VERITEK

Gas Downstream Reconciliation Performance Audit Final Report

For

Greymouth Gas New Zealand Limited

GREYMOUTH GAS

Prepared by Steve Woods – Veritek Ltd

Date of Audit: 26/08/14

Date Audit Report Complete: 08/10/14

Executive Summary

This Performance Audit was conducted at the request of the Gas Industry Company (GIC) in accordance with Rule 65 of the 2013 Amendment Version of the Gas (Downstream Reconciliation) Rules 2008.

The purpose of this audit is to assess the systems, processes and performance of Greymouth Gas New Zealand Limited (GGNZ) in terms of compliance with these rules.

The audit was conducted in accordance with terms of reference prepared by the GIC, and in accordance with the "Guideline note for rules 65 to 75 and 80: the commissioning and carrying out of performance audits and event audits, V3.0" which was published by GIC in June 2013.

The summary of report findings in the table below shows that GGNZ's control environment is "effective" for all of the areas evaluated.

Fourteen of the sixteen areas evaluated were found to be compliant. Two breach allegations are made in relation to two areas. They are summarised as follows:

- Estimated TOU consumption information has been provided on 21 occasions since the previous audit. GGNZ's processes achieve compliance with the requirement to provide its "best estimate of consumption information"; however, the existence of estimated information is considered a matter of non-compliance
- GGNZ's initial submission accuracy did not meet the 10% requirement for one gas gate on two occasions in 2014.

Summary of Report Findings

Issue	Section	Control Rating (Refer to Appendix 1 for definitions)	Compliance Rating	Comments
ICP set up information	2.1	Effective	Compliant	Altitude correction is conducted using registry data and compliance is confirmed.
Metering set up information	2.2	Effective	Compliant	All meter pressure data was confirmed as correct.
Billing factors	2.3	Effective	Compliant	The data is obtained from Niwa's National Climate Database which has actual daily values
Archiving of reading data	3.1	Effective	Compliant	I recommend that meter-reading files are zipped and password protected as a minimum to ensure its security and integrity.
Meter interrogation requirements	3.2	Effective	Compliant	All ICPs are assigned to correct allocation groups.
Meter reading requirements	3.3	Effective	Compliant	All non-TOU meters are on a monthly reading cycle.
Non TOU validation	3.4	Effective	Compliant	The manual validation process applied appears robust.
Non TOU error correction	3.5	N/A	N/A	Error correction processes have not been required and were therefore not examined.
TOU validation	3.6	Effective	Compliant	The manual validation process applied appears robust.

Energy consumption calculation	4	Effective	Compliant	TOU and non-TOU calculations were checked and confirmed as accurate.
TOU estimation and correction	5.1	Effective	Not compliant	GGNZ's processes achieve compliance with the requirement to provide its "best estimate of consumption information". The existence of any estimated TOU consumption information is considered a matter of non-compliance. This issue is addressed on a monthly basis and breach allegations are in existence in all cases.
Provision of retailer consumption information	5.2	Effective	Compliant	The process for preparing consumption information files is compliant.
Initial submission accuracy	5.3	Effective	Not compliant	GGNZ's non TOU initial submission accuracy did not meet the 10% requirement for one gas gate on two occasions in 2014.
Forward estimates	5.4	Effective	Compliant	Forward estimates are used on rare occasions and compliance is confirmed.
Historic estimates	5.5	Effective	Compliant	Historic estimates are used on rare occasions and compliance is confirmed.
Proportion of HE	5.6	Effective	Compliant	The content of GAS040 files is compliant.
Billed vs consumption comparison	5.7	Effective	Compliant	The content of GAS070 files is compliant and there is a close match between billed information and consumption information.

Persons Involved in This Audit

Auditor:

Steve Woods
Veritek Limited

GGNZ personnel assisting in this audit were.

Name	Title
Chris Boxall	Commercial Manager
Alan Kernohan	Commercial Analyst

Service providers assisting with processes within the audit scope.

Company	Processes
Wells Instrument & Electrical Services Ltd	Gathering and storing non-TOU raw meter data
Advanced Metering Services Limited (AMS)	TOU downloads and energy consumption calculation

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1. Pre-Audit and Operational Infrastructure Information

1.1 Scope of Audit

This Performance Audit was conducted at the request of the GIC in accordance with Rule 65 of the 2013 Amendment Version of the Gas (Downstream Reconciliation) Rules 2008. Rule 65 is inserted below:

65. Industry body to commission performance audits

65.1 The industry body must arrange at regular intervals performance audits of the allocation agent and allocation participants.

65.2 The purpose of a performance audit under this rule is to assess in relation to the allocation agent or an allocation participant, as the case may be, -

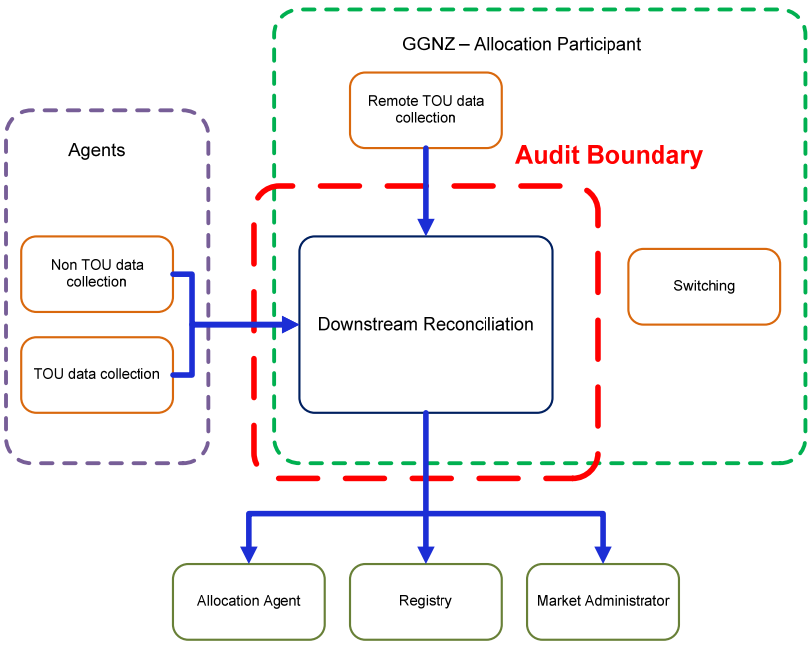
65.2.1 The performance of the allocation agent or that allocation participant in terms of compliance with these rules; and

65.2.2 The systems and processes of the allocation agent or that allocation participant that have been put in place to enable compliance with these rules.

The audit was conducted in accordance with terms of reference prepared by the GIC, and in accordance with the "Guideline note for rules 65 to 75 and 80: the commissioning and carrying out of performance audits and event audits, V3.0" which was published by GIC in June 2013.

The audit was carried out on 26/08/14 at GGNZ's Newmarket office in Auckland.

The scope of the audit includes "downstream reconciliation" only, as shown in the diagram below. Switching, metering ownership and data collection functions are not within the audit scope.



1.2 Audit Approach

As mentioned in Section 1.1, the purpose of this audit is to assess the performance of GGNZ in terms of compliance with the Rules, and the systems and processes that have been put in place to enable compliance with the rules.

This audit has examined the effectiveness of the controls GGNZ has in place to achieve compliance, and where it has been considered appropriate sampling has been undertaken to determine compliance.

Where sampling has occurred, this has been conducted using the Auditing Standard 506 (AS-506) which was published by the Institute of Chartered Accountants of New Zealand. I have used my professional judgement to determine the audit method and to select sample sizes, with an objective of ensuring that the results are statistically significant.[1]

Where calculations are performed by GGNZ's systems, the algorithm has been checked by using one or two examples as a "sample". Multiple examples are not required because they will not introduce any different variables.

Where compliance is reliant on manual processes, manual data entry for example, the sample size has been increased to a magnitude that, in my judgement, ensures the result has statistical significance.

Where errors have been found or processes found not to be compliant the materiality of the error or non-compliance has been evaluated.

[1] In statistics, a result is considered statistically significant if it is unlikely to have occurred by chance. (Wikipedia)

1.3 General Compliance

1.3.1 Summary of Previous Audit

GGNZ provided a copy of their previous audit conducted in 2011 by Veritek Ltd. Ten of the fourteen areas evaluated were found to be compliant. Four breach allegations were made in relation to the remaining areas. The resolution of these matters is summarised in the table below.

Breach Allegation	Rule	Section in this report	Resolution
The absence of meter pressure correction and the use of incorrect temperature information have led to the submission of incorrect consumption information for non-TOU ICPs to the allocation agent.	26.2.1, & 28.2	2.2, 2.3.1, 4 & 5.2	This matter is resolved. Meter pressure and temperature factors now form part of the energy calculation.
Estimated TOU consumption information has been provided on a number of occasions from April 2009 to April 2011. GGNZ's processes achieve compliance with the requirement to provide its "best estimate of consumption information"; however, the existence of estimated information is considered a matter of non-compliance. This issue is addressed on a monthly basis.	30.3	5.1	Some estimated TOU consumption has been provided to the allocation agent since the last audit.
Despite GGNZ's high level of accuracy, their practice of reading non-TOU meters on the first business day of the following month is technically not compliant with rule 30.2.2.	30.2.2	3.3, 5.2 & 5.5	This matter is now resolved. Meters are now read on the last day of the month.
The non-TOU as-billed data has not been included in the GAS070 file as required by rule 52.	52	5.7	This matter is now resolved. Non-TOU information is now included in the file.

1.3.2 Breach Allegations

GGNZ has 32 alleged breaches recorded by the Market Administrator between May 2011 and July 2014. These are summarised as follows:

Nature of Breach	Rule	Quantity	Section in this Report
Switching Breaches		3	Not within audit scope
Submission of estimated TOU data	30.3 31.1, 32.1 & 33.1	21	5.1
Initial vs final allocation variances	37.2	2	5.3
Incorrect submission information	26.2.1 & 31.1	1	5.2
The non-TOU as-billed data has not been included in the GAS070 file as required by rule 52.	52	1	5.7
Information not accurate and complete	26.2.1	2	
The absence of meter pressure correction and the use of incorrect temperature information have led to the submission of incorrect consumption information for non-TOU ICPs to the allocation agent.	26.2.1, & 28.2	1	2.2, 2.3.1, 4 & 5.2
Meters read on the first day of the next month instead of the last day of the month.	30.2.2	1	3.3, 5.2 & 5.5

As noted in the Summary of Report Findings, this audit has found two areas of non-compliance. The following breach allegations are made in relation to these matters.

Breach Allegation	Rules	Section in this report
Estimated TOU consumption information has been provided on 21 occasions since the previous audit. GGNZ's processes achieve compliance with the requirement to provide its "best estimate of consumption information"; however, the existence of estimated information is considered a matter of non-compliance. This issue is addressed on a monthly basis.	30.3	5.1
GGNZ's non TOU initial submission accuracy did not meet the 10% requirement for one gas gate on two occasions in 2014.	37.2	5.3

1.4 Draft Audit Report Comments

A draft audit report was provided to the industry body (GIC), the allocation agent, and allocation participants that I considered had an interest in the report. In accordance with rule 70.3 of the Gas (Downstream Reconciliation) Rules 2008, those parties were given an opportunity to comment on the draft audit report and indicate whether they would like their comments attached as an appendix to the final audit report. No comments were received; therefore I have not made any changes to the report.

1.5 Provision of Information to the Auditor (Rule 69)

In conducting this audit, the auditor may request any information from GGNZ, the allocation agent and any allocation participant.

Information was provided by GGNZ in a timely manner in accordance with this rule.

Information was requested from metering equipment owners and was provided within the requested timeframe or a subsequent agreed timeframe by all parties. I consider that all parties have complied with the requirements of this rule.

1.6 Transmission Methodology and Audit Trails (Rule 28.4.1)

A complete audit trail was viewed for all data gathering, validation and processing functions. This rule requires that "The consumption information supplied to the allocation agent in accordance with rules 29 to 40 is transferred in such a manner that it cannot be altered without leaving a detailed audit trail..." Compliance is confirmed with this rule in relation to consumption information supplied to the allocation agent. TOU data collection agents send monthly Excel files as email attachments and non TOU data collection agents send meter readings embedded in an email. This method is not considered secure and I recommend this data is sent as zipped files with password protection to ensure security during transmission.

2. Set-up and Maintenance of Information in Systems (Rule 28.2)

Every retailer must ensure the conversion of measured volume to volume at standard conditions and the conversion of volume at standard conditions to energy complies with NZS 5259:2004, for metering equipment installed at each consumer installation, for which the retailer is the responsible retailer.

Compliance with this rule has been examined in relation to the set-up of ICP, metering and billing information. I have also considered the "Gas (Downstream Reconciliation) Rules 2008 Billing factors guideline note, V1.0" (Billing Factors Guideline) published by GIC on 22/12/11 when examining the set up and maintenance of information.

2.1 ICP Set Up Information

2.1.1 New Connections Process

GGNZ has not dealt with any new connections. All of their ICPs have been gained through the switching process. Relevant registry information is collected manually as part of the switching process and entered into their database.

2.1.2 Altitude Information

It is a distributor responsibility to populate the registry with current and accurate altitude information and GGNZ uses these figures for non-TOU and TOU altitude factors.

NZS 5259:2004 Amendment No1 contains the following points, which affect the way altitude information should be managed:

1. The maximum permissible error is ± 1.0% where the meter pressure is below 100kPa and ±0.5% where the meter pressure is greater than 100kPa.

2. The following note is also included "To minimise uncertainty due to altitude factor the aim should be to determine the altitude to within 10m where practicable."

GGNZ provided a registry list file and I checked all ICPs against "google earth" data. The "google earth" data is based on the "Shuttle Radar Topography Mission" (SRTM) results and a number of recent studies indicate an accuracy of ± 10m for altitude. An evaluation against this data is considered an appropriate test for "reasonableness".

Point 2 above recommends altitude figures are determined to within 10m where practicable. An evaluation of altitude data on the registry was conducted to check whether this recommendation had been met. As noted above, the margin of error of the "google earth" data appears to be approximately ± 10m, therefore, to allow for this margin, I have checked that the registry data is within 20m of "google earth" data and it is for all ICPs.

2.2 Metering Set-up Information

GGNZ applies a correction for meter pressure for all of their non-TOU ICPs.

The pressure and dials information has recently been verified with the meter owner as being correct.

2.3 Billing Factors

2.3.1 Temperature Information

For ICPs where the actual temperature is not measured NZS 5259: 2004 states that temperature may be estimated and four methodologies are provided. These are listed below in order of decreasing preference.

(a) Temperature records of the station under flowing conditions. Historical records can be used if similarity is preserved.
(b) Records of actual gas temperature in similar installations over similar periods at similar locations may serve to estimate the value of gas temperature in the installation.
(c) For compact installations directly connected to short risers and well shaded from direct sunlight, where the temperature of the gas is in the vicinity of ground temperature, the temperature may be estimated from the average ground temperature at 300mm depth. NOTE – Reliable and relevant climatic temperature data may be used as a basis for estimating average 300mm ground temperatures. This may include published data. For

installations with seasonal use only, the data for the relevant season or seasons should be used.

(d) For installations where the inlet pipes are exposed to ambient air conditions the temperature may be estimated from the mean temperature obtained at reliable and relevant weather recording stations. For installations with seasonal use only, the data for the relevant season or season should be used. The installation should be shielded from direct sunlight.

GGNZ has chosen option (c). Option (c) seems to be the most logical choice because it matches the majority of GMS installations. The data is obtained from Niwa's National Climate Database which has actual daily values. GGNZ downloads this data at the end of each month and uses an average for the relevant period. The figures used are actual ground temperatures at 200mm rather than 300mm because the database does not have 300mm data for some regions. The difference between the 200mm and 300mm figures results in a difference of 0.07% which is well within the allowable 1.1% from Table 3 of NZS:5259. GGNZ selects the data from the closest climate station to the location of the relevant ICPs.

NZS 5259:2004 states "...correction may be made for the temperature drop due to pressure reduction if this reduction is made in the same installation and immediately upstream of the GMS. The temperature drop is about 0.5º per 100kPa of pressure drop. For large pressure drops or high flow rates it is recommended that the actual temperature drop be measured." This indicates that adjustment for the Joule Thompson effect is desirable.

The Billing Factors Guideline contains the following expectations by GIC:

- Network owners ensure nominal operating pressures are correctly populated in the registry for all ICPs on their networks.
- Once network pressures are correctly populated, retailers ensure that they account for the Joule- Thomson effect by using the network pressure in the registry in their conversions of metered volumes to standard volume, particularly in situations where failure to do so will result in conversion errors greater than those allowed in Table 3 of NZS5259.

This also reinforces that adjustment for the Joule Thompson effect is desirable. GGNZ applies the Joule Thompson effect adjustment and the formula was checked and confirmed as correct.

2.3.2 Calorific Values

Gas composition data is sourced from the Open Access Transmission Information System (OATIS) and is manually copied and pasted into GGNZ's spreadsheet based system. The accuracy of this information was confirmed by comparing an OATIS file with the records contained in GGNZ's system for May 2011.

At the end of each month, the data for the entire month is downloaded from OATIS and compared to the contents of GGNZ's system. This step is to confirm the accuracy of the data that is copied and pasted on a daily basis.

3. Meter Reading and Validation

3.1 Archiving of Register Reading Data (Rule 28.4.2)

Retailers are required to keep register reading data for a period of 30 months. Data was examined during the audit and it is confirmed that GGNZ has securely archived data for the entire period for all non-TOU ICPs.

3.2 Retailer to Ensure Certain Metering Interrogation Requirements are Met (Rule 29)

This rule requires that for consumer installations where the actual or expected consumption is greater than 10TJ, a TOU meter will be installed and the installation will be assigned to allocation group 1 or 2. For consumer installations where the actual or expected consumption is between 250GJ and 10TJ a non-TOU meter may be installed and the installation will be assigned to allocation group 3 or 4.

GGNZ only has allocation group 1 and 6 ICPs and the registry is correctly populated.

3.3 Meter Reading Requirements (Rules 29.4.3, 29.5 & 40.2)

All consumer installations with non-TOU meters must have register readings recorded at least once every 12 months unless exceptional circumstances prevent such an interrogation.

GGNZ ensures meters are read on the last business day of each month, to ensure compliance with rule 30.2.1 which requires that *"A register reading obtained during any day will be deemed to have been obtained at 2400 hours on that day."*

GGNZ provided copies of GAS080 reports, which show that the reading percentage, for both the rolling 4-month and 12-month targets, was 100% for all months from June 2013 to May 2014.

GGNZ achieved compliance with Rule 40.2, which is the requirement to report the number and percentage of validated register readings obtained in accordance with rules 29.4.3 and 29.5.

3.4 Non TOU Validation

Meter readings are collected manually and provided in an email to GGNZ. They are subject to the localised validation available within handheld data input devices. Once the readings reach GGNZ, validation is a manual process where the GJ per ICP is checked against historic average data. This level of validation is considered appropriate for the low number of ICPs GGNZ deals with. In the rare event that a reading appears too high or too low it is validated through a customer reading or a check reading.

3.5 Non TOU Error Correction

GGNZ has not identified any non-TOU errors and therefore correction has not been made to any data.

3.6 TOU Validation

Data for one ICP is collected using “Masterlink” software. Data for all other ICPs is collected by AMS, who also conduct the energy conversion calculation.

TOU data is manually compared to daily customer forecasts and previous consumption levels and patterns. Checks are also conducted for unexpected zeros.

4. Energy Consumption Calculation (Rule 28.2)

GGNZ’s non-TOU volume to energy calculation now includes correction for calorific value, pressure, temperature an altitude. I checked this calculation and it is correct.

AMS conducts the calculation for TOU ICPs apart from one where a GasNet meter is present. I checked AMS’s calculation and confirm it meets the requirements of NZS5259:2004.

GGNZ uses the NX19 formula to correct for compressibility for one TOU ICP. To evaluate the calculation a spreadsheet was used which replicates the NX19 formula. The relevant information for the ICPs was entered into the spreadsheet and the resulting factor (Fz) was confirmed to be correct.

5. Estimation and Submission Information

5.1 TOU Estimation and Correction (Rule 30.3)

This rule requires that retailers must provide the best estimate of consumption information to the allocation agent in situations where actual data is not available.

In these situations, GGNZ uses a range of techniques to estimate data depending on the situation. These techniques may include one or more of the following sources of information:

- Forecast data
- Check metering data
- Historic consumption information
- Uncorrected volume where available

Two estimation examples were examined and in both cases, an appropriate process was used. The data was correctly identified as estimated and an appropriate journal was available to show the details of the estimation technique.

GGNZ’s processes achieve compliance with the requirement to provide its “best estimate of consumption information”.

The existence of any estimated TOU consumption information is considered a matter of non-compliance. This issue is addressed on a monthly basis and a number of breach allegations have been made as recorded in Section 1.3.

5.2 Provision of Retailer Consumption Information (Rules 30 to 33)

GGNZ's compliance with rules 30 to 33 was examined by a "walk through" of their processes and controls to confirm compliance.

GAS040 files for some months were examined and compared to the data in GGNZ's system at ICP level. The totals matched, which confirms compliance. This also proves that GGNZ's consumption information provided to the allocation agent is calculated at ICP level and then aggregated.

5.3 Initial Submission Accuracy (Rule 37.2)

Rule 37.2 requires that the accuracy of consumption information, for allocation groups 3 to 6, for initial allocation must be within a certain percentage of error published by the industry body. The published percentage error is 10% for the period analysed.

GGNZ only has ICPs at GTA03610 and the table below shows that final consumption information is normally identical to initial consumption information. The variances from January to June 2013 are due to the introduction of adjustment for temperature and pressure from January 2014, including revision files. March and April have variances greater than 10% but less than 200GJ.

The Market Administrator has advised, through a guideline note published on 10 November 2010 that breaches where the absolute value of the volume differences are less than 200 GJs should not be determined material or referred to the Investigator.

Month	Initial Submission All Gas Gates (GJ)	Final Submission All Gas Gates (GJ)	Percentage Variation
July 2012	172.339	172.339	0
August 2012	135.109	135.109	0
September 2012	156.039	156.039	0
October 2012	143.378	143.378	0
November 2012	138.204	138.204	0
December 2012	92.976	92.976	0
January 2013	76.223	77.063	-1.09
February 2013	71.38	72.292	-1.26
March 2013	81.979	106.044	-22.69
April 2013	160.112	141.181	13.41
May 2013	209.305	217.837	-3.92
June 2013	213.737	224.337	-4.73

5.4 Forward Estimates (Rules 34 & 36)

GGNZ only uses a forward estimate process on rare occasions when a customer is away for the relevant month and the estimate is zero due to the property being vacant.

5.5 Historic Estimates (Rules 34 & 35)

On the rare occasions when GGNZ calculates historic estimates due to the inability to obtain meter readings on the last day of the month, the process employed is compliant with the rules.

5.6 Proportion of Historic Estimates (Rule 40.1)

All consumption information submitted to the allocation agent is considered historic estimates because any forward estimates are zero. The content of GAS040 files is compliant.

5.7 Billed vs Consumption Comparison (Rule 52)

The GAS070 (provision of aggregate monthly as-billed data) files were examined for the months June 2013 to May 2014. The content of the files was "proved" for TOU and non TOU information by checking the bills in GGNZ's system for all ICPs for all gas gates for a particular month.

The variation between quantities billed and consumption information for the same period was only 0.0002%.

6. Recommendations

As a result of this performance audit I only have one minor recommendation. TOU data collection agents send monthly Excel files as email attachments and non TOU data collection agents send meter readings embedded in an email. This method is not considered secure and I recommend this data is sent as zipped files with password protection to ensure security during transmission.

Appendix 1: Control Rating Definitions

Control Rating	Definition
Control environment is not adequate	Operating controls designed to mitigate key risks are not applied, or are ineffective, or do not exist. Controls designed to ensure compliance are not applied, or are ineffective, or do not exist. Efficiency/effectiveness of many key processes requires improvement.
Control environment is adequate	Operating controls designed to mitigate key risks are not consistently applied, or are not fully effective. Controls designed to ensure compliance are not consistently applied, or are not fully effective. Efficiency/effectiveness of some key processes requires improvement.
Control environment is effective	Isolated exceptions identified when testing the effectiveness of operating controls to mitigate key risks. Isolated exceptions identified when testing the effectiveness of controls to ensure compliance. Isolated exceptions where efficiency/effectiveness of key processes could be enhanced.