

METER ERROR REPORT**DRAFT**

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

SITE NAME	Melkinthorpe	
LDZ	NO	
START DATE (actual)	23 rd June 2008 (11:35)	
LAST GOOD DATE		
END DATE	11 th May 2009 (12:14)	
SIZE OF ERROR (No reconciliation required if under 0.1%)	1.038667 % under-registration (or 215,093 scm excluding default days)	
ESTIMATE – Y/N?		
ROOT CAUSE	Incorrect k factors used in flow computer	
ANALYSIS	Calculation of correct k factors and recalculation of volumes	
METER TYPE	Turbine	
AUTHOR	B. Kirkman	
CHECKED BY	A. Niazi	
ACCEPTED BY NETWORK	M. Alderson	
RECONCILIATION	Distribution	Transportation

2. BACKGROUND

Melkinthorpe Offtake is a single turbine meter stream site using a gas tracker for RD and CV determination and PTZ correction. On 23rd June 2008 the turbine meter was reinstated following calibration, however the new k factors on the calibration certificate were not entered into the flow computer and the previous values were used for k factor interpolation.

The meter operated with the incorrect k factors from 11:35 on 23rd June 2008 until 12:14 on 11th May 2009 when the correct k factors were entered.

3. ERROR QUANTIFICATION AND IMPACT

Archived 4-minutely data was downloaded from HPMIS covering the entire period. The incorrect k factor value was confirmed and the correct k factor value was calculated at each point in the data. The volumes were recalculated using both the incorrect and correct k factors, the error being the difference between the two.

The RBD and Audit data for a number of days was not available; On another day the metering equipment was being validated; On a separate occasion data was not available for 4 hours in the middle of the day. The daily correction factor for all these days was replaced with a default daily correction factor of 1.01038667, calculated from the overall error (excluding days mentioned above).

The overall error is an under-registration of 1.038667 % (or 215,093 scm excluding the default days).

4. CAUSES

Following the turbine meter calibration, the correct k factors were not entered into the flow computer and the previous values were used.

5. RECOMMENDATIONS AND LEARNING

It is recommended that the under-registration is reconciled using the daily correction factors in Appendix A. Following any meter calibration and as part of the meter reinstatement checks the flow computer configuration should be checked against the previous version to ensure the correct changes have been made. There was a possibility of gas passing into the system with reduced levels of odorant due to the under-registration of flowrates.

REFERENCES

HPMIS Database

'MelkinthorpePart1.xls' – Data spreadsheet

'MelkinthorpePart2.xls' – Data spreadsheet

'MelkinthorpeResultsTable.xls' – Data spreadsheet

VERSION HISTORY

<i>Version</i>	<i>Changes</i>	<i>Author</i>	<i>Date</i>
0	First Issue	B. Kirkman	01/07/09

DISTRIBUTION

*This Pro-forma's audience should be:
United Utilities*

APPENDIX A – Daily Correction Factors

Gas Day	HPMIS DVol	Daily Correction Factor
23/06/2008	68105	1.010754
24/06/2008	78073	1.010747
25/06/2008	113034	1.010335
26/06/2008	105002	1.010382
27/06/2008	70973	1.010958
28/06/2008	70699	1.011013
29/06/2008	97389	1.010579
30/06/2008	21363	1.010188
01/07/2008	69687	1.010447
02/07/2008	105024	1.010453
03/07/2008	87531	1.010819
04/07/2008	60827	1.010904
05/07/2008	72041	1.010769
06/07/2008	87689	1.010708
07/07/2008	84844	1.010776
08/07/2008	49656	1.010944
09/07/2008	108511	1.010358
10/07/2008	105473	1.010456
11/07/2008	97616	1.010570
12/07/2008	117616	1.010276
13/07/2008	111664	1.010423
14/07/2008	53342	1.010641
15/07/2008	35029	1.010514
16/07/2008	81915	1.010502
17/07/2008	105169	1.010423
18/07/2008	59222	1.010982

Gas Day	HPMIS DVol	Daily Correction Factor
19/07/2008	66673	1.011005
20/07/2008	70169	1.010803
21/07/2008	65507	1.010524
22/07/2008	47067	1.010563
23/07/2008	79297	1.010724
24/07/2008	95770	1.010466
25/07/2008	74848	1.010644
26/07/2008	54797	1.010497
27/07/2008	28517	1.010437
28/07/2008	27962	1.010531
29/07/2008	48819	1.010913
30/07/2008	76669	1.010854
31/07/2008	81282	1.010690
01/08/2008	109518	1.010389
02/08/2008	71484	1.011007
03/08/2008	83043	1.010632
04/08/2008	87492	1.010615
05/08/2008	9612	1.010186
06/08/2008	43195	1.010977
07/08/2008	101708	1.010219
08/08/2008	110924	1.010177
09/08/2008	63212	1.010888
10/08/2008	41783	1.010859
11/08/2008		DEFAULT
12/08/2008		DEFAULT
13/08/2008	76803	1.010812
14/08/2008	73573	1.010935
15/08/2008	103685	1.010235

Gas Day	HPMIS DVol	Daily Correction Factor
16/08/2008	74742	1.010415
17/08/2008	39469	1.010828
18/08/2008	56309	1.010942
19/08/2008	21975	1.010267
20/08/2008	83370	1.010503
21/08/2008	91683	1.010567
22/08/2008	71346	1.010483
23/08/2008	52464	1.010925
24/08/2008	14687	1.010210
25/08/2008	8484	1.010181
26/08/2008	54961	1.010960
27/08/2008	71230	1.010999
28/08/2008	61910	1.010988
29/08/2008	64797	1.010708
30/08/2008	100504	1.010462
31/08/2008	42998	1.010804
01/09/2008	75953	1.010623
02/09/2008	83479	1.010781
03/09/2008	114618	1.010152
04/09/2008	114212	1.010146
05/09/2008	110004	1.010086
06/09/2008	11200	1.010181
07/09/2008	10752	1.010181
08/09/2008	67247	1.010968
09/09/2008	107853	1.010383
10/09/2008	103703	1.010433
11/09/2008	72603	1.010950
12/09/2008	113141	1.010349

Gas Day	HPMIS DVol	Daily Correction Factor
13/09/2008	47491	1.010510
14/09/2008	30954	1.010588
15/09/2008	57738	1.010988
16/09/2008	54411	1.010678
17/09/2008	115807	1.010051
18/09/2008	115503	1.010118
19/09/2008	82533	1.010665
20/09/2008	11627	1.010181
21/09/2008	15310	1.010181
22/09/2008		DEFAULT
23/09/2008	90404	1.010695
24/09/2008	104604	1.010474
25/09/2008	119664	1.010083
26/09/2008	77262	1.010792
27/09/2008	27997	1.010512
28/09/2008	24772	1.010447
29/09/2008	95355	1.010413
30/09/2008	98482	1.010390
01/10/2008		DEFAULT
02/10/2008	99417	1.010441
03/10/2008	108836	1.010122
04/10/2008	15142	1.010181
05/10/2008	44462	1.010763
06/10/2008	99614	1.010579
07/10/2008	98697	1.010658
08/10/2008	107276	1.010497
09/10/2008	95652	1.010566
10/10/2008	120911	1.010185

Gas Day	HPMIS DVol	Daily Correction Factor
11/10/2008	32193	1.010762
12/10/2008	21966	1.010215
13/10/2008	65376	1.011094
14/10/2008	57809	1.010912
15/10/2008	84416	1.010821
16/10/2008	82257	1.010786
17/10/2008	85046	1.010783
18/10/2008	22078	1.010346
19/10/2008	39897	1.010780
20/10/2008	106753	1.010452
21/10/2008	108187	1.010374
22/10/2008	96425	1.010581
23/10/2008	76881	1.010992
24/10/2008	71290	1.010909
25/10/2008	19527	1.010253
26/10/2008	16271	1.010181
27/10/2008	61097	1.010682
28/10/2008	94341	1.010545
29/10/2008		DEFAULT
30/10/2008		DEFAULT
31/10/2008	122879	1.010119
01/11/2008	27558	1.010438
02/11/2008	24980	1.010313
03/11/2008	111534	1.010231
04/11/2008	122554	1.010020
05/11/2008	117705	1.010225
06/11/2008	95400	1.010511
07/11/2008	32697	1.010565

Gas Day	HPMIS DVol	Daily Correction Factor
08/11/2008	17969	1.010181
09/11/2008	31187	1.010325
10/11/2008	80269	1.010859
11/11/2008	115611	1.010215
12/11/2008	126176	1.009957
13/11/2008	122880	1.010087
14/11/2008	119078	1.010136
15/11/2008	35858	1.010400
16/11/2008	21014	1.010181
17/11/2008	47647	1.010864
18/11/2008	107666	1.010338
19/11/2008	130669	1.009990
20/11/2008	125328	1.010177
21/11/2008	110204	1.010237
22/11/2008	56504	1.010385
23/11/2008	28045	1.010182
24/11/2008	68963	1.010848
25/11/2008	121000	1.010167
26/11/2008	125967	1.010172
27/11/2008	126607	1.010115
28/11/2008	109909	1.010283
29/11/2008	55939	1.010385
30/11/2008	27138	1.010183
01/12/2008	46821	1.010698
02/12/2008	100087	1.010379
03/12/2008	138008	1.009823
04/12/2008	125873	1.010066
05/12/2008	136288	1.009850

Gas Day	HPMIS DVol	Daily Correction Factor
06/12/2008	72253	1.010027
07/12/2008	49841	1.010626
08/12/2008	78828	1.010177
09/12/2008	140954	1.009886
10/12/2008	136718	1.009865
11/12/2008	135156	1.009939
12/12/2008	121425	1.010085
13/12/2008	57007	1.010488
14/12/2008	39161	1.010651
15/12/2008	92686	1.010540
16/12/2008	137150	1.009899
17/12/2008	128341	1.010033
18/12/2008	118813	1.010178
19/12/2008	119422	1.010140
20/12/2008	60869	1.010329
21/12/2008	57214	1.010447
22/12/2008		DEFAULT
23/12/2008		DEFAULT
24/12/2008	18370	1.010181
25/12/2008	18218	1.010181
26/12/2008	20529	1.010181
27/12/2008	23506	1.010181
28/12/2008	21821	1.010181
29/12/2008	24351	1.010181
30/12/2008	24456	1.010181
31/12/2008	25869	1.010181
01/01/2009	24182	1.010181
02/01/2009	24301	1.010181

Gas Day	HPMIS DVol	Daily Correction Factor
03/01/2009	23641	1.010181
04/01/2009	22979	1.010181
05/01/2009	31246	1.010221
06/01/2009	75396	1.010581
07/01/2009	116283	1.010100
08/01/2009	82103	1.010501
09/01/2009	47149	1.010685
10/01/2009	31029	1.010418
11/01/2009	25025	1.010185
12/01/2009	92892	1.010248
13/01/2009	126470	1.010097
14/01/2009	123258	1.010119
15/01/2009	46773	1.010628
16/01/2009	32545	1.010228
17/01/2009	19459	1.010181
18/01/2009	20596	1.010181
19/01/2009	19559	1.010181
20/01/2009	60021	1.010658
21/01/2009	129065	1.009950
22/01/2009	119167	1.010162
23/01/2009	112421	1.010298
24/01/2009	45539	1.010639
25/01/2009	19232	1.010181
26/01/2009	20344	1.010181
27/01/2009	21905	1.010183
28/01/2009	72541	1.010792
29/01/2009	121280	1.010076
30/01/2009	115300	1.010111

Gas Day	HPMIS DVol	Daily Correction Factor
31/01/2009	57132	1.010343
01/02/2009	47473	1.010681
02/02/2009	84906	1.010691
03/02/2009	112811	1.010137
04/02/2009	73304	1.010827
05/02/2009	75130	1.010748
06/02/2009	61351	1.010848
07/02/2009	25305	1.010181
08/02/2009	24149	1.010181
09/02/2009	26234	1.010197
10/02/2009	74094	1.010538
11/02/2009	89235	1.010602
12/02/2009	121858	1.010083
13/02/2009	95220	1.010465
14/02/2009	31336	1.010556
15/02/2009		DEFAULT
16/02/2009		DEFAULT
17/02/2009		DEFAULT
18/02/2009		DEFAULT
19/02/2009		DEFAULT
20/02/2009		DEFAULT
21/02/2009		DEFAULT
22/02/2009	18119	1.010181
23/02/2009	17908	1.010181
24/02/2009	22194	1.010361
25/02/2009	113917	1.010233
26/02/2009	126156	1.010072
27/02/2009	83008	1.010401

Gas Day	HPMIS DVol	Daily Correction Factor
28/02/2009	17435	1.010181
01/03/2009	17885	1.010181
02/03/2009	21235	1.010181
03/03/2009	92116	1.010525
04/03/2009	123980	1.010008
05/03/2009	137974	1.009888
06/03/2009	68227	1.010385
07/03/2009	19622	1.010181
08/03/2009	21731	1.010181
09/03/2009	68564	1.010659
10/03/2009	126201	1.010024
11/03/2009	133437	1.010006
12/03/2009	49625	1.010819
13/03/2009	18100	1.010181
14/03/2009	17102	1.010181
15/03/2009	15961	1.010181
16/03/2009	45075	1.010656
17/03/2009	136200	1.009976
18/03/2009	115202	1.010301
19/03/2009	79737	1.010655
20/03/2009	21530	1.010232
21/03/2009	17794	1.010181
22/03/2009	17059	1.010181
23/03/2009	32909	1.010491
24/03/2009	119559	1.010178
25/03/2009	117776	1.010232
26/03/2009	116575	1.010258
27/03/2009	41286	1.010488

Gas Day	HPMIS DVol	Daily Correction Factor
28/03/2009	20174	1.010181
29/03/2009	18768	1.010181
30/03/2009	101697	1.010270
31/03/2009	123839	1.010087
01/04/2009	103108	1.010399
02/04/2009	41725	1.010722
03/04/2009	15121	1.010181
04/04/2009	16421	1.010181
05/04/2009	16133	1.010181
06/04/2009	104527	1.010429
07/04/2009	114063	1.010411
08/04/2009	87270	1.010458
09/04/2009	14382	1.010181
10/04/2009	15495	1.010181
11/04/2009	15344	1.010181
12/04/2009	15327	1.010181
13/04/2009		DEFAULT
14/04/2009		DEFAULT
15/04/2009	93656	1.010468
16/04/2009	103728	1.010542
17/04/2009	53911	1.010670
18/04/2009	15517	1.010181
19/04/2009	14184	1.010181
20/04/2009	90750	1.010317
21/04/2009		DEFAULT
22/04/2009	63768	1.010779
23/04/2009	13152	1.010181
24/04/2009	11902	1.010181

Gas Day	HPMIS DVol	Daily Correction Factor
25/04/2009	12508	1.010181
26/04/2009	12482	1.010181
27/04/2009	55944	1.010743
28/04/2009	114916	1.010376
29/04/2009	103848	1.010500
30/04/2009	55550	1.010737
01/05/2009	13479	1.010181
02/05/2009	13472	1.010181
03/05/2009	14624	1.010181
04/05/2009		DEFAULT
05/05/2009	60736	1.010810
06/05/2009		DEFAULT
07/05/2009	107289	1.010548
08/05/2009	52219	1.010824
09/05/2009	14194	1.010181
10/05/2009	13650	1.010181
11/05/2009	22320	1.001795

Default Daily Correction Factor = 1.01038667