



Measurement Error Report

Scotia Gas Networks

MER SC015 Soutra R2.docx

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1 Revision Control

Rev	Issue date	Description	Prep.	App.
1	31/08/2018	Issued for comment	BK	KV
2	06/09/2018	Final	BK	KV

2 Executive Summary

Site Name	Soutra Offtake
DNO	Scotia Gas Networks
LDZ	Scotland
Error Start Date	
(Or) Last Good Date	2 nd November 2017
Error Corrected Date	20 th March 2018
Size of Error (over or under read)	118,831 Sm ³ over-registration (approximately 1.3 GWh)
Error Description	Equipment Validation Errors
Methodology	Re-calculation of volume using process data corrected for 'As Found' errors
Meter Type	Orifice meter
MER Unique Reference Number	SC015

3 Error Description

Soutra Offtake has a single 6" orifice meter stream for measurement of gas entering the distribution network. CV, RD and CO₂ are determined by a GasPT for calculation of density and flow rates.

The metering system was validated in accordance with Joint Office procedure T/PR/ME/2 part 3 on 20th March 2018 and errors were found on the flow computer analogue to digital signal conversion (ADC; refer to section 4 for data). The flow computer was re-calibrated and re-tested successfully.

Since the previous successful validation on 2nd November 2017 the site had experienced problems with the uninterruptable power supply (UPS) and power had been lost to the flow computer in the time between the power failure occurring and the backup generator starting. This may have occurred multiple times in this period and the loss of power to the flow computer is likely to have lead to loss of ADC calibration values in the flow computer, but it is not possible to determine when the error started.

The UPS was replaced on 26th April 2018 and the flow computer was re-validated successfully with no ADC errors.

4 Methodology

The As Found errors from the validation on 20th March 2018 are shown in Tables 1 to 4.

DP (mbar)	ADC Error (%span)	Transmitter Error (Rising; %span)	Transmitter Error (Falling; %span)	Total Error (%span)
0.003	0.0058	0.1325	0.1319	0.138
12.504	0.0072	0.1002	0.1015	0.10805
25.011	0.0218	0.0889	0.1077	0.1201
37.518	0.0354	0.0873	0.1561	0.1571
50.021	0.0424	0.0841	0.1466	0.15775

Table 1 – Low DP Errors

DP (mbar)	ADC Error (%span)	Transmitter Error (Rising; %span)	Transmitter Error (Falling; %span)	Total Error (%span)
0.131	0.0249	0.0856	0.0862	0.1108
125.232	0.0484	0.0818	0.0849	0.13175
250.397	0.0793	0.076	0.076	0.1553
375.467	0.0934	0.0984	0.0734	0.1793
500.569	0.1138	0.0895	0.077	0.19705

Table 2 – High DP Errors

Pressure (barg)	ADC Error (%span)	Transmitter Error (Rising; %span)	Transmitter Error (Falling; %span)	Total Error (%span)
0.001	0.0044	-0.06	-0.0569	-0.05405
20.006	0.0081	-0.0849	-0.0836	-0.07615
40.011	0.0138	-0.111	-0.111	-0.0972
60.016	0.02	-0.1383	-0.1258	-0.11205
80.026	0.0325	-0.1594	-0.1594	-0.1269

Table 3 – Pressure Errors

Temperature (°C)	Total (RTD) Error (%span)
-9.85	0.15
2.66	0.16
15.17	0.17
27.68	0.18
40.22	0.22

Table 4 – Temperature Errors

The process data, recorded on a 4 minutely basis, was corrected for the total error using linear interpolation. Two sets of calculations (of density, flow rate and volume) were performed; one using the measured data and another using corrected data, the error being the difference between the two.

5 Error Quantification

The error is estimated to be an overall over-registration of 118,831 Sm³. The error should be corrected using the daily correction factors in Appendix A. As the start of the error cannot be determined the daily correction factors have been calculated to reconcile half of the error.

6 Learning

The DNO was aware of the potential for UPS failure and a project was in place at the time of the error to replace the UPS.

7 References

Soutra 2018 ME2(GMR3)rev J.xls – (As Found Errors) Validation Record spreadsheet
HPMIS Database Files
Gemini Daily Volumes
MER_SC015_Soutra_Data.xlsx - Calculation Data spreadsheet
Soutra Nov 2017 ME2(GMR3)rev J.xls – (Pre-Error) Validation Record spreadsheet
Soutra UPS upgrade ME2(GMR3)rev J.xls – (Post-Error) Validation Record spreadsheet

8 Appendix A – Daily Correction Factors

The error should be corrected using the Daily Correction Factors (DCF) applied to the Gemini Daily Volumes (DVOL) as detailed below. As the start of the error cannot be determined the daily correction factors have been calculated to reconcile half of the error.

Gas Day	Gemini DVOL	DCF
02-Nov-17	0.3628	0.999467
03-Nov-17	0.3311	0.999244
04-Nov-17	0.3107	0.999265
05-Nov-17	0.3542	0.999315
06-Nov-17	0.3784	0.999192
07-Nov-17	0.3556	0.999343
08-Nov-17	0.4108	0.999085
09-Nov-17	0.3698	0.999335
10-Nov-17	0.3926	0.999289
11-Nov-17	0.3682	0.999208
12-Nov-17	0.3823	0.999257
13-Nov-17	0.4166	0.998972
14-Nov-17	0.3344	0.999167
15-Nov-17	0.3675	0.999200
16-Nov-17	0.3415	0.999069
17-Nov-17	0.3699	0.999048
18-Nov-17	0.3456	0.999074
19-Nov-17	0.3745	0.998869
20-Nov-17	0.3498	0.998977
21-Nov-17	0.305	0.998810
22-Nov-17	0.3014	0.998864
23-Nov-17	0.3651	0.999135
24-Nov-17	0.4268	0.998917
25-Nov-17	0.4221	0.998968
26-Nov-17	0.3893	0.998753
27-Nov-17	0.3966	0.999042
28-Nov-17	0.4072	0.999034
29-Nov-17	0.428	0.998951
30-Nov-17	0.4685	0.999143
01-Dec-17	0.4308	0.998910
02-Dec-17	0.3503	0.998873
03-Dec-17	0.3357	0.998953
04-Dec-17	0.3485	0.998962
05-Dec-17	0.3529	0.999005
06-Dec-17	0.3203	0.998813
07-Dec-17	0.371	0.999186
08-Dec-17	0.4594	0.998985
09-Dec-17	0.4695	0.999210
10-Dec-17	0.5313	0.999490
11-Dec-17	0.5454	0.999555

Gas Day	Gemini DVOL	DCF
12-Dec-17	0.5045	0.999320
13-Dec-17	0.4547	0.999119
14-Dec-17	0.4738	0.999056
15-Dec-17	0.456	0.998985
16-Dec-17	0.4702	0.999117
17-Dec-17	0.4174	0.998795
18-Dec-17	0.437	0.998853
19-Dec-17	0.3443	0.998704
20-Dec-17	0.2936	0.998511
21-Dec-17	0.3452	0.998918
22-Dec-17	0.3355	0.998476
23-Dec-17	0.2478	0.997765
24-Dec-17	0.2301	0.997997
25-Dec-17	0.2527	0.999226
26-Dec-17	0.3608	0.998634
27-Dec-17	0.4422	0.998984
28-Dec-17	0.4578	0.999127
29-Dec-17	0.4571	0.999024
30-Dec-17	0.384	0.998366
31-Dec-17	0.3658	0.998511
01-Jan-18	0.3374	0.998799
02-Jan-18	0.3646	0.998101
03-Jan-18	0.354	0.998588
04-Jan-18	0.3518	0.998700
05-Jan-18	0.3706	0.998686
06-Jan-18	0.3956	0.998547
07-Jan-18	0.4542	0.999044
08-Jan-18	0.4938	0.999094
09-Jan-18	0.4277	0.998560
10-Jan-18	0.3904	0.998817
11-Jan-18	0.3785	0.998790
12-Jan-18	0.3557	0.998672
13-Jan-18	0.349	0.998519
14-Jan-18	0.3611	0.998554
15-Jan-18	0.3561	0.998890
16-Jan-18	0.4547	0.998904
17-Jan-18	0.4534	0.998842
18-Jan-18	0.4282	0.998849
19-Jan-18	0.4481	0.999009
20-Jan-18	0.4391	0.998990

Gas Day	Gemini DVol	DCF
21-Jan-18	0.4652	0.999128
22-Jan-18	0.3975	0.998313
23-Jan-18	0.3322	0.998265
24-Jan-18	0.3471	0.998528
25-Jan-18	0.3511	0.998618
26-Jan-18	0.3489	0.998193
27-Jan-18	0.3108	0.997997
28-Jan-18	0.2701	0.997504
29-Jan-18	0.3116	0.998368
30-Jan-18	0.3585	0.998617
31-Jan-18	0.3968	0.998803
01-Feb-18	0.4026	0.998477
02-Feb-18	0.3511	0.998564
03-Feb-18	0.3528	0.997700
04-Feb-18	0.3417	0.998703
05-Feb-18	0.4195	0.998623
06-Feb-18	0.4389	0.998891
07-Feb-18	0.4589	0.998987
08-Feb-18	0.3627	0.998584
09-Feb-18	0.3721	0.998799
10-Feb-18	0.3391	0.998375
11-Feb-18	0.3823	0.998908
12-Feb-18	0.4106	0.998598
13-Feb-18	0.4108	0.998729
14-Feb-18	0.4261	0.998635
15-Feb-18	0.392	0.998993
16-Feb-18	0.3581	0.998568
17-Feb-18	0.3157	0.998365
18-Feb-18	0.332	0.998030
19-Feb-18	0.2852	0.996915

Gas Day	Gemini DVol	DCF
20-Feb-18	0.2779	0.997708
21-Feb-18	0.3201	0.998406
22-Feb-18	0.3748	0.998909
23-Feb-18	0.3927	0.998877
24-Feb-18	0.4011	0.999265
25-Feb-18	0.4234	0.999284
26-Feb-18	0.4837	0.999155
27-Feb-18	0.5119	0.999405
28-Feb-18	0.6036	0.999707
01-Mar-18	0.5933	0.999721
02-Mar-18	0.5672	0.999624
03-Mar-18	0.5034	0.999349
04-Mar-18	0.4651	0.999145
05-Mar-18	0.4502	0.998868
06-Mar-18	0.4425	0.998866
07-Mar-18	0.3866	0.999165
08-Mar-18	0.3692	0.999242
09-Mar-18	0.3506	0.999085
10-Mar-18	0.3721	0.998573
11-Mar-18	0.3084	0.998880
12-Mar-18	0.3443	0.998992
13-Mar-18	0.3441	0.999152
14-Mar-18	0.3579	0.999153
15-Mar-18	0.394	0.998832
16-Mar-18	0.4278	0.999021
17-Mar-18	0.476	0.999316
18-Mar-18	0.4831	0.999375
19-Mar-18	0.4147	0.998976
20-Mar-18	0.3685	0.999807