006799
23/12/2015	1.006141
24/12/2015	1.006097
25/12/2015	1.006593
26/12/2015	1.009142
27/12/2015	1.009738
28/12/2015	1.007957
29/12/2015	1.007137
30/12/2015	1.006693
31/12/2015	1.003804
01/01/2016	1.001512
02/01/2016	1.006315
03/01/2016	1.005267
04/01/2016	1.002011
05/01/2016	1.002613
06/01/2016	1.000410
07/01/2016	0.999994
08/01/2016	0.999315
09/01/2016	1.002750
10/01/2016	1.001662
11/01/2016	0.998311
12/01/2016	0.998242
13/01/2016	0.997908
14/01/2016	0.998725
15/01/2016	0.997674
16/01/2016	0.998423
17/01/2016	1.000049
18/01/2016	0.999590
19/01/2016	0.998992
20/01/2016	0.998772
21/01/2016	0.997745
24/01/2016	1.005558
25/01/2016	1.005688
26/01/2016	1.003300
27/01/2016	1.002391
28/01/2016	1.000085
29/01/2016	1.001304
30/01/2016	1.001597
31/01/2016	1.002976

01/02/2016	1.003691
02/02/2016	1.000125
05/02/2016	1.003384
06/02/2016	1.002834
07/02/2016	1.003290
08/02/2016	0.999401
09/02/2016	1.000942
10/02/2016	0.999080
11/02/2016	1.000165
13/02/2016	1.001597
14/02/2016	1.001507
15/02/2016	0.997946
16/02/2016	0.997452
17/02/2016	0.998686
18/02/2016	0.999768
19/02/2016	1.000561
21/02/2016	1.003628
22/02/2016	1.003247
23/02/2016	1.002675
24/02/2016	0.999711
25/02/2016	0.999441
26/02/2016	1.000385
27/02/2016	1.001962
28/02/2016	1.001606
29/02/2016	0.998605
01/03/2016	1.001755
02/03/2016	0.998487
03/03/2016	1.000381
04/03/2016	0.997960
05/03/2016	1.000681
06/03/2016	0.999721
07/03/2016	0.999761
10/03/2016	1.000859
11/03/2016	1.002703
12/03/2016	1.005338
13/03/2016	1.005551
14/03/2016	1.006107
15/03/2016	1.005189
16/03/2016	1.005383
18/03/2016	1.001122
19/03/2016	1.002822
20/03/2016	1.004818
21/03/2016	1.004318
22/03/2016	1.003690
23/03/2016	1.003069
24/03/2016	1.003897

26/03/2016	1.005585
27/03/2016	1.006242
28/03/2016	1.004296
29/03/2016	1.005312
30/03/2016	1.006458
31/03/2016	1.006063
01/04/2016	1.004519
02/04/2016	1.006201
03/04/2016	1.006633
04/04/2016	1.007395
12/04/2016	1.005702
13/04/2016	1.007660
14/04/2016	1.002490
31/08/2016	0.995104
01/09/2016	0.996727
02/09/2016	0.993528
03/09/2016	0.995736
04/09/2016	0.996089
05/09/2016	0.997300
06/09/2016	0.995246
07/09/2016	0.994173
08/09/2016	1.001855
09/09/2016	0.995301
10/09/2016	0.996185
11/09/2016	0.998743
12/09/2016	0.994734
13/09/2016	0.992647
14/09/2016	0.994520
15/09/2016	0.993452
16/09/2016	0.998544
17/09/2016	0.996533
18/09/2016	0.994868
19/09/2016	0.998322
20/09/2016	1.000094
21/09/2016	1.002449
22/09/2016	1.000693
23/09/2016	0.996453
24/09/2016	0.997817
25/09/2016	0.997502
26/09/2016	1.001647
27/09/2016	0.999558
28/09/2016	0.995092
29/09/2016	0.998763
30/09/2016	1.000539
01/10/2016	1.007654
02/10/2016	1.003444

03/10/2016	1.001913
04/10/2016	1.001360
05/10/2016	1.001995
06/10/2016	1.004661
07/10/2016	1.002030