



# Measurement Error Report

**Thyson Technology Limited**

**MER WM016 Strongford BNEF.docx**

**Document Reference:** NK3225-001

**Client Reference:** PO 0000035494

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## 1 Revision Control

Rev	Issue date	Description	Prep.	App.
1	18/06/2018	Issued for comment	BK	KV

## 2 Executive Summary

<b>Site Name</b>	Strongford BNEF
<b>DNO</b>	Cadent Gas Limited
<b>LDZ</b>	West Midlands
<b>Error Start Date</b>	11 <sup>th</sup> October 2017
<b>(Or) Last Good Date</b>	
<b>Error Corrected Date</b>	4 <sup>th</sup> April 2018
<b>Size of Error (over or under read)</b>	22,985 Sm <sup>3</sup> over-registration (approximately 0.25 GWh)
<b>Error Description</b>	Intermittent erroneous USM flow readings
<b>Methodology</b>	Comparison of inlet meter and fiscal meter flow readings
<b>Meter Type</b>	Ultrasonic meter
<b>MER Unique Reference Number</b>	WM016

## 3 Error Description

Strongford BNEF has a single 3" Sick Flowsic500 ultrasonic meter stream for measurement of gas exiting the grid entry unit (GEU) and entering the distribution network (referred to in this report as 'Fiscal USM'). A second 3" Sick Flowsic500 ultrasonic meter is located on the inlet to the GEU for process control (referred to in this report as 'Inlet USM'). Propane injection is used to control the gas properties (e.g. calorific value, Wobbe number, etc.) to meet the requirements of the Gas Safety (Management) Regulations (GS(M)R). Gas that is not within specification is rejected by a diverter valve.

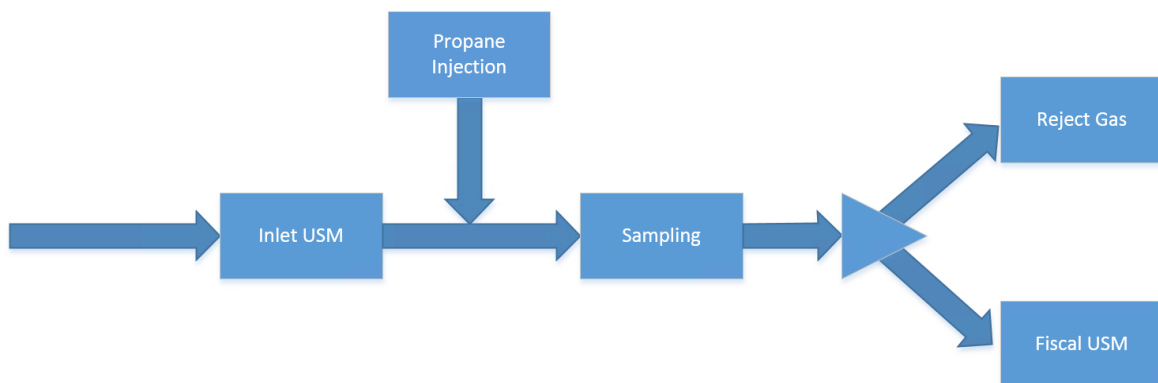


Figure 1 - Grid Entry Unit Flow Diagram

During normal operation the Fiscal USM will read slightly higher (~10 Sm<sup>3</sup>/h) than the Inlet USM due to the addition of propane. On a number of occasions between 11<sup>th</sup> October 2017 and 4<sup>th</sup> April 2018 the Fiscal USM intermittently read much higher than the Inlet USM for prolonged periods of time.

### 3.1 Error Period 1 – October 2017

At 23:30 on 11<sup>th</sup> October 2017, the Fiscal USM started to read ~165 Sm<sup>3</sup>/h higher than the Inlet USM. The process was halted at 08:30 on 17<sup>th</sup> October 2017 with no flow through the Inlet USM and the diverter valve set to reject, however the Fiscal USM continued to register a flow of ~135 Sm<sup>3</sup>/h. The process was restarted at 10:45 and at 11:15 the Fiscal USM started to read correctly (~10 Sm<sup>3</sup>/h higher than the Inlet USM).

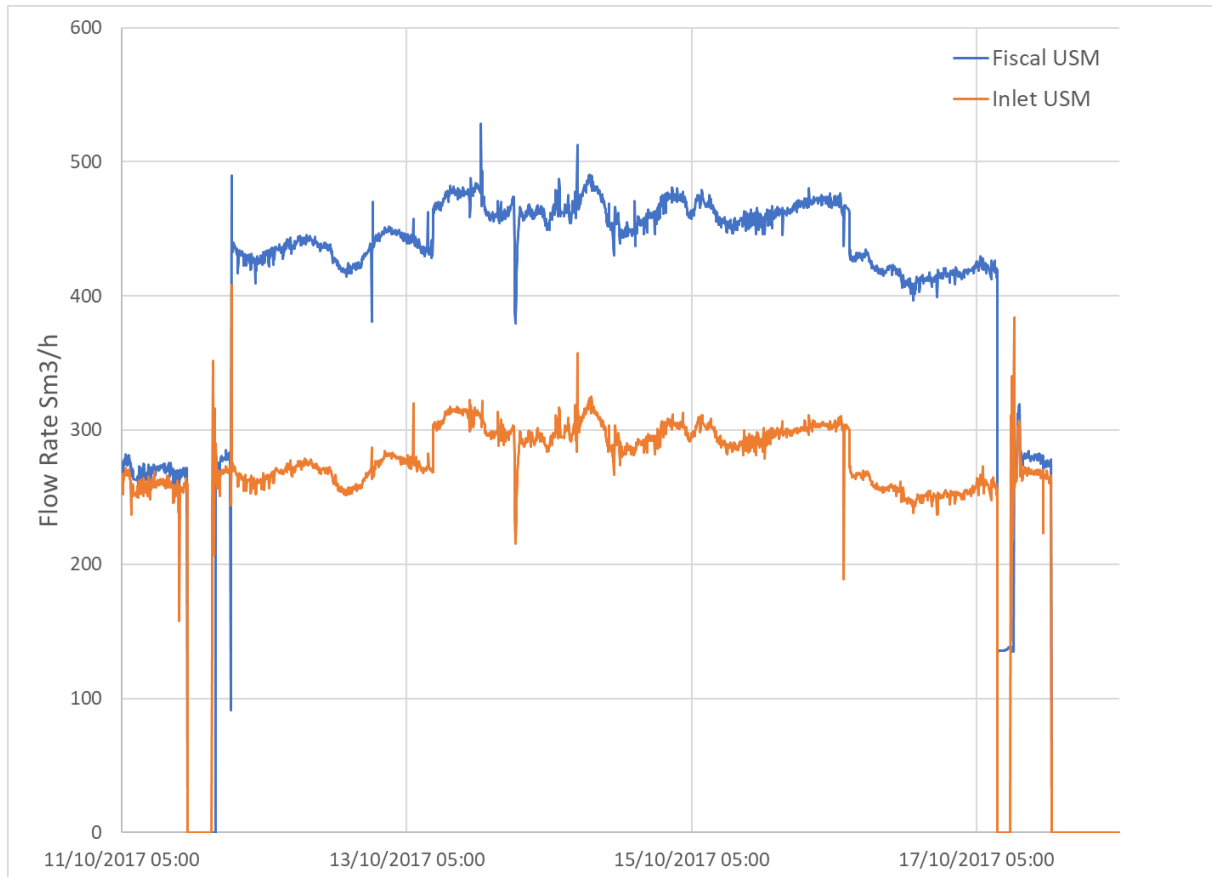


Figure 2 - Error Period 1 - October 2017

### 3.2 Error Period 2 – February 2018

At 17:00 on 16<sup>th</sup> February 2018, the Fiscal USM started to read ~130 Sm<sup>3</sup>/h lower than the Inlet USM until 17:00 on 17<sup>th</sup> February 2018 when the Fiscal USM started to read correctly (~10 Sm<sup>3</sup>/h higher than the Inlet USM).

Following a period of no flow, the process started at 18:30 on 19<sup>th</sup> February 2018. The diverter valve was opened to allow gas entry into the network at 19:00 with the Fiscal USM reading ~165 Sm<sup>3</sup>/h higher than the Inlet USM. The diverter valve was closed at 11:00 on 21<sup>st</sup> February 2018. When the diverter valve was re-opened at 12:00 on 21<sup>st</sup> February 2018 the Fiscal USM started to read correctly (~10 Sm<sup>3</sup>/h higher than the Inlet USM).

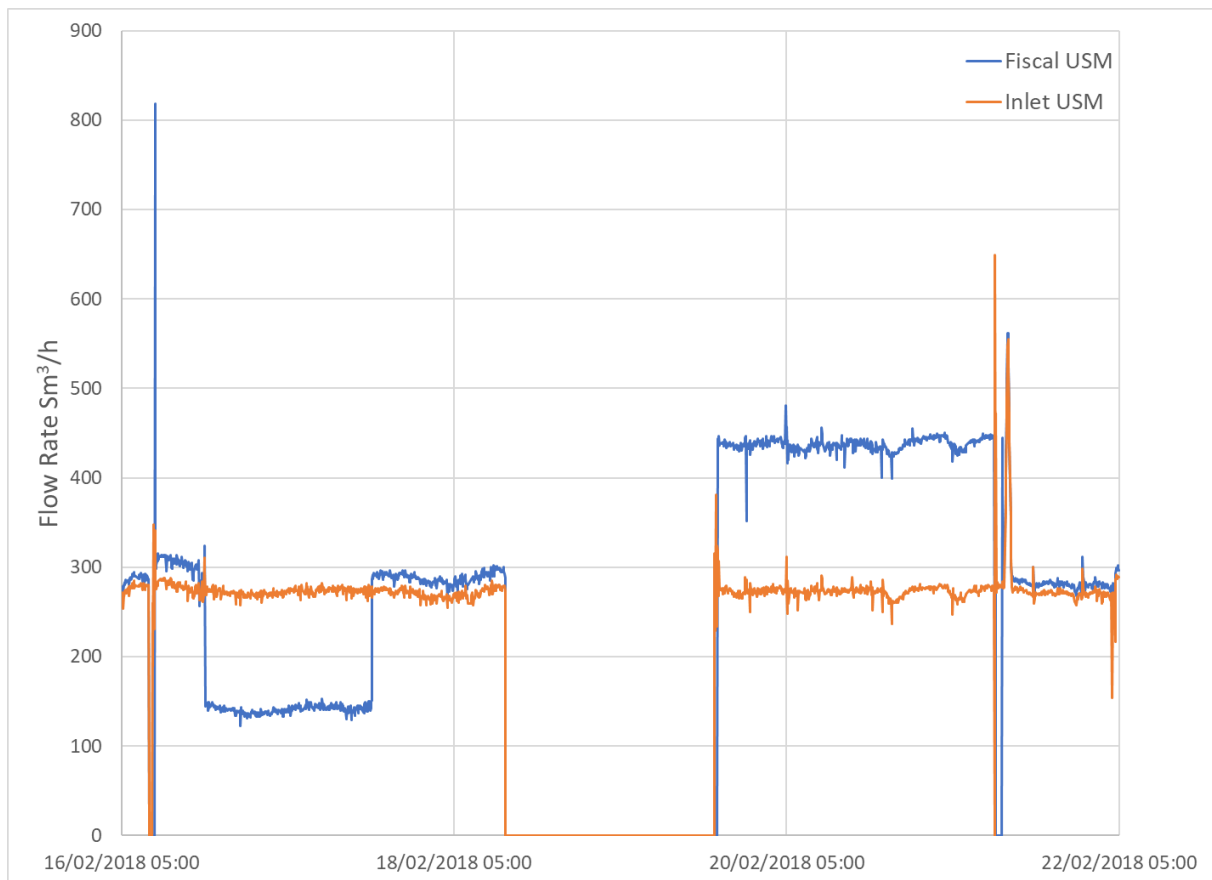


Figure 3 - Error Period 2 - February 2018

### 3.3 Error Period 3 – March 2018

At 05:00 on 14<sup>th</sup> March 2018, the Fiscal USM started to read ~135 Sm<sup>3</sup>/h lower than the Inlet USM. The process was halted at 06:00 with no flow through the Inlet USM and the diverter valve set to reject, however the Fiscal USM continued to register a flow of ~135 Sm<sup>3</sup>/h. The process was restarted at 07:00 and at 07:20 the Fiscal USM started to read correctly (~10 Sm<sup>3</sup>/h higher than the Inlet USM).

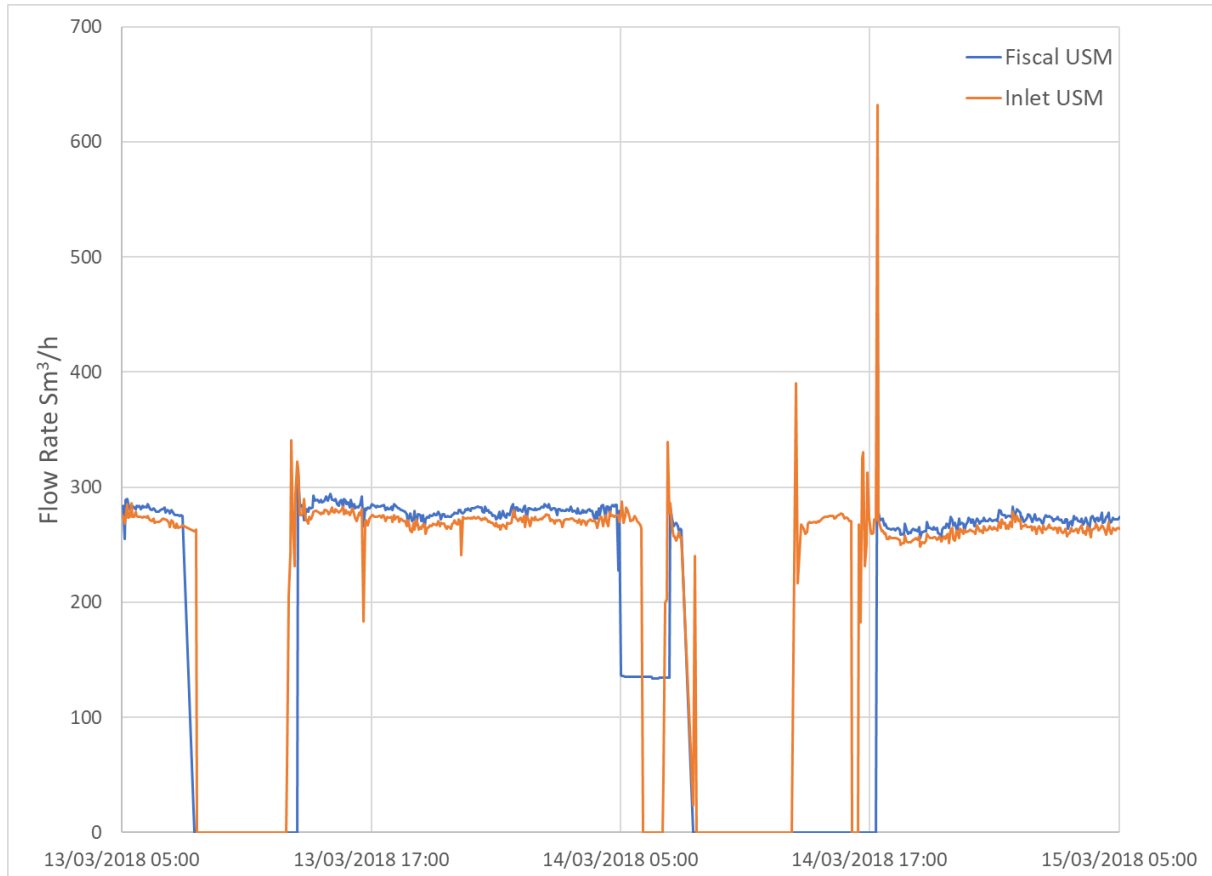


Figure 4 - Error Period 3 - March 2018

### 3.4 Error Period 4 – April 2018

At 05:00 on 4<sup>th</sup> April 2018, the Fiscal USM started to read ~130 Sm<sup>3</sup>/h lower than the Inlet USM. The process was halted at 05:15 with no flow through the Inlet USM and the diverter valve set to reject, however the Fiscal USM continued to register a flow of ~135 Sm<sup>3</sup>/h. The process was restarted at 08:00 and at 08:40 the Fiscal USM started to read correctly (~10 Sm<sup>3</sup>/h higher than the Inlet USM).

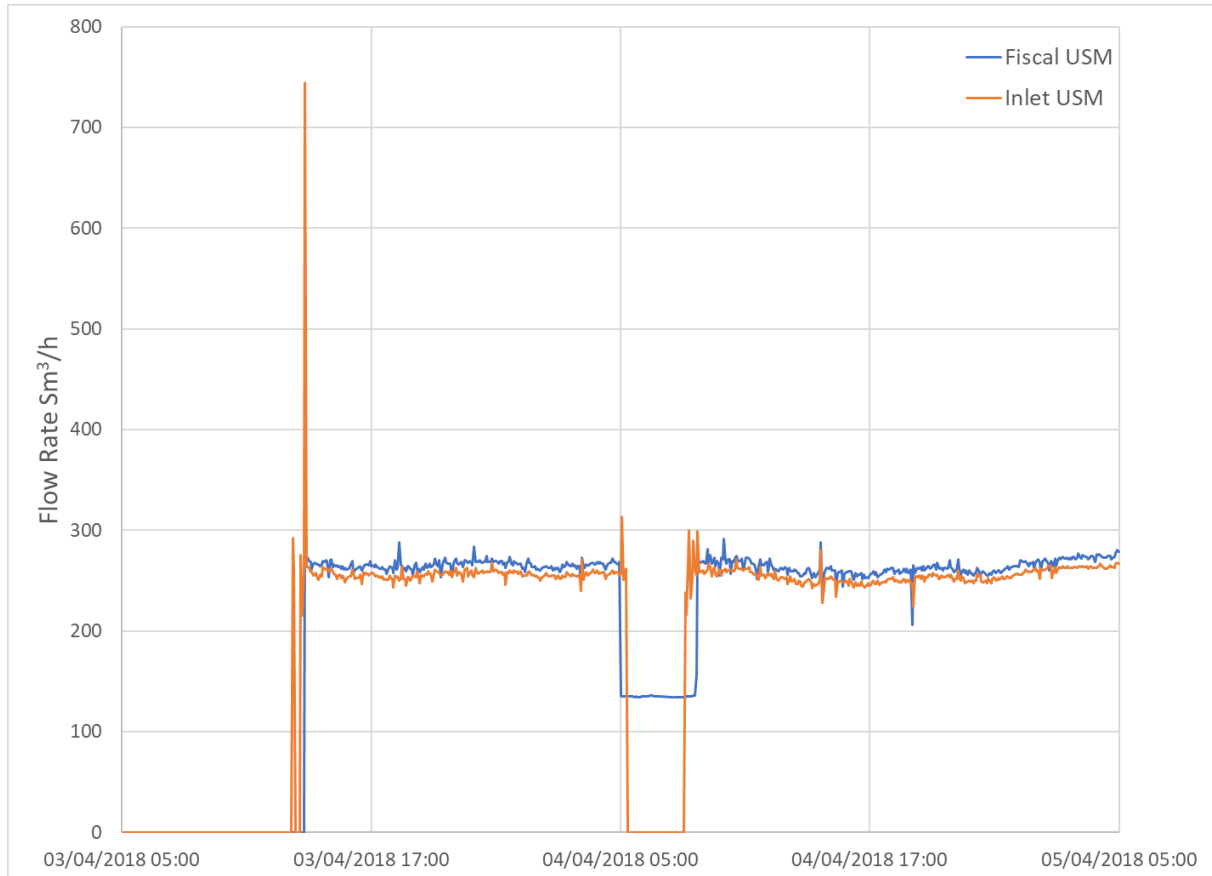


Figure 5 - Error Period 4 - April 2018



## 4 Methodology

The offset between the Inlet USM and Fiscal USM during normal operation was calculated from the days of normal operation surrounding each error period (refer to Table 1). The Fiscal USM volume flow was then corrected (on a 4-monthly basis) using the Inlet USM volume flow plus the offset for that period. Two sets of volume totals were calculated; one using the measured Fiscal USM flow and another using the corrected Fiscal USM flow, the error being the difference between the two.

Error Period	Date	Average Offset
1	11 <sup>th</sup> to 17 <sup>th</sup> October 2017	+10.71
2	16 <sup>th</sup> to 23 <sup>rd</sup> February 2018	+14.83
3	13 <sup>th</sup> to 15 <sup>th</sup> March 2018	+8.42
4	3 <sup>rd</sup> to 4 <sup>th</sup> April 2018	+9.07

Table 1 - Fiscal USM Average Offset from Inlet USM

## 5 Error Quantification

The error is estimated to be an overall over-registration of 22,985 Sm<sup>3</sup>. The error for each period is detailed in Table 2. The error should be corrected using the daily correction factors in Appendix A.

Error Period	Date	Total Error
1	11 <sup>th</sup> to 17 <sup>th</sup> October 2017	+20,339
2	16 <sup>th</sup> to 23 <sup>rd</sup> February 2018	+2,448
3	13 <sup>th</sup> to 15 <sup>th</sup> March 2018	-51
4	3 <sup>rd</sup> to 4 <sup>th</sup> April 2018	+249
<b>Total</b>		<b>+22,985</b>

Table 2 - Fiscal USM Average Offset from Inlet USM

## 6 Learning

The exact cause of the intermittent erroneous readings is not known, however it may be prudent to introduce logic into the system to detect large consistent discrepancies between the Inlet USM and Fiscal USM when gas is flowing into the network.

## 7 References

Strongford Site Data Files (DAT\$####.ST3 and FLO\$####.ST3)  
 Gemini Daily Volumes  
 MER\_WM016\_Strongford\_Data.xlsx - Calculation Data spreadsheet

## 8 Appendix A – Daily Correction Factors

The error should be corrected using the Daily Correction Factors applied to the Gemini Daily Volumes as detailed below.

<b>Gas Day</b>	<b>Gemini Daily Volume</b>	<b>Daily Correction Factor</b>
11-Oct-2017	0.00610	0.859494
12-Oct-2017	0.01046	0.643540
13-Oct-2017	0.01106	0.663939
14-Oct-2017	0.01116	0.666117
15-Oct-2017	0.01112	0.665135
16-Oct-2017	0.01016	0.640043
17-Oct-2017	0.00365	0.745422
16-Feb-2018	0.00499	1.350180
17-Feb-2018	0.00514	1.345904
18-Feb-2018	0.00215	1.000000
19-Feb-2018	0.00439	0.661076
20-Feb-2018	0.01048	0.658236
21-Feb-2018	0.00759	0.880865
14-Mar-2018	0.00377	1.013528
04-Apr-2018	0.00588	0.957709