

**METER ERROR REPORT****FINAL**

Reconcile?	Y
------------	---

Safety Issue?	N
---------------	---

Thesis Report No.	
-------------------	--

**1. EXECUTIVE SUMMARY**

SITE NAME	Lower Quinton Offtake	
LDZ	WM	
START DATE (actual)	22/02/2010	
LAST GOOD DATE		
END DATE	02/09/2010	
SIZE OF ERROR (No reconciliation required if under 0.1%)	1.926 % under-registration (491,953 scm)	
ESTIMATED ENERGY (SMER if greater than or equal to 50 GWh)	5.356621 GWh under-registration	
ESTIMATE – Y/N?	N	
ROOT CAUSE	The volume integrator interposing relay started to fail causing erroneous volume counts to be registered via telemetry.	
ANALYSIS	Detailed within this report	
METER TYPE	Ultrasonic	
AUTHOR	Ben Kirkman	
ACCEPTED BY UKD NETWORK	Andrew Finch	
RECONCILIATION	Distribution	Transportation

## 2. BACKGROUND

Gas is supplied to part of the West Midlands Network at Lower Quinton FWACV offtake. The site comprises two ultrasonic meter systems operated in parallel each rated for 100% of the site declared capacity. The meter system uses a gas chromatograph for CV determination and PTZ correction.

A totalisation check was carried out on 19<sup>th</sup> February 2010 which passed AF/AL (As Found, As Left). On 22<sup>nd</sup> February 2010 a fault was raised by DNCC because of discrepancies between telemetry data ANAG\_VAL1 (average F1 instantaneous volume flow rate versus HVOL values derived from INTG1 volume integrator pulses.

On 23<sup>rd</sup> February a technician attended site and changed the volume integrator relay for an emergency spare that was on site. This resolved the problem for a short period, however, upon retrospective analysis, the replacement relay started failing on 22<sup>nd</sup> April 2010. Once the problem became detectable, a new relay was installed 2<sup>nd</sup> September 2010 which resolved the issue.

Volume information for billing purposes is currently taken from telemetered information. It was this data that was affected by the failing relay.

## 3. ERROR QUANTIFICATION AND IMPACT

Figure 1 shows the discrepancy between the telemetered integrator DVOL versus the daily volume figures from HPMIS during the erroneous period.

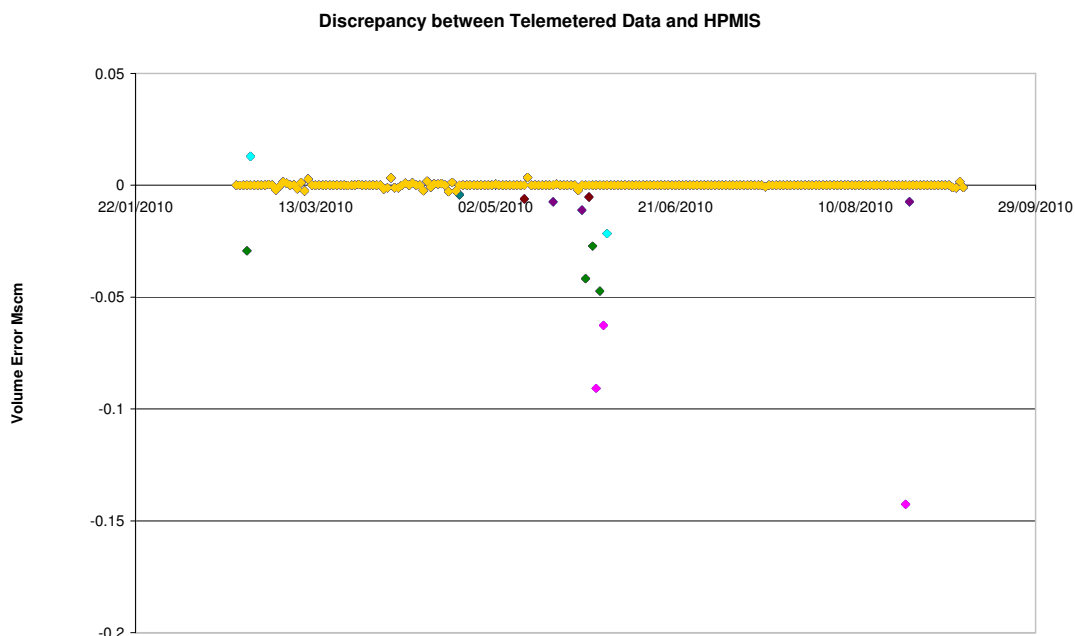


Figure 1 – The discrepancy between the telemetered integrator DVOL versus the daily volume figures from HPMIS during the erroneous period.

The data for the period was examined to determine the threshold above which a significant error was thought to have occurred. This was set to 0.004 Mscm

and any discrepancy less than this was considered to be due to the normal background differences that are associated with the telemetry-derived DVOL and telemetry scan time.

HPMIS data was unaffected by the failure described, so a correction can be achieved by substituting the telemetered values with those taken from HPMIS over the erroneous periods.

The error over the period is an under-registration of 491,953 scm.

#### 4. CAUSES

The error was caused by a failing interposing relay (flow computer to telemetry) which provides the volume integrator count.

#### 5. RECOMMENDATIONS AND LEARNING

The daily volumes should be reconciled using the table of daily correction factors in Appendix A.

Consideration should be given to either (a) replacing the relay more frequently as part of standard annual maintenance (b) re-engineering the circuit to provide a solid state interface (ie no relay dependency) or (c) migrating to HPMIS data for billing purposes.

#### REFERENCES

LowerQuinton\_Data.xls  
DNCC Fault data (Appendix B)  
HPMIS Database

#### VERSION HISTORY

<i>Version</i>	<i>Changes</i>	<i>Author</i>	<i>Date</i>
<i>O</i>	<i>First issue</i>	<i>B Kirkman</i>	<i>21/12/2010</i>

#### DISTRIBUTION

*National Grid Gas Operations*  
*National Grid Gas Transmission – Measurement Assurance Group*  
*National Grid Gas Distribution, Network Integrity – Measurement & Process Group*

**Appendix A – Table of Daily Correction Factors**

Gas day	Gemini Volume scm	HPMIS Volume scm	Error scm	Daily Correction Factor
22/02/2010	1588000	1617331	-29331	1.01847
23/02/2010	1756000	1743139	12861	0.992676
22/04/2010	1579000	1583273	-4273	1.002706
10/05/2010	1318000	1324099	-6099	1.004627
18/05/2010	1861000	1868421	-7421	1.003988
26/05/2010	2219000	2230092	-11092	1.004999
27/05/2010	2323000	2364741	-41741	1.017969
28/05/2010	1801000	1806280	-5280	1.002932
29/05/2010	1988000	2015185	-27185	1.013675
30/05/2010	1739000	1829798	-90798	1.052213
31/05/2010	1530000	1577381	-47381	1.030968
01/06/2010	2316000	2378613	-62613	1.027035
02/06/2010	483000	504617	-21617	1.044756
24/08/2010	1607000	1749609	-142609	1.088742
25/08/2010	947000	954374	-7374	1.007787

**Appendix B – DNCC Fault Data**  
22<sup>nd</sup> February 2010

**Fault**

**Area:** DNCC

**Fault No:** 116449      **Reporting engineer:** Jim Eldridge

**Title:** Site integrator suspect 22/2      **Created:** 23/02/2010 02:26

**Status:** Closed

**Priority:** Next Working Day      **Meter validation:** No

**Callout:** No      **Notification:** Resource Management

**Engineer on site time:** 10:08

**date:** 23/02/2010

**Time lapse:** 07.41 hr.min

**Date Cleared:** 23/02/2010

**LDZ:** WM

**Site:** LOW\_QUIN

**District:** WM - South Sector

**Point(s):** INTG1

**Fault Trail:**

- 23/02/10 02:30 First Log Entry: Hvol & flow integrator errors. Please call & check site equipment. (trend plot on desk-errors at approx 18.00 hrs & 01:00 of next day. (Jim Eldridge)
- 23/02/10 04:19 Log Entry: 4am volume looks suspect-corrected back from 0.071 to 0.062. (Jim Eldridge)
- 23/02/10 09:03 LDZ Action Taken: W/O 01317422 ANDY RANDLE TO ATTEND (Gareth Yeomans)
- 23/02/10 10:08 Booked on ALAN CURRAN: Booking on Comments : Site integrator suspect 22/2 (Nicholas P Martin)
- 23/02/10 10:08 Booked on ANDY RANDLE: Booking on Comments : Site integrator suspect 22/2 (Nicholas P Martin)
- 23/02/10 15:33 Booked off ALAN CURRAN: Booking off Comments : Changed the relay on the integrator (Martin F Murray)
- 23/02/10 15:33 Booked off RANDLE ANDY: Booking off Comments : Changed the relay on the integrator (Martin F Murray)
- 23/02/10 15:35 Final Fault Log Entry: Fault Closed (Martin F Murray)
- 23/02/10 15:35 Final Issue Log Entry: Issue Closed (Martin F Murray)

2<sup>nd</sup> September 2010

**Notes Application Window: Fault - 119458 - Log Book - Lotus Notes**

**Area:** UNCC

**Fault No:** 119458      **Reporting engineer:** Jim Eldridge  
**Title:** Metering check requested by Roger Wood GG      **Created:** 31/08/2010 13:00  
**Status:** Closed  
**Priority:** Next Working Day      **Meter validation:** Yes  
**Callout:** No      **Notification:** Resource Management

**Engineer on site time:** 09:16  
**date:** 02/09/2010

**Time lapse:** 44:15 hr:min  
**Date Cleared:** 02/09/2010

**LDZ:** WM  
**Site:** LOW\_QUIN  
**District:** WM - South Sector  
**Point(s):** METERING1

**Fault Trail:**

- 31/08/10 13:02 First Log Entry: Roger Wood has requested that the metering is checked on this offake. (Email from G.McGuinness refers) (Jim Eldridge)
- 31/08/10 14:28 LDZ Action Taken: ALLAN CURRAN/STEVE CHAPMAN PLANNED 2/9/10 (Peter J Gordon)
- 02/09/10 09:16 Booked on ALAN CURRAN +1: Booking on Comments : Metering check requested by Roger Wood GG (Mo Khan)
- 02/09/10 09:17 Booked on Gerrard McGuinness: Booking on Comments : Metering check requested by Roger Wood GG (Mo Khan)
- 02/09/10 09:46 Meter Validation (Pre Maint): Inlet = 59.7, Outlet = 29, ODP = na, Flow = 1.62, CV = 39.23, SG = 0.591, Valve\_Position = 11.0, Integrator\_Reading = 22.19100, (Mo Khan)
- 02/09/10 14:50 Meter Validation (Post Maint): Inlet = 57.66, Outlet = 39.53, ODP = n/a, Flow = 1.626, CV = 39.258, SG = 0.591, Valve\_Position = 11.25, Integrator\_Reading = 22.852, (Fraser Hart)
- 02/09/10 14:51 Booked off ALAN CURRAN +1: Booking off Comments : "Think" the problem has been solved by changing a relay. Request to flow the site in the next few days to see if problem re-occurs. (Fraser Hart)
- 02/09/10 14:52 Booked off Gerrard McGuinness: Booking off Comments : "Think" the problem has been solved by changing a relay. Request to flow the site in the next few days to see if problem re-occurs. (Fraser Hart)
- 02/09/10 14:52 Final Fault Log Entry: Fault Closed (Fraser Hart)
- 02/09/10 16:53 Final Log Entry: Closed. (Jim Eldridge)

**Appendix C – Full Daily Results Table**

Gas Day	Gemini Volume scm	HPMIS Volume scm	Discrepancy scm
19/02/2010	55000	827049	-772049
20/02/2010	0	58	-58
21/02/2010	0	0	0
22/02/2010	1588000	1617331	-29331
23/02/2010	1756000	1743139	12861
24/02/2010	0	0	0
25/02/2010	0	0	0
26/02/2010	0	0	0
27/02/2010	0	0	0
28/02/2010	742000	741637	363
01/03/2010	0	0	0
02/03/2010	40000	42155	-2155
03/03/2010	2423000	2423564	-564
04/03/2010	2403000	2401580	1420
05/03/2010	942000	941066	934
06/03/2010	2399000	2398936	64
07/03/2010	4000	3863	137
08/03/2010	2400000	2401475	-1475
09/03/2010	2243000	2241803	1197
10/03/2010	1297000	1299531	-2531
11/03/2010	920000	917315	2685

Gas Day	Gemini Volume scm	HPMIS Volume scm	Discrepancy scm
12/03/2010	0	0	0
13/03/2010	0	0	0
14/03/2010	0	0	0
15/03/2010	0	0	0
16/03/2010	0	0	0
17/03/2010	0	0	0
18/03/2010	0	0	0
19/03/2010	0	0	0
20/03/2010	0	0	0
21/03/2010	0	0	0
22/03/2010	34000	34147	-147
23/03/2010	2000	1960	40
24/03/2010	0	0	0
25/03/2010	99000	98684	316
26/03/2010	0	0	0
27/03/2010	0	0	0
28/03/2010	0	0	0
29/03/2010	70000	70008	-8
30/03/2010	0	0	0
31/03/2010	0	0	0
01/04/2010	1554000	1555772	-1772
02/04/2010	4319000	4320212	-1212
03/04/2010	2200000	2196667	3333
04/04/2010	2008000	2009117	-1117
05/04/2010	2338000	2339193	-1193
06/04/2010	1958000	1958040	-40
07/04/2010	2212000	2211071	929
08/04/2010	2125000	2124978	22
09/04/2010	2173000	2171900	1100
10/04/2010	0	0	0
11/04/2010	0	0	0
12/04/2010	1963000	1965362	-2362
13/04/2010	1913000	1911244	1756
14/04/2010	1604000	1604826	-826
15/04/2010	2271000	2270434	566
16/04/2010	2402000	2401509	491
17/04/2010	19000	18209	791
18/04/2010	0	0	0
19/04/2010	331000	333809	-2809
20/04/2010	2407000	2405735	1265
21/04/2010	2399000	2401541	-2541
22/04/2010	1579000	1583273	-4273
23/04/2010	0	0	0
24/04/2010	0	0	0
25/04/2010	0	0	0
26/04/2010	0	0	0
27/04/2010	0	0	0
28/04/2010	0	0	0
29/04/2010	0	0	0
30/04/2010	0	0	0
01/05/2010	0	0	0

<b>Gas Day</b>	<b>Gemini Volume scm</b>	<b>HPMIS Volume scm</b>	<b>Discrepancy scm</b>
02/05/2010	43000	42583	417
03/05/2010	0	0	0
04/05/2010	0	0	0
05/05/2010	0	0	0
06/05/2010	0	0	0
07/05/2010	0	0	0
08/05/2010	0	0	0
09/05/2010	0	0	0
10/05/2010	1318000	1324099	-6099
11/05/2010	446000	442566	3434
12/05/2010	0	0	0
13/05/2010	0	0	0
14/05/2010	0	0	0
15/05/2010	0	0	0
16/05/2010	0	0	0
17/05/2010	0	0	0
18/05/2010	1861000	1868421	-7421
19/05/2010	1668000	1667482	518
20/05/2010	0	0	0
21/05/2010	0	0	0
22/05/2010	0	0	0
23/05/2010	0	0	0
24/05/2010	0	694	-694
25/05/2010	1699000	1701201	-2201
26/05/2010	2219000	2230092	-11092
27/05/2010	2323000	2364741	-41741
28/05/2010	1801000	1806280	-5280
29/05/2010	1988000	2015185	-27185
30/05/2010	1739000	1829798	-90798
31/05/2010	1530000	1577381	-47381
01/06/2010	2316000	2378613	-62613
02/06/2010	483000	504617	-21617
03/06/2010	0	0	0
04/06/2010	0	0	0
05/06/2010	0	0	0
06/06/2010	0	0	0
07/06/2010	0	0	0
08/06/2010	0	0	0
09/06/2010	0	0	0
10/06/2010	0	0	0
11/06/2010	0	0	0
12/06/2010	0	0	0
13/06/2010	0	0	0
14/06/2010	0	0	0
15/06/2010	0	0	0
16/06/2010	0	0	0
17/06/2010	0	0	0
18/06/2010	0	0	0
19/06/2010	0	0	0
20/06/2010	0	0	0
21/06/2010	0	0	0

Gas Day	Gemini Volume scm	HPMIS Volume scm	Discrepancy scm
22/06/2010	0	0	0
23/06/2010	0	0	0
24/06/2010	0	0	0
25/06/2010	0	0	0
26/06/2010	0	0	0
27/06/2010	0	0	0
28/06/2010	0	0	0
29/06/2010	0	0	0
30/06/2010	0	0	0
01/07/2010	0	0	0
02/07/2010	0	0	0
03/07/2010	0	0	0
04/07/2010	0	0	0
05/07/2010	0	0	0
06/07/2010	0	0	0
07/07/2010	0	0	0
08/07/2010	0	0	0
09/07/2010	0	0	0
10/07/2010	0	0	0
11/07/2010	0	0	0
12/07/2010	0	0	0
13/07/2010	0	0	0
14/07/2010	0	0	0
15/07/2010	0	0	0
16/07/2010	22000	22672	-672
17/07/2010	0	0	0
18/07/2010	0	0	0
19/07/2010	0	0	0
20/07/2010	0	0	0
21/07/2010	0	0	0
22/07/2010	0	0	0
23/07/2010	0	0	0
24/07/2010	0	0	0
25/07/2010	0	0	0
26/07/2010	0	0	0
27/07/2010	0	0	0
28/07/2010	0	0	0
29/07/2010	0	0	0
30/07/2010	0	0	0
31/07/2010	0	0	0
01/08/2010	0	0	0
02/08/2010	0	0	0
03/08/2010	0	0	0
04/08/2010	0	0	0
05/08/2010	0	0	0
06/08/2010	0	0	0
07/08/2010	0	0	0
08/08/2010	0	0	0
09/08/2010	0	0	0
10/08/2010	0	0	0
11/08/2010	0	0	0



<b>Gas Day</b>	<b>Gemini Volume scm</b>	<b>HPMIS Volume scm</b>	<b>Discrepancy scm</b>
12/08/2010	0	0	0
13/08/2010	0	0	0
14/08/2010	0	0	0
15/08/2010	0	0	0
16/08/2010	0	0	0
17/08/2010	0	0	0
18/08/2010	0	0	0
19/08/2010	0	0	0
20/08/2010	0	0	0
21/08/2010	0	0	0
22/08/2010	0	0	0
23/08/2010	0	0	0
24/08/2010	1607000	1749609	-142609
25/08/2010	947000	954374	-7374
26/08/2010	0	0	0
27/08/2010	0	0	0
28/08/2010	0	0	0
29/08/2010	0	0	0
30/08/2010	0	0	0
31/08/2010	0	0	0
01/09/2010	0	0	0
02/09/2010	38000	733152	-695152
03/09/2010	0	0	0
04/09/2010	0	0	0
05/09/2010	0	0	0
06/09/2010	349000	349915	-915
07/09/2010	1681000	1682142	-1142
08/09/2010	1684000	1682316	1684
09/09/2010	1314000	1314938	-938