

METER ERROR REPORT**FINAL**

Reconcile?	Y
Safety Issue?	N
Thesis Report No.	

1. EXECUTIVE SUMMARY

SITE NAME	Ilchester
LDZ	South West
START DATE (actual)	25th September 2010 (02:53)
LAST GOOD DATE	
END DATE	25th September 2010 (05:17)
SIZE OF ERROR (No reconciliation required if under 0.1%)	24,149. SCM over registration (equivalent to 2.70%)
ESTIMATE – Y/N?	N
ROOT CAUSE	Pressure transducer locking up
ANALYSIS	HPMIS RBD data
METER TYPE	Orifice Plate
AUTHOR	S Western
CHECKED BY	C Stock

2. BACKGROUND

Gas is supplied to part of the South West LDZ, Wales & West Utilities Network, at Ilchester FWACV offtake. The site metering system comprises a single Orifice meter with an isolated bypass.

On the 25th of September 2010 the pressure transducer locked up for some undiscovered reason for a period of 2 hours 10 minutes. This caused the standard flow rate to be incorrectly calculated. The condition was rectified by turning the power to the transmitter off and then on again.

3. ERROR QUANTIFICATION AND IMPACT

The RBD data was reviewed before and after the pressure transducer (PT) locked up. The ten PT readings prior to and after the locking of the PT were averaged to estimate the actual pressure reading during the period of the PT locking up.

Using the HPMIS orifice plate design calculation (See Fig. 1a & 1b) together with the 8 minute RBD and gas composition data the volume flow for the period where the PT locked was calculated. In each instance, the volume flow for the locked up PT and the estimated PT reading were calculated. By comparing these calculated flows over the period of the PT locking up it was estimated that orifice metering system over-registered 24,149.91scm of gas.

From HPMIS, the Dvol for Gas Day the 24th of September 2010 was 0.894117mscm so the over-registration equates to 2.700 % of Dvol. A spreadsheet detailing the calculations is available on request.

The error would have had a minor affect on odourisation.

Fig. 1a - HPMIS screen shot for flow calculation using calculated average pressure

Orifice Plate Meter Design (ISO5167(BS EN 1042)) and Deflection Calculations

Site: ILCHESTER OFOO
Stream: MTA

Site Design Capacity: 4.5 mscmd Design Mode: Flowrate RBD Approved Design

Design Conditions
 Site Operating Pressure: Max 69.0000 BarG, Min 35.0000 BarG
 Temperature: 12.935 °C
 Pressure: 56.3650 BarA
 Diff. Pressure: 13.38 mBar
 Upstream Temp Correct

Gas Properties
 User Defined Calculated
 Gas Density: 47.2105620 kg/m³
 Isentropic Index: 1.349
 Viscosity: 118.5 µPoise
 Calorific Value: 39.042 MJ/scm
 Relative Density: 0.60165
 Air Density: 1.22541 kg/scm

Dimensions
 Temp Corrected Dimensions
 Drain Hole Correction
 Drain Hole: No
 Drain Hole Bore: mm
 Certified Dimensions: Pipe Diam. 433.172 mm at 20.00 °C, Orifice Diam. 209.446 mm at 21.00 °C, Beta Ratio 0.4835
 Corrected Dimensions: Pipe Diameter mm, Orifice Diameter mm, Beta Ratio
 Plate Expn Coeff: 1.60E-05 °C Pipe Expn Coeff: 1.10E-05 °C

Flow Rates
 Time Base: hour
 Gas Design Flow Rates: Mass Flow 27,317.12 kg, Volume Flow 37,051.58 scm, Energy Flow 1,446,583.86 MJ
 Discharge Coeff.: 0.602508
 Reynolds Number: 1,881,878
 Meter Operating Flowrate: Max 4.500000 mscmd, Min mscmd

Fig. 1b - HPMIS screen shot for flow calculation using locked pressure value

Orifice Plate Meter Design (ISO5167(BS EN 1042)) and Deflection Calculations

Site:
 Stream:
 Site Design Capacity: mscmd Design Mode: RBD Approved Design

Design Conditions

Site Operating Pressure: Max BarG Min BarG
 Temperature: °C
 Pressure: BarA
 Diff. Pressure: mBar

Gas Properties

User Defined Calculated
 Gas Density: kg/m³
 Isentropic Index:
 Viscosity: µPoise
 Calorific Value: MJ/scm
 Relative Density:
 Air Density: kg/scm

Dimensions

Temp Corrected Dimensions Drain Hole Correction
 Drain Hole: Drain Hole Bore: mm

Certified Dimensions

Pipe Diam.: mm at °C
 Orifice Diam.: mm at °C
 Beta Ratio:

Corrected Dimensions

Pipe Diameter: mm
 Orifice Diameter: mm
 Beta Ratio:

Plate Expn Coeff: /°C Pipe Expn Coeff: /°C

Flow Rates

Time Base:

Gas Design Flow Rates

Mass Flow: kg
 Volume Flow: scm
 Energy Flow: MJ
 Discharge Coeff.:
 Reynolds Number:

Meter Operating Flowrate

Max: mscmd
 Min: mscmd

4. RECOMMENDATIONS AND LEARNING

HPMIS (RBD data) should be monitored to identify any such future errors. Should the error re-occur an assessment of the transmitter may be required to ensure its integrity.

REFERENCES

- ISO 5167
- HPMIS database

VERSION HISTORY

Version	Changes	Author	Date
Rev0	First draft	S Western	13/10/2010
Rev1	First draft	S Western	04/01/2011