

NULL METER ERROR REPORT**FINAL**

Reconcile?	N
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Safety Issue?	N
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Thesis Report No.	
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1. EXECUTIVE SUMMARY

SITE NAME	Bracknell	
LDZ	NT	
START DATE (actual)	22 nd Jan 2021	
LAST GOOD DATE		
END DATE	1 st June 2021	
SIZE OF ERROR (No reconciliation required if under 0.1%)	< 0.0342% on original measured volume	
ESTIMATE – Y/N?	N	
ROOT CAUSE	Incorrect CO ₂ and Isentropic Exponent fixed factors were entered into flow computer	
ANALYSIS	Calculation of flowrates using incorrect and correct CO ₂ and Isentropic Exponent fixed factors to determine the error.	
METER TYPE	Orifice	
AUTHOR	Damian Ray	
CHECKED BY	Simon Howard	
ACCEPTED BY CADENT NETWORK		
RECONCILIATION	Distribution	Transportation

2. BACKGROUND

Gas is supplied to part of the Cadent network at Bracknell FWACV inter LDZ site. The site metering system comprises of a single stream orifice plate.

On the 22nd January 2021, incorrectly calculated CO₂ and Isentropic Exponent fixed factors were entered into the site flow computer configuration. On the 1st June the correct values for the CO₂ and Isentropic Exponent were entered into the flow computer.

3. ERROR QUANTIFICATION AND IMPACT

Table 1 details the correct and incorrect CO₂ and Isentropic Exponent fixed factors entered into the flow computer. Image 1 shows the incorrect CO₂ and Isentropic Exponent fixed factors and image 2 shows the correct CO₂ and Isentropic Exponent fixed factors.

	Incorrect	Correct
CO ₂	0.787099	0.8327
Isentropic Exponent	1.297847	1.297931

Table 1 Correct and Incorrect CO₂ and Isentropic Exponent values

Data Analysis Period 1 January 2020 05:00 hrs to 1 January 2021 05:00 hrs inclusive

Average composition, flow pressure and flow temperature

site	h_ref	Count	meter	Stream	(mol.%)												P (bar.g)	T (degC)	Calc		Visc (µPoise)	Isent (index)	Average CO ₂ (mol.%) Omni 6 d.p.	Isentropic Exponent (Index) Omni 6 d.p.	Viscosity (pa.s) Omni 7 d.p.
					c1	c2	c3	nc4	ic4	nc5	ic5	neoc5	c6	co2	n2	TR_GO.DAT			Fluid Data & Analysis	Fluid Data & Analysis					
Bracknell	H9423	109485	MO1	3	91.09904	4.477093	0.958162	0.149866	0.175526	0.029947	0.043784	0	0.044804	0.787099	1.362943	21.40729	11.43690414	108.0721789	1.297847243	0.787099	1.297847	0.0000108			

Image 1, Incorrect CO₂ and Isentropic Exponent

Data Analysis Period 1 January 2020 05:00 hrs to 1 January 2021 05:00 hrs inclusive

Average composition, flow pressure and flow temperature

site	h_ref	Count	meter	Stream	(mol.%)												P (bar.g)	T (degC)	Calc		Visc (µPoise)	Isent (index)	Average CO ₂ (mol.%) Omni 6 d.p.	Isentropic Exponent (Index) Omni 6 d.p.	Viscosity (pa.s) Omni 7 d.p.
					c1	c2	c3	nc4	ic4	nc5	ic5	neoc5	c6	co2	n2	TR_GO.DAT			Fluid Data & Analysis	Fluid Data & Analysis					
Bracknell ¹	H9423	102467	MO1	3	91.995158	4.462908	0.919806	0.151546	0.186753	0.031865	0.047568	0.001536	0.063331	0.832700	1.306829	21.377362	10.677473	107.821051	1.297931	0.832700	1.297931	0.0000108			

Image 2 Correct CO₂ and Isentropic Exponent

The percentage error in flowrate, summarized in Table 2 was calculated using the incorrect and correct CO₂ and isentropic exponent values. The error was analysed over a range of flow pressures, differential pressures and temperatures and was found to be minimally affected. The percentage error was calculated using the worst case values for both differential pressure and temperature.

Percentage Error in Flowrate %	< 0.0342
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Table 2 Error in Volumetric Flowrate

4. CAUSES

The error was caused by the fixed factors being incorrectly calculated due to missing data in the extracted data.

5. RECOMMENDATIONS AND LEARNING

An appropriate data validation process should be employed to ensure a complete data set is available for the fixed factor calculations.

REFERENCES

Bracknell fixed factor Error 2021.xls

VERSION HISTORY

<i>Version</i>	<i>Changes</i>	<i>Author</i>	<i>Date</i>
1	<i>First Issue</i>	Damian Ray	25/10/2021