

**METER ERROR REPORT****Final**

Reconcile?	Y
Safety Issue?	N

**1. EXECUTIVE SUMMARY**

SITE NAME	Rugby NTS to LDZ Offtake
LDZ	WM
START DATE (actual)	12 <sup>th</sup> March 2021
LAST GOOD DATE	n/a
END DATE	15 <sup>th</sup> March 2021
SIZE OF ERROR (No reconciliation required if under 0.1%)	0.286 Msm <sup>3</sup> (3.09GWh) -2.205% (Under read)
ESTIMATE – Y/N?	N
ROOT CAUSE	Following an ad hoc activity on site the flow pressure transmitter was left isolated from the metering line.
ANALYSIS	RbD, Audit and flow computer configuration data
METER TYPE	Orifice plate
AUTHOR	Simon Howard
CHECKED BY	Uche Oguike
ACCEPTED BY CADENT NETWORK	Ben Oldham

## 2. BACKGROUND

Gas is supplied to part of the West Midlands Network at the Rugby NTS to LDZ FWACV offtake. Rugby is a single stream orifice plate meter site using a gas chromatograph for RD and CV determination and PTZ correction.

On 12<sup>th</sup> March 2021 as part of an adhoc visit to confirm the correct orientation of the orifice plate the pressure transmitter was isolated from the metering stream whilst the line was depressurised. When returning to service the pressure transmitter was left isolated with a pressure “locked in” to the pressure transmitter that was within the normal operating range thus no alarm was generated by the flow computer.

Pre / Post work checks carried out by Cadents control room indicated a slight discrepancy and this was highlighted to the Gas Quality and Measurement (GQ&M) team. The data required to investigate further was automatically collected from site at 6am on the 13<sup>th</sup> March (as is standard across all FWACV installations) and was investigated by the GQ&M team on the next working day which was the 15<sup>th</sup> March. The flow pressure transmitter was changing over time and therefore not immediately suspected to be in error. On further investigation and comparison with the site inlet pressure (P1) it became apparent the change in flow pressure was not to the extent expected and was most likely fluctuating with temperature change rather than representative of actual changes in pressure in the metering tube.

A site visit was organised as soon as this was identified and later the same day an instrumentation operative identified that as a result of a sticking manifold that once exercised, reintroduced line pressure to the flow pressure transmitter. The faulty manifold has now been replaced.

## 3. ERROR QUANTIFICATION AND IMPACT

Gas property (from Audit data files) and raw meter data (from RbD files) applicable for the dates 12<sup>th</sup> March 2021 through to and including 15<sup>th</sup> March 2021 were used in the analysis.

Within the resolution capabilities of the data (circa 4 mins), the period of error was unambiguously identified as being from 12<sup>th</sup> March 2021 at 13:14 hours (first bad reading) to 15<sup>th</sup> March 2021 at 19:11 (last bad reading).

Four complete Gas Days' worth of flow computation was used to reconstitute corrected flow.

The Rugby metering stream is immediately downstream of the site inlet filters. Immediately upstream of the filters is an inlet pressure transmitter (P1). Analysis of data prior and subsequent to the period of the meter error shows that for typical flow rates the meter pressure is approximately 0.3bar lower than the P1 inlet pressure which is as a result in a small pressure drop across the filters. For the period the error occurred the reconciliation uses the P1 pressure minus 0.3bar as a reasonable approximation of the actual metering pressure.

The error has been quantified by firstly using the 4 minute data to recalculate the “uncorrected” flow data then use the same data but with the calculated flow pressure value (based on P1) to produce a “corrected” flow dataset. This methodology gives a consistent dataset to compare the impact of the corrected data value rather than simply comparing the reported totalised readings with a corrected dataset based on the 4 minute data.

#### 4. CAUSES

A faulty “sticking” manifold led the instrumentation technician to believe the flow pressure transmitter had been correctly reinstated when in fact it was isolated from the meter stream, this was not apparent due to the locked in pressure being similar to the metering stream line pressure.

#### 5. RECOMMENDATIONS AND LEARNING

- An Engineering Bulletin (EB/719) has been produced which contains reference to reinstatement of metering systems and emphasises the importance of following the checks set out in CP16 to ensure all instrumentation has been correctly returned to service.
- Consideration should be given to the replacement of current Honeywell pressure transmitters with pressure transmitters which contain a local display of measured pressure, this will allow the technician to check for and confirm a change in pressure when the isolation valve is operated even where the pressure change is relatively small.

#### STANDARD REFERENCE CONDITIONS STATEMENT

Unless stated otherwise, all volumes stated here are for the real dry gas at ISO Standard Reference conditions of 15°C and 1.01325 bar. Any stated energy values are calculated using a gross calorific value for the real dry gas at ISO reference conditions of 15°C (combustion) and 15°C and 1.01325 bar (metering).

#### VERSION HISTORY

<i>Version</i>	<i>Changes</i>	<i>Author</i>	<i>Date</i>
<i>Rev 0</i>	<i>Draft for review and comment</i>	<i>Simon Howard</i>	<i>02/12/2021</i>
<i>Rev1.0</i>	<i>Final Draft</i>	<i>Simon Howard</i>	<i>16/03/2022</i>

#### DISTRIBUTION

NGGT Energy Balance, Network Capability and Operations, Gas Joint Office of Gas Transporters.

**APPENDIX**

## Correction Factors

Gas Day	Deemed Incorrect sm3	Deemed Correct sm3	From EOD Files sm3	Correction Factor	Error %
12/03/2021	3256409.78	3287440.24	3271981	1.009529039	-0.94390934
13/03/2021	2886321.38	3035682.371	2895803	1.051747872	-4.920178428
14/03/2021	3310850.61	3442598.592	3312017	1.039792791	-3.826992366
15/03/2021	3210859.88	3184281.461	3208801	0.991722336	0.834675589