



Null Report

Grange Farm Energy

MER/CAD/253/23 Scampton Grange

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1 Revision Control

Rev	Issue date	Description	Prep.	App.
1	14/09/23	Issued for comment	TB	CJ

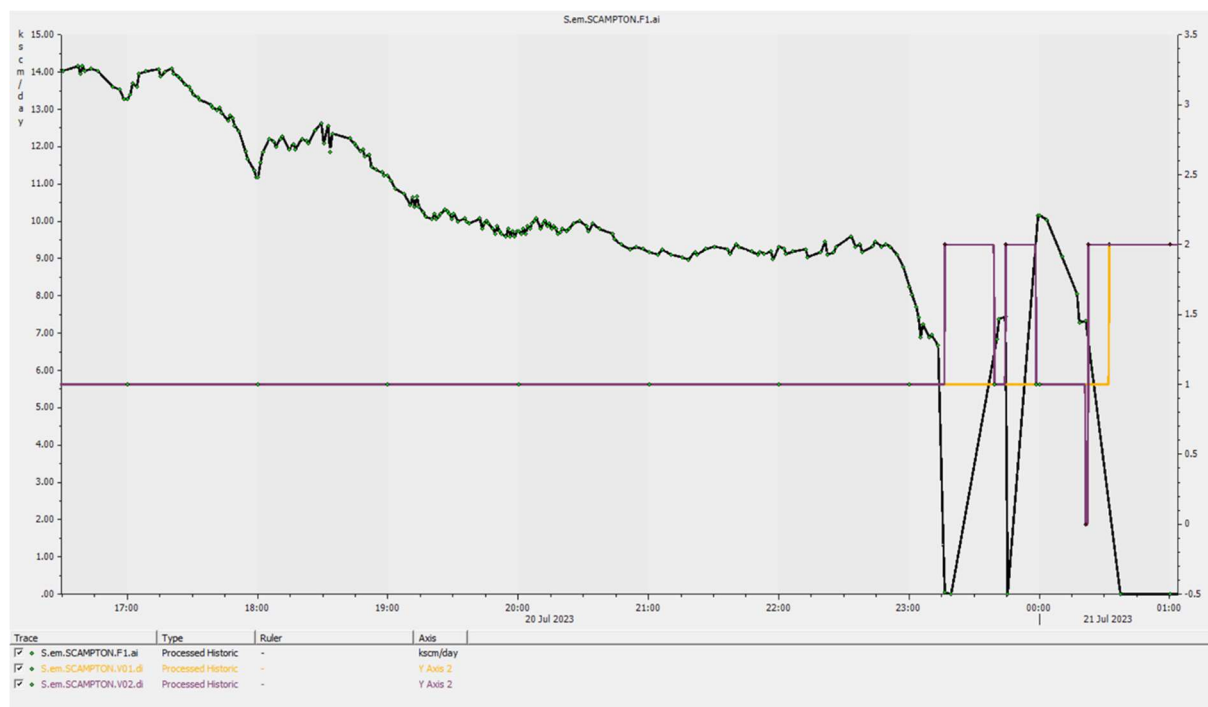
2 Executive Summary

Site Name	Grange Farm Scampton
DNO	Cadent Gas Limited
LDZ	East Midlands
Error Start Date	20 th July 2023
(Or) Error Last Good Date	
Error Corrected Date	
Size of Error (over or under read)	
Error Description	Frozen HMI data
Methodology	Data analysis to confirm no meter error
Meter Type	Rotary PD flow meter
MER Unique Reference Number	
Cadent Internal Reference	MER/CAD/253/23

3 Error Description

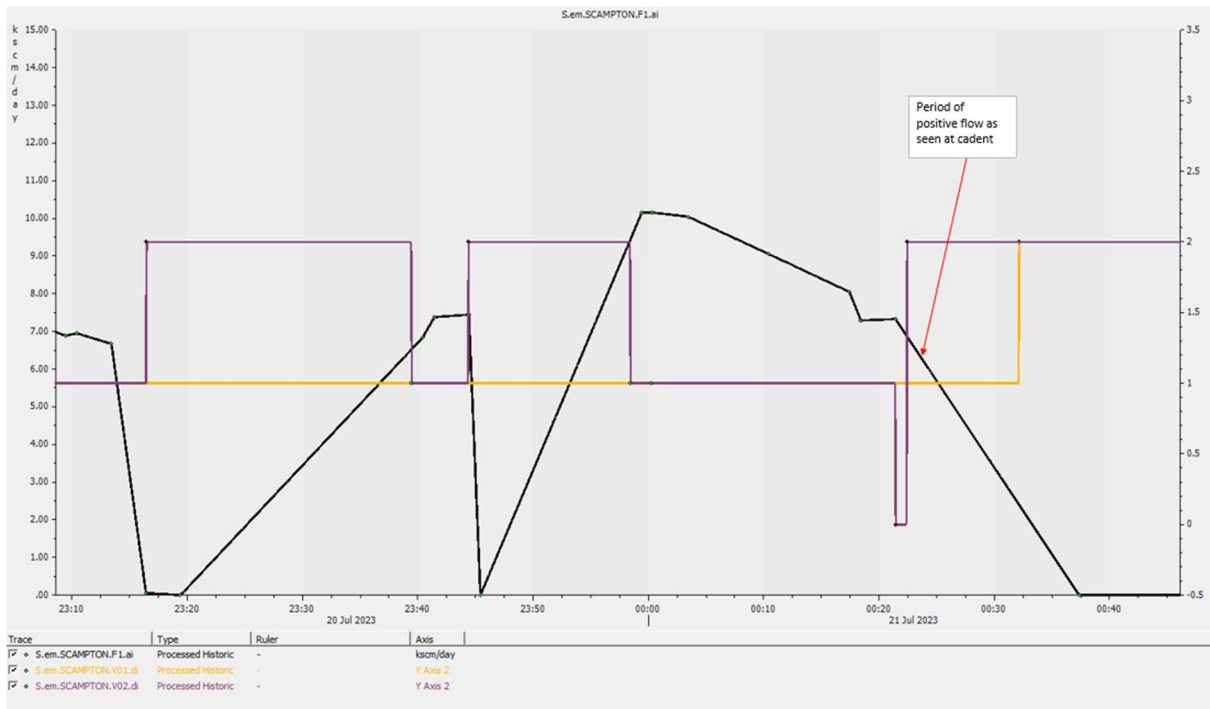
Grange Farm Scampton BNEF has a single rotary PD flow meter stream for measurement of gas exiting the grid entry unit (GEU) and entering the distribution network (referred to as Fiscal Meter). A second turbine flow meter is located on the outlet of the biogas upgrader for process control (referred to 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 meter will read slightly higher than the Inlet meter due to the addition of propane.

This Null Error Report covers an error occurrence on gas day 20/07/2023. The error consisted of Cadent control reporting a positive flow rate following the closure of the grid entry valve V01. It was reported by the BNEF site that the flowrates were ‘frozen’ on their HMI system during valve closure’s which led Cadent control to believe there was a flow error. The chart below shows the gas flow in black. The outlet valve V02 in purple and the ROV V01 in yellow, showing open at ‘1’ and closed at ‘2’. As can be seen in chart 1 below it would appear that there is positive gas flow during periods where the valves are closed.



Documents.All Users.Matt Pitts.Scampton Flow error
Chart 1 – Cadent control flow data 20/07/23

Chart 2 shows a close up shot of the suspected error period. It shows two initial instances of Valve V02 (purple) closing, with a displayed gradual gas flow drop off. It also shows a third instance, however in this instance the valve logic code drops from ‘1’ to ‘0’ before settling at ‘2’, this gas flow drop off can be seen from the point of valve logic changing from ‘1’. This has caused what appears to be a positive flow for a period, giving a flow alarm at Cadent control and forcing the closing of the ROV, valve V01. The reported error is this displayed flow rate during periods where valve V02 is shown as shut in.



Documents.All Users.Matt Pitts.Scampton Flow error
Chart 2 – close up view Cadent control flow data 20/07/23

4 Methodology

Cadent control provided flow data for the period in question, and this along with the downloaded Danint flow data was analysed to identify any possible flow meter error. The two Cadent flow data files, used in the chart above, have a data scan cycle timestamp of every 15 minutes and every 10 minutes. The Danint data has a data scan time of approx. every 3 minutes. From analysing this data and cross referencing the valve closure times there does not appear to be any error within the metering data. The reported flow/no flow values at the metering station correspond to the times given for valve operation.

The graphical representation in chart 2 above appears to show flow during the ‘purple’ V01 valve closures only due to the interpolation lines of 2 known scan points, these are shown as green dots (more easily visible in the MER calculation spreadsheet). The control room witnessing a live flow during the 3rd V02 closure was due to the valve code dropping to ‘0’ for 54 seconds before reverting to code ‘2’. This in turn forced the control operator to shut-in V01 ROV.

Chart 3 below shows the 3 minute Danint flow data with the valve operation times. Chart 4 shows the same Danint data with the 10 minute Cadent flow data superimposed over the top. This gives a visual demonstration of the ‘offset’ effect of the interpolation points between data scan times on the graphical flow chart.

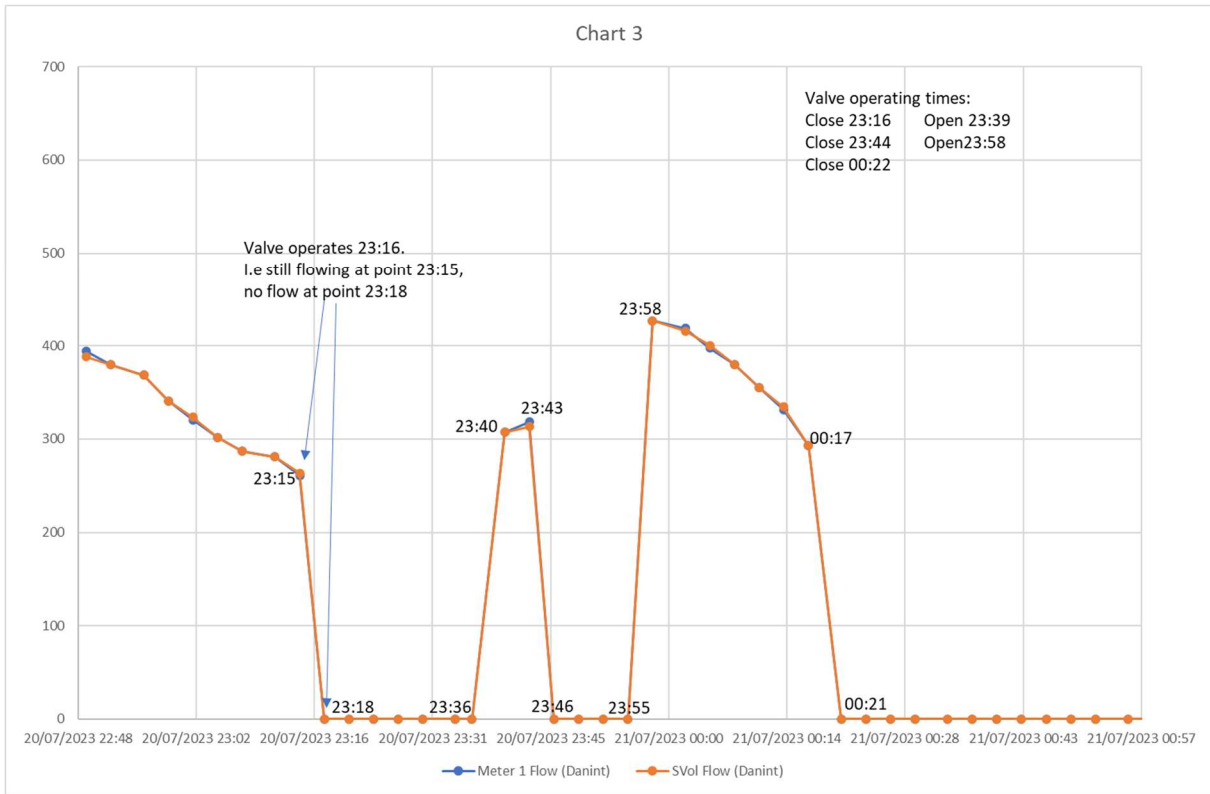


Chart 3 – Danint flow data 20/07/23 with valve timings

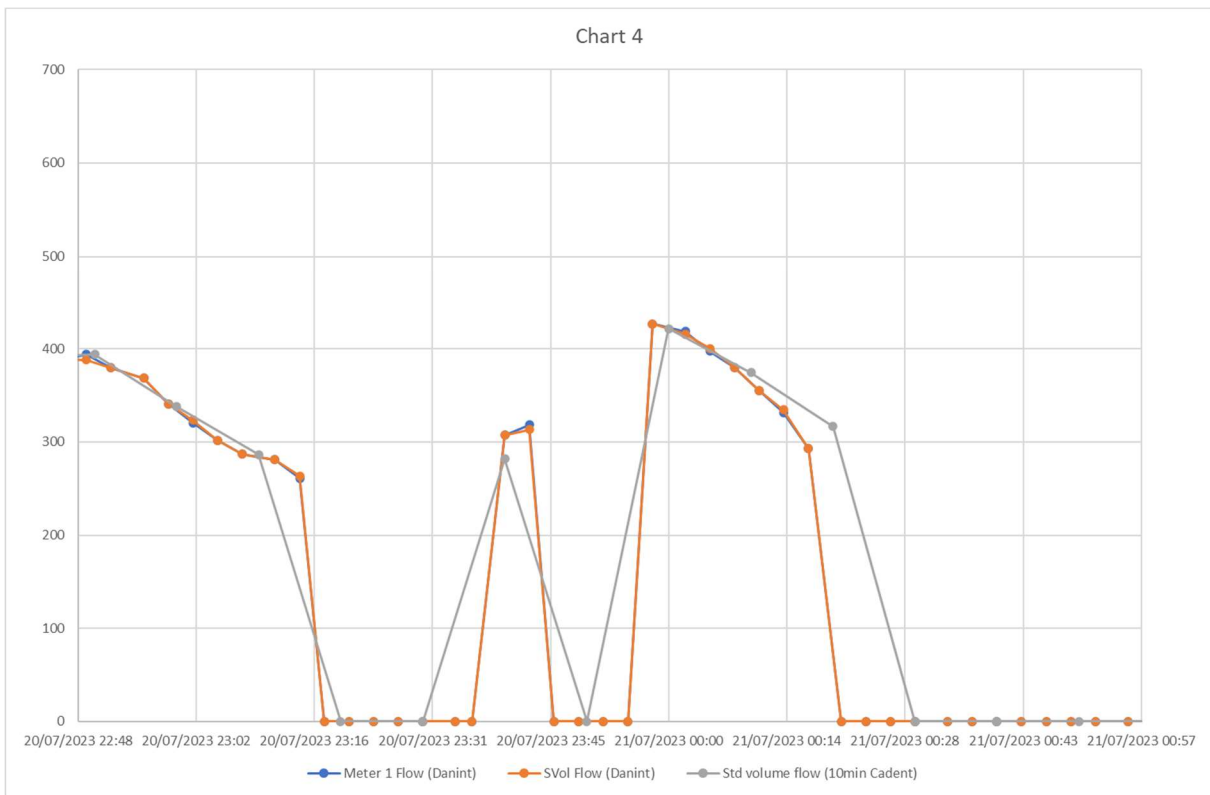


Chart 4 – Danint flow data (orange) & Cadent flow data (grey) for 20/07/23

Additional data was then requested with a higher resolution to check for potential errors between the timestamps of the previous data. This data is unfortunately obtained from the 'interpolated' Cadent flow data rather than being independently obtained from the metering. However this data does provide accurate valve operation times to approx. 6 seconds. This data was used to confirm the valve operations as listed in chart 3.

5 Error Quantification

The data for each error is detailed in the accompanying document "MER_CAD_xxx_23 Scampton Calc Data.xlsx".

The data analysis shows there to be no error in the metering data, thus this is a Null error report. The table below shows the End-of-Day Svol totals using various calculation methods and comparison to the metering reported Svol total and the in-use Gemini Svol total.

Daily total calculation method	Svol total in mcm
Latest Gemini data gas day 20/07/23	0.009640
Metering PrevDay total Svol gas day 21/07/23	0.009615
Addition of Cadent hourly Svol data for gas day 20/07/23	0.009595
Non resettable total EOD 20/07/23 minus EOD 19/07/23	0.009617
Addition of Danint data Svol flow increments gas day 20/07/23	0.009601
Addition of Danint data Svol flow increments gas day 20/07/23 (+2 additional 2 minutes as data commences at 05:02)	0.009618

Table 1 – Reported and Calculated daily Svol totals for 20/07/23 using differing calculation methods

The slight differences for the reported End-of-Day totals between Gemini and Metering data could be down to a time synchronization issue or telemetry delay for the EOD report time. As per 'Daily tot data' within the MER spreadsheet, if there were a EOD time sync error of between 1 and 3 minutes would account for difference between reported/calculated. An EOD time in the supervisory of 04:57, 04:58 or 04:58:30 would give EOD total of 9643 Sm³; as per Gemini data. An EOD time of 04:59, 05:00 or 05:01 would give a value of 9617 Sm³, very close to the actual flow computer Prevday reported total of 9615 Sm³. The data available for analysis starts at 05:02, which shows an EOD of 9601 Sm³, if two thirds of the previous 3 minute flow increment is added to this to give an approximation of a 05:00 start time this would give a EOD value of **9618 Sm³** (no need to repeat any adjustment for the end of the day as zero flowrate).

Suggest performing a time synchronisation of the flow computer, supervisory and telemetry. In normal operation with a steady flowrate a slight time error would not cause an issue as no data is lost. The first two minutes of the day would be captured in the overlap of the final two minutes of the day. However in start/stop operations this can cause issues with accurate reporting; and data analysis during any error periods.

6 Learning

Reason for the valve logic coding 'dropping' to zero should be investigated. Time synchronisation of the flow computer, supervisory and telemetry should be performed.

7 References

MER_CAD_253_23 Scampton 1 Calc Data.xlsx

Calculation spreadsheet

Cadent flow data

Danint flow data

Scampton initial & latest Gemini data