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Delivering Measurement Excellence

Measurement Error Report

Severn Trent PLC

MER/CAD/245/23 Strongford BNEF

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1 Revision Control

Rev	Issue date	Description	Prep.	App.
1	25/05/2023	Issued for comment	TB	BK

2 Executive Summary

Site Name	Strongford BNEF
DNO	Cadent Gas Limited
LDZ	West Midlands
Error Start Date	16/03/2023
(Or) Error Last Good Date	
Error Corrected Date	
Size of Error (over or under read)	375 Sm^3 (0.004 GWh) over registration
Error Description	Erroneous readings on Fiscal meter
Methodology	Calculation of recorded Svol DANINT, GEU Scada and inlet flowrates during periods of erroneous flows, and the subtraction of these values from the reported totals.
Meter Type	Ultrasonic
MER Unique Reference Number	
Cadent Internal Reference	MER/CAD/245/23

3 Error Description

Strongford bio-methane facility has a single ultrasonic flow meter stream for measurement of gas exiting the grid entry unit (GEU) and entering the distribution network (referred to as Fiscal Meter). A second flow meter is located on the inlet to the GEU for process control (referred to in this report as Inlet Meter). 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 via a diverter valve. During normal operation the Fiscal USM will read slightly higher than the Inlet meter due to the addition of propane.

During the following dates, errors were noted:

- 16/03/2023 – 09:47 to 12:07, and 16:11 to 16:27

4 Methodology

Over the period of interest, the flowrates on the fiscal meter dropped dramatically indicating the meter system had gone into reject mode but was still recording a flow. The flow drop was preceded by a 'jump' or 'overshoot' in flow. This error will take in account the erroneous flow both before and after the system had gone into reject. This can be seen in figure 1 below. *Note: The switch to reject mode is evident from the trends in pressure and temperature.*

The error consisted of the fiscal meter reading high for a total period of 83 minutes. This is actually split into two error periods of 52 minutes and 31 minutes, treated in this report as a single error as it affects a single gas day. It should be noted the error duration from the DANINT data appears to be longer, however there is a gap in data points between 10:11 and 12:07 where the actual zero flow is recorded. It can be seen on the GEU data the actual zero flow is recorded at 10:25.

The calculated error is equated by plotting the fiscal meter from DANINT data, fiscal meter data from GEU-SCADA and inlet meter during 'healthy' flow periods to equate the offset between inlet and fiscal meters. This could then be used to calculate a 'corrected' flowrate for expected fiscal flowrate. This expected flow can then be used to identify the periods of error where the DANINT and GEU data show the fiscal meter to either 'overshoot' or 'freeze' when dropping to zero. This is evident in the figure 2 below showing both an 'overshoot' and 'false zero' during two periods of system going into 'reject' mode. This calculated error value was then subtracted from the calculated daily volume.

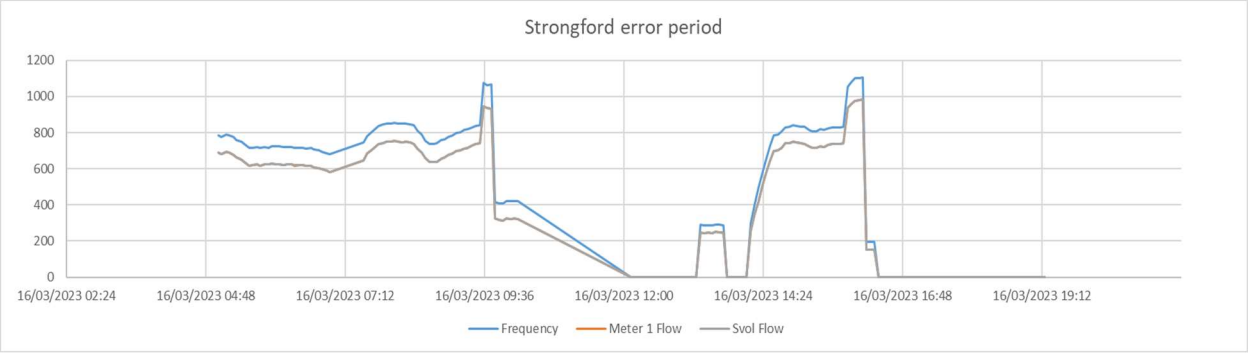

Figure 1 - Volume flow rates for Inlet Meter and Fiscal Meter showing the two instances of error

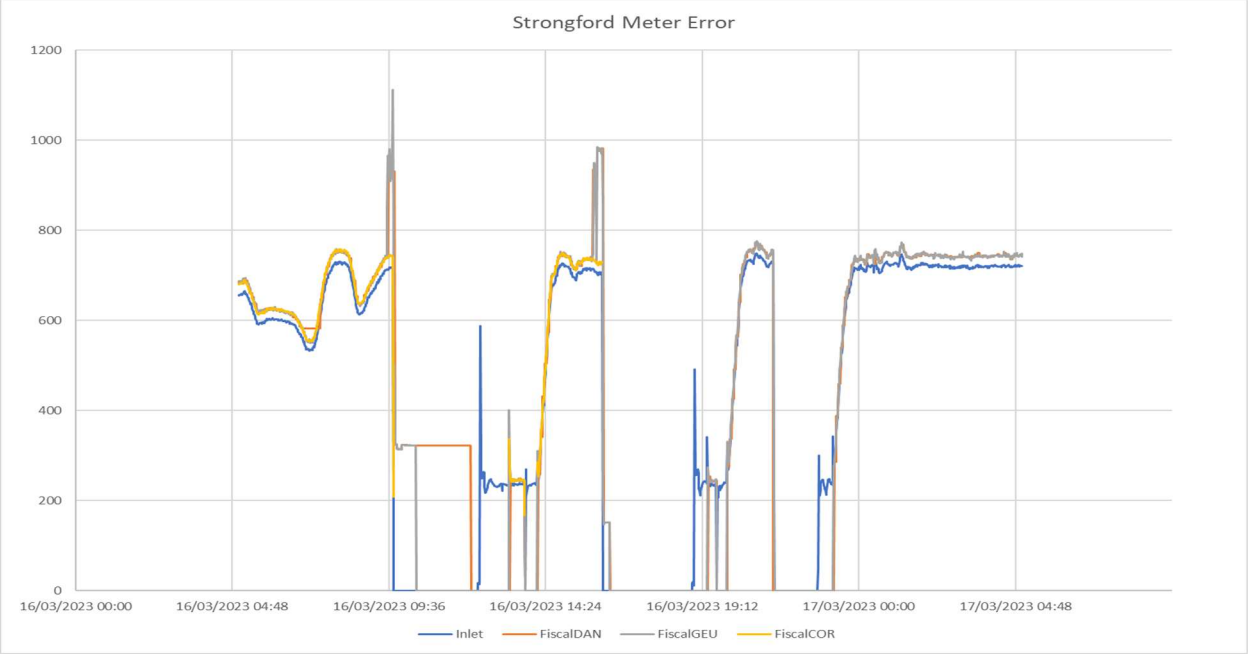

Figure 2 – DANINT & GEU data vs Corrected Fiscal data

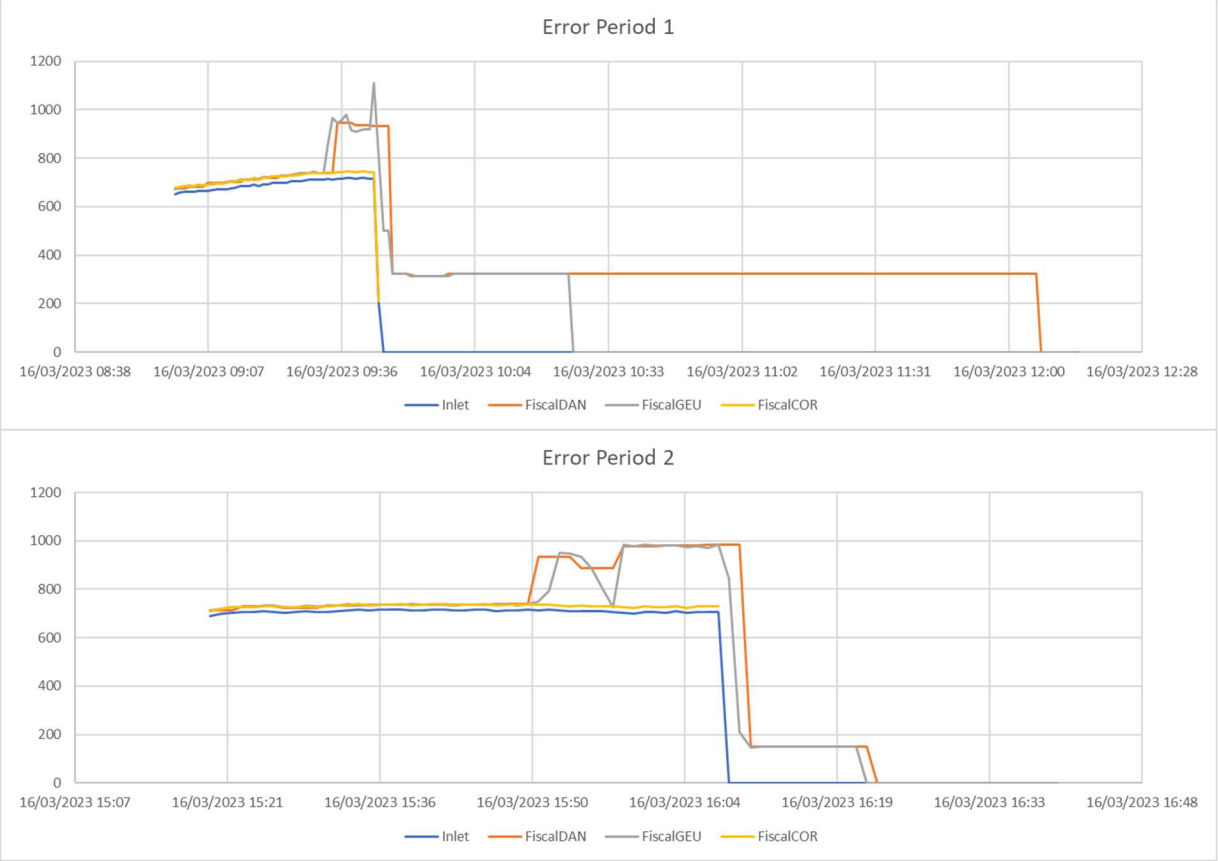

Figure 3 – Shows the two error periods, including overshoot and false zero

5 Error Quantification

The data for each Error is detailed in the accompanying document "MER_CAD_245_23 Strongford calc data.xlsx".

The error is estimated to be an overall over registration of **375** Sm^3. The error should be corrected using the daily correction factors in Appendix A applied to the Gemini daily volumes. Table 1 details the daily volume total as reported and the corrected daily total using the error calculation data as detailed in this report.

Gas Day	Daily Volume (Sm^3)		
	Reported	Corrected	Error
16-Mar-23	10,174	9,798	375

Table 1 – Daily totals for the period of mismeasurement

6 Learning

Contamination on the Fiscal ultrasonic meter transducers have caused the meter to read erroneously. The pipework and meter were cleaned to prevent the issue from reoccurring. It is recommended considering additional liquid filtration on the propane injection line. Consideration should be given to continuously monitoring, recording and time/date stamping the diverter valve position in order to ascertain if the system was recirculating or flowing to the distribution network. This would result in easier analysis if measurement errors were to occur again.

7 References

Gemini Billed Daily Volumes

MER_CAD_245_23 Strongford calc data.xlsx Calculation 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. The Daily Correction Factor is the ratio of the corrected volume to the uncorrected volume for the gas day.

Gas Day	Gemini Daily Volume	Daily Correction Factor
16-Mar-23	0.01015	0.963118

Table 2 – Daily correction factor for the period of mismeasurement