

METER ERROR REPORT**FINAL**

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

SITE NAME	Royston	
LDZ		
START DATE (actual)	5 th November 2019	
LAST GOOD DATE	4 th November 2019	
END DATE	9 th June 2020	
SIZE OF ERROR (No reconciliation required if under 0.1%)	-0.14784% error on original volume (Overread by 0.14806%) (35245 sm ³ / 0.39GWh)	
ESTIMATE – Y/N?	N	
ROOT CAUSE	Incorrect K Factors	
ANALYSIS	Recalculation of volume using correct K factors.	
METER TYPE	Turbine	
AUTHOR	William van Woerden	
CHECKED BY	Catherine Jones	
ACCEPTED BY CADENT NETWORK		
RECONCILIATION	Distribution	Transportation

The calculation for the overall error is taken as the volume error caused by the incorrect K factors being in use for meter MT1, divided by the total flowrate as measured by the station (calculated as the Instantaneous Net Volume Totaliser (sm³) value at the end of the analysis period minus Instantaneous Net Volume Totaliser (sm³) value at the start of the analysis period, which accounts for flow when both MT1 and MT2 were in use).

The overall error calculated is an overread in volume of 0.14806% for the period analysed.

2. BACKGROUND

Gas is supplied to part of the Cadent network at Royston FWACV offtake. The site comprises a metering system with two turbine meter streams, MT1 and MT2, operating in a 2 x 100% configuration.

It was discovered on 9th June 2020 that on 5th November 2019, the K factors on the flow computer configuration for MT1 were inadvertently changed to K factors from a previous meter calibration. This was corrected on the date of discovery.

3. ERROR QUANTIFICATION AND IMPACT

Flow and conditions data were requested for the period impacted, from 5th November 2019 when K factors for MT1 were inadvertently changed, to 9th June 2020 when the K factors were updated to the correct values. The error has occurred for turbine meter MT1 only, and MT2 is not affected.

For the period identified, meter MT1 was in operation using the incorrect K factors, though, note that MT1 was not in operation during the period from 5th November 2019 to 28th November 2019 inclusive, therefore flow measurement was not affected during this time.

Table 1 Incorrect (in use) and correct K factors for MT1.

Table 1 Incorrect (in use) and correct K factors

(In Use) Incorrect Frequency	(In Use) Incorrect K Factor	Correct Frequency	Correct K Factor
61	2737.14	63	2743.601
121	2740.45	123	2745.14
299	2740	304	2744.143
480	2739.19	481	2743.841
866	2740.19	873	2743.876
1211	2735.54	1235	2743.513

For each data cycle, occurring every 4-5 minutes, the flowrate was recalculated using the frequency data provided and by interpolating the K factor from the correct K factor set. This adjusted flowrate was compared to the non-adjusted flowrate calculated using the K factor as provided. The difference between the uncorrected and corrected flowrates are added to the station flowrate. A correction factor is also calculated and applied to the difference between subsequent volumetric integrator readings. Gas day correction factors are summarised in **Error! Reference source not found.**

4. CAUSES

The flow error has been caused by the MT1 K factors being inadvertently changed to values from a previous meter calibration.

5. RECOMMENDATIONS AND LEARNING

The configurations saved after making changes should be checked against the current meter calibration certificate.

REFERENCES

1. Royston MER Final V4.xlsx

VERSION HISTORY

<i>Version</i>	<i>Changes</i>	<i>Author</i>	<i>Date</i>
1	<i>First Issue</i>	W. van Woerden	03/08/2020
2	<i>Cadent comments included, start date changed from 06/11/19 to 05/11/19.</i>		14/09/2020
3	<i>Daily correction factors starting from 29/11/19 included</i>		14/09/2021
4	<i>Gas quality and Measuring Station Metering Data System data added for Gas Day 30.11.19, previously not included. Error updated.</i>		12/11/2021
5	<i>Added statement to Section 3 to clarify the dates when MT1 was operational, minor formatting changes.</i>		09/12/2021

APPENDIX

The table below gives the daily correction factors which should be used to reconcile the error.

Where there is a short period of missing data a correction has been applied equal to the mean correction factor for the previous and subsequent days.

This applies for Gas Days where fewer than 320 data points were recorded. Because the error is not similarly distributed across the data period, the default correction factor as detailed in MER guidance is not used.

Table 2 Daily Correction Factors

Gas Day	Daily Error (scm)	Daily Volume (scm)	Daily Correction Factor
05/11/2019	0	109778	1
06/11/2019	0	119346	1
07/11/2019	0	118324	1
08/11/2019	0	133637	1
09/11/2019	0	132687	1
10/11/2019	0	124137	1
11/11/2019	0	129244	1
12/11/2019	0	130420	1
13/11/2019	0	121531	1
14/11/2019	0	124130	1
15/11/2019	0	123598	1
16/11/2019	0	118722	1
17/11/2019	0	115036	1
18/11/2019	0	129485	1
19/11/2019	0	142043	1
20/11/2019	0	147388	1
21/11/2019	0	142275	1
22/11/2019	0	129255	1
23/11/2019	0	116813	1
24/11/2019	0	115050	1
25/11/2019	0	114721	1
26/11/2019	0	107224	1
27/11/2019	0	108589	1
28/11/2019	0	119526	1
29/11/2019	-139.900753	141751	0.999013
30/11/2019	-241.291087	152132	0.998414
01/12/2019	-234.866221	147374	0.998406
02/12/2019	-245.898282	154450	0.998408
03/12/2019	-230.690564	144340	0.998402
04/12/2019	-235.307096	147528	0.998405
05/12/2019	-230.363325	143333	0.998393
06/12/2019	-197.619985	119887	0.998352
07/12/2019	-191.572838	115409	0.998340

08/12/2019	-202.367893	123343	0.998359
09/12/2019	-227.779409	142298	0.998399
10/12/2019	-223.155335	138497	0.998389
11/12/2019	-228.004927	142412	0.998399
12/12/2019	-229.733168	143027	0.998394
13/12/2019	-223.633237	139087	0.998392
14/12/2019	-230.090099	144256	0.998405
15/12/2019	-222.664413	138660	0.998394
16/12/2019	-220.997534	137098	0.998388
17/12/2019	-221.613243	137988	0.998394
18/12/2019	-221.035439	136644	0.998382
19/12/2019	-198.315438	120004	0.998347
20/12/2019	-205.290326	125741	0.998367
21/12/2019	-206.150560	125841	0.998362
22/12/2019	-204.720522	125144	0.998364
23/12/2019	-214.339808	132102	0.998377
24/12/2019	-196.156519	118304	0.998342
25/12/2019	-203.588850	124141	0.998360
26/12/2019	-210.943180	129006	0.998365
27/12/2019	-200.980943	121541	0.998346
28/12/2019	-203.973996	124247	0.998358
29/12/2019	-205.244818	125660	0.998367
30/12/2019	-211.128914	129902	0.998375
31/12/2019	-203.598304	110350	0.998374
01/01/2020	-213.001413	130975	0.998374
02/01/2020	-210.881989	129193	0.998368
03/01/2020	-213.283873	131689	0.998380
04/01/2020	-217.528846	134082	0.998378
05/01/2020	-209.551695	128310	0.998367
06/01/2020	-216.632631	134186	0.998386
07/01/2020	-207.039459	126123	0.998358
08/01/2020	-189.354085	113338	0.998329
09/01/2020	-191.702709	115946	0.998347
10/01/2020	-214.051672	132560	0.998385
11/01/2020	-207.235079	126649	0.998364
12/01/2020	-201.005896	122542	0.998360
13/01/2020	-215.460183	133168	0.998382
14/01/2020	-200.621431	124494	0.998389
15/01/2020	-205.767267	126013	0.998367
16/01/2020	-209.484603	128074	0.998364
17/01/2020	-213.757466	132297	0.998384
18/01/2020	-230.464011	144315	0.998403
19/01/2020	-235.052255	147736	0.998409
20/01/2020	-231.468162	144582	0.998399
21/01/2020	-231.899453	145111	0.998402
22/01/2020	-218.152614	135005	0.998384

23/01/2020	-214.164870	132079	0.998379
24/01/2020	-209.520768	127677	0.998359
25/01/2020	-210.971066	129217	0.998367
26/01/2020	-207.923931	127114	0.998364
27/01/2020	-216.397788	133979	0.998385
28/01/2020	-237.016707	148543	0.998404
29/01/2020	-224.648145	138862	0.998382
30/01/2020	-386.564455	126676	0.996948
31/01/2020	-14.720700	119236	0.999877
01/02/2020	-193.670220	117021	0.998345
02/02/2020	-196.126119	118513	0.998345
03/02/2020	-206.764861	127393	0.998377
04/02/2020	-227.482671	142079	0.998399
05/02/2020	-226.476288	141068	0.998395
06/02/2020	-223.390844	138940	0.998392
07/02/2020	-219.192294	135521	0.998383
08/02/2020	-198.256786	120530	0.998355
09/02/2020	-200.474885	121959	0.998356
10/02/2020	-222.040669	137928	0.998390
11/02/2020	-244.253987	153026	0.998404
12/02/2020	-235.426753	147070	0.998399
13/02/2020	-218.328315	135677	0.998391
14/02/2020	-213.762930	131404	0.998373
15/02/2020	-191.352713	114496	0.998329
16/02/2020	-201.471891	122836	0.998360
17/02/2020	-215.464829	133478	0.998386
18/02/2020	-223.828474	139546	0.998396
19/02/2020	-225.363771	140178	0.998392
20/02/2020	-219.815763	136753	0.998393
21/02/2020	-225.418462	140487	0.998395
22/02/2020	-195.402511	118153	0.998346
23/02/2020	-192.952714	116757	0.998347
24/02/2020	-207.469199	126819	0.998364
25/02/2020	-216.069339	134045	0.998388
26/02/2020	-228.629349	142934	0.998400
27/02/2020	-238.206256	149502	0.998407
28/02/2020	-433.793006	148667	0.997082
29/02/2020	-21.163660	132713	0.999841
01/03/2020	-214.741455	132885	0.998384
02/03/2020	-219.143348	135688	0.998385
03/03/2020	-230.938892	144287	0.998399
04/03/2020	-223.176854	138687	0.998391
05/03/2020	-232.302773	145608	0.998405
06/03/2020	-215.956078	133778	0.998386
07/03/2020	-203.229547	123965	0.998361
08/03/2020	-186.896028	112678	0.998341

09/03/2020	-208.890616	128369	0.998373
10/03/2020	-177.700428	105581	0.998317
11/03/2020	-180.370329	108209	0.998333
12/03/2020	-201.536042	122686	0.998357
13/03/2020	-202.824363	124058	0.998365
14/03/2020	-190.583270	114472	0.998335
15/03/2020	-190.934442	115107	0.998341
16/03/2020	-196.394166	118828	0.998347
17/03/2020	-185.059882	110526	0.998326
18/03/2020	-181.276382	108011	0.998322
19/03/2020	-206.144198	126177	0.998366
20/03/2020	-205.613193	126265	0.998372
21/03/2020	-201.450925	123420	0.998368
22/03/2020	-198.330532	120961	0.998360
23/03/2020	-199.985305	121974	0.998360
24/03/2020	-190.388490	115245	0.998348
25/03/2020	-188.907957	114583	0.998351
26/03/2020	-193.630022	117739	0.998355
27/03/2020	-190.575930	115154	0.998345
28/03/2020	-196.917930	120450	0.998365
29/03/2020	-215.084230	132806	0.998380
30/03/2020	-384.476712	124132	0.996903
31/03/2020	-23.170582	110688	0.999791
01/04/2020	-208.514129	126529	0.998352
02/04/2020	-178.078079	104746	0.998300
03/04/2020	-171.311877	100003	0.998287
04/04/2020	-148.551906	82994	0.998210
05/04/2020	-130.753501	69095	0.998108
06/04/2020	-132.437028	71056	0.998136
07/04/2020	-138.306357	75039	0.998157
08/04/2020	-128.633189	67815	0.998103
09/04/2020	-109.884435	53006	0.997927
10/04/2020	-107.627298	51335	0.997903
11/04/2020	-100.681884	46860	0.997851
12/04/2020	-102.791339	46686	0.997798
13/04/2020	-132.154352	70968	0.998138
14/04/2020	-142.111641	78655	0.998193
15/04/2020	-130.846057	69322	0.998112
16/04/2020	-124.544656	64257	0.998062
17/04/2020	-129.346334	68008	0.998098
18/04/2020	-140.418227	77259	0.998183
19/04/2020	-128.209740	67471	0.998100
20/04/2020	-128.418117	67710	0.998103
21/04/2020	-125.782406	65168	0.998070
22/04/2020	-120.423654	60554	0.998011
23/04/2020	-112.924596	54837	0.997941

24/04/2020	-112.741874	54387	0.997927
25/04/2020	-120.726665	61890	0.998049
26/04/2020	-111.708163	53976	0.997930
27/04/2020	-115.931134	57740	0.997992
28/04/2020	-149.651686	84606	0.998231
29/04/2020	-294.338134	81046	0.996368
30/04/2020	-2.087125	82907	0.999975
01/05/2020	-136.823830	74761	0.998170
02/05/2020	-122.926043	63080	0.998051
03/05/2020	-127.647230	67109	0.998098
04/05/2020	-137.291369	75868	0.998190
05/05/2020	-147.184284	83202	0.998231
06/05/2020	-141.357115	78378	0.998196
07/05/2020	-128.404078	67634	0.998101
08/05/2020	-111.757948	53867	0.997925
09/05/2020	-111.093480	51997	0.997863
10/05/2020	-134.235109	72186	0.998140
11/05/2020	-162.312358	94628	0.998285
12/05/2020	-159.628024	92420	0.998273
13/05/2020	-162.070162	94881	0.998292
14/05/2020	-151.236595	86385	0.998249
15/05/2020	-116.270926	58314	0.998006
16/05/2020	-113.122731	56030	0.997981
17/05/2020	-119.019561	59460	0.997998
18/05/2020	-119.143301	59823	0.998008
19/05/2020	-120.653800	60736	0.998013
20/05/2020	-109.024124	51739	0.997893
21/05/2020	-103.113809	47260	0.997818
22/05/2020	-112.175558	53422	0.997900
23/05/2020	-114.163561	54824	0.997918
24/05/2020	-113.237709	54134	0.997908
25/05/2020	-109.953883	51621	0.997870
26/05/2020	-118.516046	58260	0.997966
27/05/2020	-119.624592	59324	0.997984
28/05/2020	-121.170849	61041	0.998015
29/05/2020	-118.860524	58895	0.997982
30/05/2020	-117.098678	57341	0.997958
31/05/2020	-117.794729	47206	0.997964
01/06/2020	-118.055761	58161	0.997970
02/06/2020	-114.545660	55090	0.997921
03/06/2020	-253.770814	60542	0.995808
04/06/2020	-124.219829	64809	0.998083
05/06/2020	-128.697968	69108	0.998138
06/06/2020	-137.570697	76426	0.998200
07/06/2020	-135.395242	74323	0.998178
08/06/2020	-138.573241	77526	0.998213

09/06/2020	-49.628992	28266	0.998244
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