



SMER EM011 Thornton Curtis

Cadent Gas Ltd

SMER EM011 Thornton Curtis - Summary Report

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Document Author: Ben Kirkman (Kelton) / Paul Daniel (i-Vigilant)

Contact: ben.kirkman@kelton.co.uk

Kelton Engineering Ltd

The Mackenzie Building, 168 Skene Street
Aberdeen, AB10 1PE, Scotland, UK

t: +44 (0) 1224 630000 | f: +44 (0) 1224 630004
e: info@kelton.co.uk | w: www.kelton.co.uk

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1 Revision Control

Rev	Issue date	Description	Prep.	App.
1	18/05/2023	Issued for comment	BK	

2 Executive Summary

Site Name	Thornton Curtis NTS to LDZ Offtake
DNO	Cadent Gas Limited
LDZ	East Midlands
Error Start Date	21 st April 2022
(Or) Error Last Good Date	
Error Corrected Date	4 th July 2022
Size of Error (over or under read)	75.93 MSm ³ under registration (839 GWh)
Error Description	Incorrect seating of orifice plate
Methodology	Site flow testing with reference meter
Meter Type	Orifice Plate
MER Unique Reference Number	EM011
Cadent Internal Reference	MER/CAD/218/22

3 Error Description

An increase in Unidentified Gas (UIG) was reported for the East Midlands Local Distribution Zone (LDZ) starting from 21st April 2022. This coincided with orifice plate maintenance being carried out at Thornton Curtis National Transmission System (NTS) to LDZ Offtake and an investigation on 4th July 2022 subsequently found that a measurement error had occurred due to incorrect seating of the orifice plate within the carrier.

Further description of the error is provided in Kelton Report (Ref. NK3262-002) and i-Vigilant Report (iVJob22094-RPT-002-F01).

4 Methodology

Two independent methodologies were proposed in Kelton Report (Ref. NK3262-001) and i-Vigilant Report (iVJob22094-RPT-001-F03). These methodologies were combined, with additional consideration of restrictions on available site operations, into the final NRO test plan. Further description of the final methodology is provided in Kelton Report (Ref. NK3262-002) and i-Vigilant Report (iVJob22094-RPT-002-F01).

5 Error Quantification

The test data was analysed independently by each ITE and results presented in Kelton Report (Ref. NK3262-002) and i-Vigilant Report (iVJob22094-RPT-002-F01).

The overall result of each ITE analysis was within 0.1% of each other (25.11% and 25.21%). The main difference between the methodologies was identified as being the application of the offset between the reference meter and the meter under test. In one methodology the offsets from the start and end of a test period were averaged, whereas in the other methodology only the offset from the start of a test period was used. Following discussion, the ITEs decided that the averaging method shall be used resulting in an overall result of 25.11% under-registration, with an uncertainty of $\pm 1.1\%$ at a confidence interval of 95% ($k=1.96$). This equates to a daily correction factor of 1.335292.

The Gemini billed daily volume and energy data was not used in the Kelton Report (Ref. NK3262-002) and i-Vigilant Report (iVJob22094-RPT-002-F01). Therefore, there was a discrepancy between the reports in the calculation of the overall error for the period in volume and energy terms.

New part-day corrections were calculated, and the error was recalculated, using the Gemini billed daily volume and energy data as a reference.

The test data does not show a correlation between error and flow rate therefore this daily correction factor can be applied to all gas days between 22nd April and 3rd July (inclusive). Gas days 21st April and 4th July require part-day corrections as stated in Table 1.

Gas Day	Daily Correction Factor
21 st April 2022	1.116923
22 nd April 2022 to 3 rd July 2022 (inclusive)	1.335292
4 th July 2022	1.151050

Table 1 - Daily Correction Factors

6 Learning

The error was caused by the orifice plate being incorrectly located. The personnel involved were not familiar with the task associated with this particular orifice plate carrier, and the controls put in place were insufficient to prevent the error. It is recommended that the following additional controls are considered:

- Review of pre- and post- validation check methods
- Review of internal investigation process following measurement queries
- Measurement training for management & Energy Control Centre personnel
- Orifice carrier specific or site-specific mechanical procedures
- Site-specific instructional reference videos
- Orifice carrier specific or site-specific mechanical locating aids (e.g. dipstick)
- Training for mechanical personnel

7 References

Kelton Report Ref. NK3262-002	- SMER EM011 Thornton Curtis
Kelton Report Ref. NK3262-001	- SMER EM011 Thornton Curtis - Methodology
i-Vigilant Report iVJob22094-RPT-002-F01	- Thornton Curtis MER (EM011) - Error Due to Incorrect Orientation of Orifice Plate
i-Vigilant Report iVJob22094-RPT-001-F03	- Thornton Curtis MTA: EM011 - Proposed Method to Establish Measurement Error
MER_EM011_Gemini Data.xlsx	- Gemini Data spreadsheet
MER_EM011_Results Summary.xlsx	- Results spreadsheet
MER_EM011_Position2 Test Results.xlsx	- Test Calculation spreadsheet
MER_EM011_Position2 Repeat Test Results.xlsx	- Test Calculation spreadsheet
MER_EM011_Position1 Test Results.xlsx	- Test Calculation spreadsheet
MER_EM011_Position3 Test Results.xlsx	- Test Calculation spreadsheet
MER_EM011_PartDayCorrections R2.xlsx	- Calculation spreadsheet