

METER ERROR REPORT**FINAL**

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

SITE NAME	LOCKERBIE OFFTAKE
LDZ	SCOTLAND
LAST GOOD DATE	02/06/08
START DATE	02/06/08
END DATE	26/05/09
SIZE OF ERROR (No reconciliation required if under 0.1%)	-0.225%
ESTIMATE – Y/N?	N
ROOT CAUSE	Pressure transmitter calibration drift
ANALYSIS	Appendix A
METER TYPE	ORIFICE
AUTHOR	T Roberts
CHECKED BY	S Howells

2. BACKGROUND

Gas is supplied to part of the Scotland network at Lockerbie Offtake which employs an orifice plate meter to measure the volumetric flow rate in accordance with BS EN ISO 5167.

During a routine ME2 CP10 calibration on 26.5.09 out of tolerance errors (>0.2% fsd at operational pressures) were recorded on the pressure compensation transmitter.

3. ERROR QUANTIFICATION AND IMPACT

ME2 calibration results

AS FOUND 2009

TX	26-May-09					
% Span	Applied Pressure (BarG)	Corrected Pressure (BarG)	Expected Current (mA)	Measured Current (mA)	Error % span	
0	0	0	4	3.9872	-0.08	
25	20	20.05289	8.010577	7.9897	-0.13048	
50	40	40.10577	12.02115	11.992	-0.18222	
75	60	60.15866	16.03173	15.987	-0.27957	
100	80	80.21155	20.04231	19.994	-0.30193	
125	100	100.2644	24.05289	20.794	n/a	
100	80	80.21155	20.04231	19.995	-0.29568	
75	60	60.15866	16.03173	15.993	-0.24207	
50	40	40.10577	12.02115	11.994	-0.16972	
25	20	20.05289	8.010577	7.9903	-0.12673	
0	0	0	4	3.987	-0.08125	

ADC	26-May-09			AV TX	LOOP
Input Current (mA)	Expected P (BarG)	Displayed P (BarG)	Error % span	Error % span	Error % span
4.0032	0.016	0.011	-0.00625	-0.08062	-0.087
8.0022	20.011	19.999	-0.015	-0.12861	-0.144
12.001	40.005	39.992	-0.01625	-0.17597	-0.192
16.001	60.005	59.985	-0.025	-0.26082	-0.286
19.999	79.995	79.978	-0.02125	-0.29881	-0.320

Using the ME2 results from the transmitter and ADC calibrations, combined loop errors were calculated for each point.

Average pressure for each Gasday was then calculated from HPMIS records. The error for each Gasday average pressure was then corrected using the table values for loop error.

Using the two pressures, errors on flowrate were calculated using an average gas composition for the extremes of average measured pressure and several points in between, recorded during the error period (50, 52.5, 55, 57.5, and 60 barg). The results ranged between -0.221% and -0.227% so the average error of -0.225% was chosen. This value was divided by two as required when the

exact start of the error is not known, to give an error of -0.1125% which was then used to correct the daily Gemini values.

4. CAUSES

Pressure compensation transmitter calibration drift between ME2 revalidations.

5. RECOMMENDATIONS AND LEARNING

This report recommends that Gemini dvols for the period are corrected as detailed in Appendix A.

REFERENCES

ME2
HPMIS rbd data
Gemini dvol data

VERSION HISTORY

<i>Version</i>	<i>Changes</i>	<i>Author</i>	<i>Date</i>
<i>Rev 1</i>	<i>First draft</i>	<i>T Roberts</i>	<i>1.6.12</i>

DISTRIBUTION

NG UKT Data assurance and Quality Team
SGN S Skipp
SGN E Melen
SGN S Howells

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Appendix A

Gas Day	Gemini Volume (mscm)	Volume corrected (mscm)
02/06/2008	0.150180	0.150301
03/06/2008	0.147440	0.147606
04/06/2008	0.154360	0.154534
05/06/2008	0.151220	0.151390
06/06/2008	0.143740	0.143902
07/06/2008	0.127060	0.127203
08/06/2008	0.135890	0.136043
09/06/2008	0.139150	0.139307
10/06/2008	0.149620	0.149789
11/06/2008	0.153590	0.153763
12/06/2008	0.160580	0.160761
13/06/2008	0.159430	0.159610
14/06/2008	0.146830	0.146995
15/06/2008	0.155640	0.155815
16/06/2008	0.157360	0.157537
17/06/2008	0.174050	0.174246
18/06/2008	0.170820	0.171012
19/06/2008	0.170260	0.170452
20/06/2008	0.173000	0.173195
21/06/2008	0.206440	0.206673
22/06/2008	0.199750	0.199975
23/06/2008	0.166970	0.167158
24/06/2008	0.175010	0.175207
25/06/2008	0.175900	0.176098
26/06/2008	0.179730	0.179932
27/06/2008	0.172800	0.172995
28/06/2008	0.151240	0.151410
29/06/2008	0.150420	0.150589
30/06/2008	0.150980	0.151150
01/07/2008	0.146370	0.146535
02/07/2008	0.145060	0.145223
03/07/2008	0.139880	0.140038
04/07/2008	0.137800	0.137955
05/07/2008	0.152640	0.152812
06/07/2008	0.152640	0.152812
07/07/2008	0.156930	0.157107
08/07/2008	0.150730	0.150900
09/07/2008	0.148200	0.148367
10/07/2008	0.161170	0.161352
11/07/2008	0.158170	0.158348
12/07/2008	0.148560	0.148727
13/07/2008	0.141140	0.141299
14/07/2008	0.142550	0.142711
15/07/2008	0.141850	0.142010

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16/07/2008	0.150780	0.150950
17/07/2008	0.150750	0.150920
18/07/2008	0.147210	0.147376
19/07/2008	0.135900	0.136053
20/07/2008	0.122600	0.122738
21/07/2008	0.116080	0.116211
22/07/2008	0.107660	0.107781
23/07/2008	0.092470	0.092574
24/07/2008	0.096670	0.096779
25/07/2008	0.111080	0.111205
26/07/2008	0.105260	0.105379
27/07/2008	0.112030	0.112156
28/07/2008	0.109370	0.109493
29/07/2008	0.108280	0.108402
30/07/2008	0.110810	0.110935
31/07/2008	0.112690	0.112817
01/08/2008	0.118140	0.118273
02/08/2008	0.112260	0.112386
03/08/2008	0.120670	0.120806
04/08/2008	0.136750	0.136904
05/08/2008	0.131920	0.132069
06/08/2008	0.134500	0.134651
07/08/2008	0.154300	0.154474
08/08/2008	0.144020	0.144182
09/08/2008	0.146700	0.146865
10/08/2008	0.139150	0.139307
11/08/2008	0.143750	0.143912
12/08/2008	0.157860	0.158038
13/08/2008	0.152530	0.152702
14/08/2008	0.151010	0.151180
15/08/2008	0.155520	0.155695
16/08/2008	0.145050	0.145213
17/08/2008	0.143400	0.143562
18/08/2008	0.152700	0.152872
19/08/2008	0.147320	0.147486
20/08/2008	0.151190	0.151360
21/08/2008	0.142780	0.142941
22/08/2008	0.154800	0.154974
23/08/2008	0.154940	0.155115
24/08/2008	0.143160	0.143321
25/08/2008	0.140510	0.140668
26/08/2008	0.154880	0.155054
27/08/2008	0.149240	0.149408
28/08/2008	0.140770	0.140929
29/08/2008	0.133350	0.133500
30/08/2008	0.131980	0.132129
31/08/2008	0.139430	0.139587
01/09/2008	0.154950	0.155125
02/09/2008	0.171550	0.171743
03/09/2008	0.187870	0.188082
04/09/2008	0.183950	0.184157
05/09/2008	0.208750	0.208985

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06/09/2008	0.204510	0.204740
07/09/2008	0.176540	0.176739
08/09/2008	0.170220	0.170412
09/09/2008	0.183130	0.183336
10/09/2008	0.174070	0.174266
11/09/2008	0.154960	0.155135
12/09/2008	0.151070	0.151240
13/09/2008	0.155730	0.155905
14/09/2008	0.155360	0.155535
15/09/2008	0.188510	0.188722
16/09/2008	0.193120	0.193338
17/09/2008	0.182050	0.182255
18/09/2008	0.167570	0.167759
19/09/2008	0.166460	0.166647
20/09/2008	0.135300	0.135452
21/09/2008	0.143780	0.143942
22/09/2008	0.155580	0.155755
23/09/2008	0.177000	0.177199
24/09/2008	0.150750	0.150920
25/09/2008	0.164740	0.164926
26/09/2008	0.170630	0.170822
27/09/2008	0.161580	0.161762
28/09/2008	0.188110	0.188322
29/09/2008	0.202910	0.203139
30/09/2008	0.208320	0.208555
01/10/2008	0.221480	0.221729
02/10/2008	0.240650	0.240921
03/10/2008	0.265900	0.266199
04/10/2008	0.260780	0.261074
05/10/2008	0.241130	0.241402
06/10/2008	0.269220	0.269523
07/10/2008	0.236360	0.236626
08/10/2008	0.207660	0.207894
09/10/2008	0.226250	0.226505
10/10/2008	0.217010	0.217254
11/10/2008	0.196110	0.196331
12/10/2008	0.208850	0.209085
13/10/2008	0.206070	0.206302
14/10/2008	0.252750	0.253035
15/10/2008	0.259670	0.259962
16/10/2008	0.260270	0.260563
17/10/2008	0.253140	0.253425
18/10/2008	0.236840	0.237107
19/10/2008	0.247100	0.247378
20/10/2008	0.246300	0.246577
21/10/2008	0.278330	0.278643
22/10/2008	0.271490	0.271796
23/10/2008	0.263070	0.263366
24/10/2008	0.263640	0.263937
25/10/2008	0.284850	0.285171
26/10/2008	0.272910	0.273217
27/10/2008	0.316780	0.317137

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28/10/2008	0.362870	0.363279
29/10/2008	0.381180	0.381609
30/10/2008	0.386520	0.386955
31/10/2008	0.374250	0.374672
01/11/2008	0.336760	0.337139
02/11/2008	0.328520	0.328890
03/11/2008	0.320660	0.321021
04/11/2008	0.317000	0.317357
05/11/2008	0.292170	0.292499
06/11/2008	0.292820	0.293150
07/11/2008	0.305720	0.306064
08/11/2008	0.291180	0.291508
09/11/2008	0.338110	0.338491
10/11/2008	0.338400	0.338781
11/11/2008	0.319070	0.319429
12/11/2008	0.320700	0.321061
13/11/2008	0.298080	0.298416
14/11/2008	0.269060	0.269363
15/11/2008	0.263250	0.263546
16/11/2008	0.302340	0.302681
17/11/2008	0.337960	0.338341
18/11/2008	0.300290	0.300628
19/11/2008	0.295090	0.295422
20/11/2008	0.300150	0.300488
21/11/2008	0.347890	0.348282
22/11/2008	0.376750	0.377174
23/11/2008	0.356000	0.356401
24/11/2008	0.367000	0.367413
25/11/2008	0.359540	0.359945
26/11/2008	0.295520	0.295853
27/11/2008	0.327880	0.328249
28/11/2008	0.382300	0.382731
29/11/2008	0.400530	0.400981
30/11/2008	0.447420	0.447924
01/12/2008	0.448000	0.448505
02/12/2008	0.463900	0.464422
03/12/2008	0.440620	0.441116
04/12/2008	0.407470	0.407929
05/12/2008	0.406930	0.407388
06/12/2008	0.410610	0.411072
07/12/2008	0.427860	0.428342
08/12/2008	0.387200	0.387636
09/12/2008	0.420400	0.420873
10/12/2008	0.403900	0.404355
11/12/2008	0.420940	0.421414
12/12/2008	0.393190	0.393633
13/12/2008	0.346200	0.346590
14/12/2008	0.368150	0.368565
15/12/2008	0.389650	0.390089
16/12/2008	0.344130	0.344518
17/12/2008	0.356890	0.357292
18/12/2008	0.342260	0.342645

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19/12/2008	0.369190	0.369606
20/12/2008	0.328030	0.328399
21/12/2008	0.308040	0.308387
22/12/2008	0.298520	0.298856
23/12/2008	0.304780	0.305123
24/12/2008	0.299440	0.299777
25/12/2008	0.290210	0.290537
26/12/2008	0.347000	0.347391
27/12/2008	0.395270	0.395715
28/12/2008	0.388330	0.388767
29/12/2008	0.400760	0.401211
30/12/2008	0.446060	0.446562
31/12/2008	0.452720	0.453230
01/01/2009	0.420020	0.420493
02/01/2009	0.402470	0.402923
03/01/2009	0.399600	0.400050
04/01/2009	0.409560	0.410021
05/01/2009	0.445930	0.446432
06/01/2009	0.478160	0.478699
07/01/2009	0.449550	0.450056
08/01/2009	0.420810	0.421284
09/01/2009	0.437250	0.437742
10/01/2009	0.413670	0.414136
11/01/2009	0.368710	0.369125
12/01/2009	0.347210	0.347601
13/01/2009	0.377870	0.378296
14/01/2009	0.406350	0.406808
15/01/2009	0.359930	0.360335
16/01/2009	0.353490	0.353888
17/01/2009	0.359140	0.359544
18/01/2009	0.380290	0.380718
19/01/2009	0.393250	0.393693
20/01/2009	0.415510	0.415978
21/01/2009	0.405200	0.405656
22/01/2009	0.375390	0.375813
23/01/2009	0.396550	0.396997
24/01/2009	0.395860	0.396306
25/01/2009	0.384110	0.384543
26/01/2009	0.393290	0.393733
27/01/2009	0.360720	0.361126
28/01/2009	0.379110	0.379537
29/01/2009	0.374690	0.375112
30/01/2009	0.368510	0.368925
31/01/2009	0.377050	0.377475
01/02/2009	0.420460	0.420934
02/02/2009	0.432410	0.432897
03/02/2009	0.426610	0.427090
04/02/2009	0.447410	0.447914
05/02/2009	0.449970	0.450477
06/02/2009	0.434250	0.434739
07/02/2009	0.426820	0.427301
08/02/2009	0.451750	0.452259

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09/02/2009	0.428680	0.429163
10/02/2009	0.417200	0.417670
11/02/2009	0.414100	0.414566
12/02/2009	0.438820	0.439314
13/02/2009	0.383300	0.383732
14/02/2009	0.402290	0.402743
15/02/2009	0.331500	0.331873
16/02/2009	0.331510	0.331883
17/02/2009	0.273720	0.274028
18/02/2009	0.308040	0.308387
19/02/2009	0.334100	0.334476
20/02/2009	0.351420	0.351816
21/02/2009	0.305870	0.306214
22/02/2009	0.292630	0.292960
23/02/2009	0.292140	0.292469
24/02/2009	0.299660	0.299997
25/02/2009	0.315640	0.315995
26/02/2009	0.326830	0.327198
27/02/2009	0.294980	0.295312
28/02/2009	0.291160	0.291488
01/03/2009	0.290910	0.291238
02/03/2009	0.352950	0.353348
03/03/2009	0.365530	0.365942
04/03/2009	0.358490	0.358894
05/03/2009	0.389440	0.389879
06/03/2009	0.375540	0.375963
07/03/2009	0.346950	0.347341
08/03/2009	0.366010	0.366422
09/03/2009	0.347390	0.347781
10/03/2009	0.303240	0.303582
11/03/2009	0.348340	0.348732
12/03/2009	0.293590	0.293921
13/03/2009	0.309520	0.309869
14/03/2009	0.288200	0.288525
15/03/2009	0.255690	0.255978
16/03/2009	0.295380	0.295713
17/03/2009	0.271780	0.272086
18/03/2009	0.278510	0.278824
19/03/2009	0.251860	0.252144
20/03/2009	0.306230	0.306575
21/03/2009	0.299430	0.299767
22/03/2009	0.295440	0.295773
23/03/2009	0.295850	0.296183
24/03/2009	0.335490	0.335868
25/03/2009	0.313300	0.313653
26/03/2009	0.317750	0.318108
27/03/2009	0.338310	0.338691
28/03/2009	0.328130	0.328500
29/03/2009	0.321190	0.321552
30/03/2009	0.307350	0.307696
31/03/2009	0.264010	0.264307
01/04/2009	0.256520	0.256809

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02/04/2009	0.210430	0.210667
03/04/2009	0.254160	0.254446
04/04/2009	0.255490	0.255778
05/04/2009	0.254850	0.255137
06/04/2009	0.273010	0.273317
07/04/2009	0.253150	0.253435
08/04/2009	0.252880	0.253165
09/04/2009	0.248380	0.248660
10/04/2009	0.227570	0.227826
11/04/2009	0.206830	0.207063
12/04/2009	0.204020	0.204250
13/04/2009	0.207090	0.207323
14/04/2009	0.228250	0.228507
15/04/2009	0.221480	0.221729
16/04/2009	0.208570	0.208805
17/04/2009	0.234180	0.234444
18/04/2009	0.199790	0.200015
19/04/2009	0.184960	0.185168
20/04/2009	0.193700	0.193918
21/04/2009	0.222140	0.222390
22/04/2009	0.233910	0.234173
23/04/2009	0.254110	0.254396
24/04/2009	0.215130	0.215372
25/04/2009	0.178680	0.178881
26/04/2009	0.211560	0.211798
27/04/2009	0.244030	0.244305
28/04/2009	0.243860	0.244135
29/04/2009	0.235540	0.235805
30/04/2009	0.227080	0.227336
01/05/2009	0.239970	0.240240
02/05/2009	0.197000	0.197222
03/05/2009	0.205150	0.205381
04/05/2009	0.255720	0.256008
05/05/2009	0.253210	0.253495
06/05/2009	0.246080	0.246357
07/05/2009	0.243900	0.244175
08/05/2009	0.260900	0.261194
09/05/2009	0.244660	0.244936
10/05/2009	0.203130	0.203359
11/05/2009	0.198090	0.198313
12/05/2009	0.200320	0.200546
13/05/2009	0.203460	0.203689
14/05/2009	0.207080	0.207313
15/05/2009	0.234340	0.234604
16/05/2009	0.195390	0.195610
17/05/2009	0.203500	0.203729
18/05/2009	0.232090	0.232351
19/05/2009	0.210290	0.210527
20/05/2009	0.195930	0.196151
21/05/2009	0.188850	0.189063
22/05/2009	0.167930	0.168119
23/05/2009	0.187740	0.187951

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24/05/2009	0.169800	0.169991
25/05/2009	0.151760	0.151931
26/05/2009	0.172640	0.172686