VERITEK

Gas Downstream Reconciliation Performance Audit Draft Report

For

Greymouth Gas New Zealand Limited

GREYMOUTH GAS

Prepared by Tara Gannon – Veritek Ltd

Date of Audit: 19/06/17

Date Audit Report Complete: 14/07/17

Executive Summary

This Performance Audit was conducted at the request of the Gas Industry Company (GIC) in accordance with Rule 65 of the Gas (Downstream Reconciliation) Rules 2008 effective from 14 September 2015.

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: 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 17 of the areas evaluated, and adequate for the other area.

15 of the 18 areas evaluated were found to be compliant. Two breach allegations are made in relation to these areas. They are summarised as follows:

- Historic estimate is not calculated in accordance with rules 34 and 35 where actual readings are not received on the last day of each month.
- There are no audit trails within the excel based system to record modifications to meter reading data.

As a result of this audit I recommend the following:

- Consider applying a compressibility factor for non TOU ICPs with meter pressures over 50 kPa.
- The Allocation Agent Functional Specification dated 1 February 2017, states that GAS050 consumption should be rounded to three decimal places. Currently GGNZ's reports show a higher number of decimal places. I recommend rounding the GAS050 submission data to three decimal places.

Summary of Report Findings

Issue	Section	Control Rating (Refer to Appendix 1 for definitions)	Compliance Rating	Comments
Transmission methodology and audit trails	1.5	Effective	Compliant	Transmission methodologies are secure and audit trails for submission information are appropriate.
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 non TOU meter pressure data was confirmed as correct.
Billing factors	2.3	Effective	Compliant	Temperature data is obtained from Niwa's National Climate Database. Actual daily values are applied. Calorific values were confirmed to be correct.
Archiving of reading data	3.1	Effective	Not compliant	Meter reading data is retained for more than 30 months. Audit trails are not created when estimated readings are replaced with actuals.
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.

Issue	Section	Control Rating (Refer to Appendix 1 for definitions)	Compliance Rating	Comments
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 to be accurate.
TOU estimation and correction	5.1	Effective	Compliant	GGNZ's processes achieve compliance with the requirement to provide its "best estimate of consumption information".
Provision of retailer consumption information	5.2	Effective	Compliant	The process for preparing consumption information files is compliant. There has been some submission of inaccurate information due to non conformance for some historic estimate calculations, discussed in section **5.5**.
Initial submission accuracy	5.3	Effective	Not compliant	GGNZ's non TOU initial submission accuracy did not meet the 10% requirement on all occasions.
Forward estimates	5.4	Effective	Compliant	Forward estimates are used, and compliance is confirmed.
Historic estimates	5.5	Adequate	Not compliant	Historic estimates are not correctly calculated in all cases.
Proportion of HE	5.6	Effective	Compliant	The content of GAS040 files is compliant.

Issue	Section	Control Rating (Refer to Appendix 1 for definitions)	Compliance Rating	Comments
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.
Gas Trading Notifications	5.8	Effective	Compliant	Gas trading notifications are issued as necessary.

Persons Involved in This Audit

Auditor:

Tara Gannon
Veritek Limited

GGNZ personnel assisting in this audit were.

Name	Title
Chris Boxall	Commercial Manager
Rafy Shasha	Marketing & Commercial Executive

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 Gathering and storing non-TOU raw meter data
First Gas via OATIS	TOU downloads and energy consumption calculation

Contents

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, -

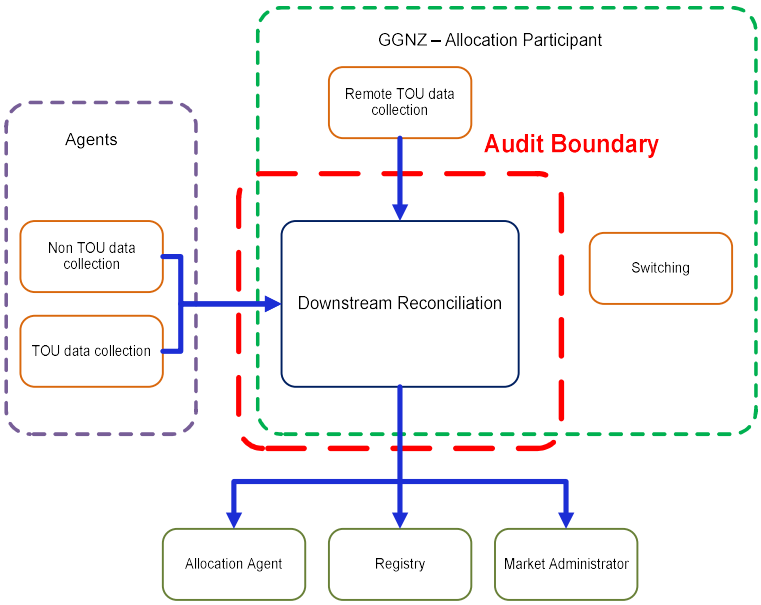
65.2.1 The performance of the allocation agent or that allocation participant in terms of compliance with these rules; and

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 19 June 2017 at GGNZ's 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 conformance 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 2014 by Veritek Ltd. 14 of 16 areas evaluated were found to be compliant. Two 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
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 conformance. This issue is addressed on a monthly basis.	30.3	5.1	Cleared. Provision of estimated TOU consumption is no longer a rule breach.
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	Still existing. One gas gate did not meet the accuracy and materiality requirements for one month.

1.3.2 Breach Allegations

GGNZ has 14 alleged breaches recorded by the Market Administrator between August 2014 and April 2017. These are summarised as follows:

Nature of Breach	Rule	Quantity	Section in this Report
Provision of interim data for allocation group 4 and 6	32.4	1	5.2
Provision of final data for allocation group 4 and 6	33.4	1	5.2
Initial vs final allocation variances	37.2	6	5.3
Gas (Switching Arrangements) Rules 2008 breaches	67.3, 69.1 and 72.2	5	Not within audit scope

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

Breach Allegation	Rules	Section in this report
There are no audit trails within the excel based system to record modifications to meter reading data.	28.4.1	3.1
Historic estimate is not calculated in accordance with rules 34 and 35 where actual readings are not received on the last day of each month.	34.1 and 35	5.5

1.4 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.

1.5 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 and stored in such a manner that it cannot be altered without leaving a detailed audit trail..."

A sample of six initial, interim and final GAS040 and GAS050 reports submitted on the Allocation Portal were checked against the original reports on GGNZ's network. This check confirmed that the original files were still available, and had not been edited after the submission date and time.

Audit trails are maintained within the allocation portal. Compliance is confirmed.

Meter reading data is received using several methods:

- Wells provide readings in the body of an email. I traced a sample of nine Wells readings from the emails to GGNZ's system and confirmed that all were recorded correctly. It is not possible to edit the readings contained in the email, unless the data is copied to a new file, forwarded or replied to.
- Where AMS is in the process of upgrading from non TOU to TOU, they provide readings in the body of an email. I traced a sample of three of these reads to GGNZ's system and confirmed that they were recorded correctly. As for Wells, it is not possible to edit the

readings contained in the email, unless the data is copied to a new file, forwarded or replied to.

- GGNZ downloads TOU readings for one ICP using Masterlink. I observed the process and confirmed that reads for three days matched the Masterlink data.
- AMS sends DDR (daily delivery report data) via SFTP. These files contain volumes, not readings. I traced 15 days of data from the source file for three ICPs, including volume, CV and delivered energy.
- DDR information provided by First Gas for gas gate meters is downloaded from OATIS. These files contain volumes, not readings. I traced May 2017 data from the source file for two ICPs, including volume, CV and delivered energy. Audit trails are contained within OATIS.
- GGNZ does not accept customer readings.

1.6 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 2015 Amendment Version 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. The following responses were received.

Party	Response	Comments provided	Attached as appendix
GGNZ	Yes	Yes	Included in the audited party comments box for each non conformance and recommendation.
Contact Energy	Yes	Yes	Yes

The comments received were considered in accordance with rule 71.1, prior to preparing the final audit report. The comments received were considered in accordance with rule 71.1, prior to preparing the final audit report. The following table records the changes that were made to the report after considering comments. In the appendix, I have recorded the reasons for not making changes after consideration of some comments.

Report Section	Change to Report
3.1	Added wording to clarify that where estimates are created and later replaced with actual data, an audit trail is not created within the excel spreadsheet.

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 5259:2015, 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 30/11/2015 when examining the set up and maintenance of information.

2.1 ICP Set Up Information

2.1.1 New Connections Process

New connections are rarely completed by GGNZ. Most ICPs have been gained through the switching process. Relevant registry information is collected manually as part of the switching process and entered into GGNZ's excel based system.

Review of the registry list report confirmed that one new connection is underway. ICP 1001294166NGCC4 has been at READY status since 01/03/17, and it is expected that the network and metering work will be complete by 01/10/17. The site is still to be built. GGNZ has an existing contract with the customer for other sites. ICP 1001294166NGCC4 will be added to the contract once work is completed, and the ICP will be claimed and have its status updated. The customer's project management team has liaised with Vector and GGNZ, and GGNZ is aware of the progress and timeframes.

Compliance is confirmed.

2.1.2 Altitude Information

It is a distributor's responsibility to populate the registry with correct altitude information to support compliance with NZS 5259:2015, and it is a retailer responsibility to comply with NZS 5259:2015 for the conversion of volume to energy.

NZS 5259:2015, which was published in November 2015, contains the following requirements regarding the way that altitude information should be managed.

1. The maximum permissible error is ± 1.0% where the meter pressure is less than or equal to 100kPa, and ±0.5% where the meter pressure is greater than 100kPa.
2. The following note is also included "Altitude should be determined 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. To allow for this margin, I checked that the registry data is within ± 20m of "google earth" data. Compliance was confirmed for all ICPs.

2.2 Metering Set-up Information

GGNZ matches its ICP information to the registry on an ad hoc basis, approximately twice per annum. This includes checks of data used in the conversion process, such as meter pressures and altitudes. GGNZ do not monitor registry notification files to identify changes to their ICP information.

To ensure their ICP information is up to date, GGNZ monitors ICPs they know are due for meter maintenance, to ensure that paperwork is received and processed.

Given that 34 ICPs are supplied, it is reasonable to reconcile records to the registry less frequently than retailers supplying large numbers of ICPs. However, without prompt identification of changes to registry information for GGNZ ICPs through reviewing notification files, discrepancies could exist for up to six months before being identified through a registry match. This is recorded as non conformance as part of GGNZ's 2017 Registry Audit Report.

GGNZ applies a correction for meter pressure for all of their non-TOU ICPs as discussed in section **4**. Meter pressure values matched the registry for all non TOU ICPs. Compliance is confirmed.

An event detail report was provided for the period from 1 April 2016 to 31 March 2017. No meter pressure changes were processed during the period.

2.3 Billing Factors

2.3.1 Temperature Information

For ICPs where the actual temperature is not measured NZS 5259:2015 states that temperature may be estimated and four methodologies are provided. These are listed below in order of decreasing preference.

(a) Gas temperature records for the GMS location under flowing conditions. Historic records can be used if similarity is preserved.

(b) Records of actual gas temperature in similar installations at similar locations over corresponding periods.

(c) For compact installations directly connected to short risers and well shaded from direct sunlight, 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.

(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. The installation should be shielded from direct sunlight.

GGNZ has chosen option (c) and records an average daily temperature for each month. They apply the daily weighted average temperature for the billing/read-read period. 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. GGNZ selects the data from the closest climate station to the location of the relevant ICPs.

The difference between the monthly 200mm and 300mm figures was analysed for three regions where 20cm and 30cm data is available, for a period of five years. I found the average difference in degrees Celsius was -0.06 to +0.69, and the average difference in the temperature factor was -0.24% to +0.2%. The maximum daily difference identified was -2.5 degrees, resulting in a factor difference of +0.87%. This is within the maximum permissible error from Table 3 of NZS 5259:2015.

NZS 5259:2015 states that correction for temperature drop due to Joule-Thomson effect of pressure reduction is applicable if temperature methodologies (b), (c) or (d) are used, provided the reduction is made in the same installation and immediately upstream of the GMS. "In other cases or for large pressure drops or high flow rates the actual temperature drop should be measured. For natural gas the temperature drop is about 0.5º per 100kPa of pressure drop." This indicates that adjustment for the Joule-Thomson 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 NZS 5259:2015.

This also reinforces that adjustment for the Joule-Thomson effect is desirable. GGNZ applies the Joule-Thomson effect adjustment, and the formula was checked and confirmed correct. This is discussed further in section **4**.

Compliance is confirmed.

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 gas types used (R, T and X) for January to May 2017.

I also verified that CV is correctly recorded for TOU sites where AMS completes the gas conversion by reviewing CV data for May 2017 for two gas gates.

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.

Compliance is confirmed.

3. Meter Reading and Validation

3.1 Archiving of Register Reading Data and Information Supplied to the Allocation Agent (Rule 28.4)

Retailers are required to keep register reading data for a period of 30 months. Reads dated before 2014 were sighted for each of the meter reading and volume information sources – Wells, Masterlink, OATIS and AMS.

There are no audit trails within GGNZ's excel based system to record modification of meter read information, although the source data files are retained by GGNZ and the meter reading providers. I found that where estimates are created and later replaced with actual data, an audit trail is not created within the excel spreadsheet. This is recorded as non conformance below.

Non Conformance	Description	Audited party comment
Regarding: Rule 28.4.1 **Control Rating**: Adequate	There are no audit trails within the excel based system to record modifications to meter reading data.	Response: An audit trail is captured on the gas reconciliation portal (relating to data transfer), and by requiring each version of each file to have a different suffix (in relation to data storage). It is not clear from this assessment whether the issue is that there were modifications that did not leave an audit trail, or simply that the audit trail was not evident in excel.

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 10 TJ, 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 250 GJ and 10 TJ a non-TOU meter may be installed and the installation will be assigned to allocation group 3 or 4.

GGNZ reviews customer allocation groups at the end of each month. GGNZ elects to upgrade all allocation group 4 customers with consumption over 3,000 GJ to TOU metering. Each month the ICPs being upgraded are checked to determine whether the upgrade is complete.

GGNZ's group 6 customers are domestic, and tend to use well under 250 GJ per annum. Their consumption is checked for reasonableness as a group as part of the monthly management reporting.

If consumption is higher than expected, it will be investigated at ICP level and the allocation group changed if necessary.

All ICPs are scheduled to be read at least monthly, regardless of allocation group.

GGNZ supplies a small number of customers and is familiar with their annual usage and consumption patterns, as well as the requirements of this clause.

Compliance is confirmed.

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 close to the end of the month.

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 February 2017 and March 2017.

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

Non TOU meter readings are collected manually by Wells and AMS. Wells provide most of the non TOU readings. AMS provide readings for allocation group 4 customers in the process of upgrading to TOU metering. Meter readings are collected manually and provided in the body of an email to GGNZ.

Wells meter readings are subject to the localised validation available within handheld data input devices. AMS readings are not validated prior to being sent.

Once the readings reach GGNZ, validation is a manual process where the CV, temperature data and GJ per ICP is checked against historic average data. I observed the validation process. This level of validation is considered appropriate for the small 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.

Compliance is confirmed.

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 patterns. Checks are also conducted for unexpected zeros. Any unexpected values are checked with the customer. I observed the validation process.

TOU customers provide a week ahead nomination of the volume they expect to use. Actual weekly consumption is compared against this and provided to the customer, who then uses it as input into their next weekly nomination.

Compliance is confirmed.

4. Energy Consumption Calculation (Rule 28.2)

GGNZ's non-TOU volume to energy calculation includes correction for calorific value, pressure, temperature an altitude. Temperature is adjusted for the Joule Thomson effect. A compressibility factor is not applied for non TOU ICPs.

AMS conducts the conversion calculation and provides corrected volumes for all TOU ICPs except 0004227098NG2B8. For 0004227098NG2B8, GGNZ downloads the reading data and converts it to energy. NX19 is used to calculate the compressibility factor.

To evaluate energy consumption calculations, a spreadsheet was prepared which converts volume between meter readings to volume at standard conditions and then to energy consumption.

The relevant information for a sample of ICPs was entered into the spreadsheet, and the resulting energy value was compared to that calculated by GGNZ. This comparison confirmed the accuracy of the GGNZ calculation and confirmed compliance with NZS 5259:2015. The sample of ICPs included TOU and non TOU, and volumes converted to energy by GGNZ, First Gas, and AMS.

Where volumes were converted to energy by First Gas or AMS, I traced a sample of data from the DDR reports through GGNZ's system to the GAS050 report to confirm the data was consistent.

Compliance with rule 28.2 is confirmed.

While no factors were found to be outside the maximum permissible errors under NZS 5259: 2015, I recommend that GGNZ consider applying a compressibility factor for non TOU ICPs with meter pressure over 50 kPa. Errors outside the maximum permissible error for the compressibility factor could occur at higher pressures.

Recommendation	Audited party comment
Consider applying a compressibility factor for non TOU ICPs with meter pressures over 50 kPa.	Response: Our current approach is to upgrade non-TOU ICPs to TOU ICPs where warranted. However, we will consider adopting the suggested approach for non-TOU ICPs that are not upgraded.

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

Eight estimation examples were examined and in all 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". Compliance is confirmed.

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.

GGNZ use a checklist to ensure that submissions have been created, checked and submitted on time.

GAS040 non TOU energy submissions
Each non TOU ICP's consumption is checked as part of the validation processes described in section **3.4**. GGNZ also checks that the consumption is consistent with the expected values in their BPP book.

GAS040 consumption for a sample of gas gates for December 2016, January 2017 and May 2017 was examined and compared to the data in GGNZ's system at ICP level for a sample of gas gates; 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.

The market administrator alleged a breach of rules 32.4 and 33.4 for provision of interim and final data for allocation groups 4 and 6 for September 2016. This is recorded in section **1.3.2**.

GAS050 TOU energy submissions
Each TOU ICP's consumption is checked as part of the validation processes described in section **3.6**. GGNZ also checks that the consumption is consistent with the expected values in their BPP book. This includes a check for any estimated data, to make sure it is correctly flagged.

GAS050 files were checked for a sample of ICPs and months, including tracing from read files through to invoices and the GAS050 submissions. Total consumption was correctly aggregated.

A recommendation is raised below in relation to rounding of the GAS050 reports.

Recommendation	Audited party comment
According to the Allocation Agent Functional Specification dated 1 February 2017, GAS050 consumption should be rounded to three decimal places. Currently GGNZ's reports show a higher number of decimal places. I recommend rounding the submission data to three decimal places.	Response: This change has already been made.

Vacant ICPs

The matter of "vacant consumption" was also examined. When an ICP is vacant but still active (ACTV on the registry), meter reading still occurs and any volume that is recorded is converted into validated consumption and is then included in the allocation process. GGNZ does not supply any active vacant ICPs.

Accuracy of information used to prepare submissions

Non conformance in relation to the calculation of some historic estimates was identified in section **5.5**. This has led to submission of incorrect information to the allocation agent.

5.3 Initial Submission Accuracy (Rule 37.2)

Final allocations are complete for the months through to March 2016. 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.

There was only one variation over ± 10% and ± 200 GJ for June 2014 shown in the table below. This alleged breach occurred due to an allocation system error, and was later retracted.

Month	Total Gas Gates	Number Within 10%	% Compliant	Within ±10% or < 200 GJ	% Compliant or immaterial
Jul-13	1	1	100%	1	100%
Aug-13	1	1	100%	1	100%
Sep-13	1	1	100%	1	100%
Oct-13	1	1	100%	1	100%
Nov-13	1	0	0%	1	100%
Dec-13	1	0	0%	1	100%
Jan-14	1	0	0%	1	100%
Feb-14	1	0	0%	1	100%
Mar-14	1	1	100%	1	100%

Month	Total Gas Gates	Number Within 10%	% Compliant	Within ±10% or < 200 GJ	% Compliant or immaterial
Apr-14	1	1	100%	1	100%
May-14	1	0	0%	1	100%
Jun-14	1	0	0%	0	0%
Jul-14	1	0	0%	1	100%
Aug-14	1	0	0%	1	100%
Sep-14	1	0	0%	1	100%
Oct-14	1	0	0%	1	100%
Nov-14	1	0	0%	1	100%
Dec-14	1	0	0%	1	100%
Jan-15	1	0	0%	1	100%
Feb-15	1	1	100%	1	100%
Mar-15	1	1	100%	1	100%
Apr-15	1	1	100%	1	100%
May-15	1	1	100%	1	100%
Jun-15	1	0	0%	1	100%
Jul-15	1	1	100%	1	100%
Aug-15	1	1	100%	1	100%
Sep-15	1	0	0%	1	100%
Oct-15	1	1	100%	1	100%
Nov-15	1	1	100%	1	100%
Dec-15	1	0	0%	1	100%
Jan-16	1	1	100%	1	100%
Feb-16	1	1	100%	1	100%
Mar-16	1	1	100%	1	100%

The table below shows the difference between consumption information for initial and final submissions at an aggregated level for all gas gates. The consumption information submitted to the allocation agent for the initial allocation is within ± 10% and ± 200 GJ of the consumption information submitted for the final allocation for all months reviewed except June 2014. This alleged breach occurred due to an allocation system error, and was later retracted.

Month	Initial Submission All Gas Gates (GJ)	Final Submission All Gas Gates (GJ)	GJ Variation	Percentage Variation
Jul-13	251.681	260.893	9.212	-3.5%
Aug-13	213.643	222.434	8.791	-4.0%
Sep-13	190.698	198.308	7.61	-3.8%
Oct-13	145.595	150.366	4.771	-3.2%
Nov-13	136.067	94.695	-41.372	43.7%
Dec-13	32.945	73.857	40.912	-55.4%
Jan-14	12.411	28.14	15.729	-55.9%
Feb-14	23.746	38.755	15.009	-38.7%
Mar-14	60.161	65.523	5.362	-8.2%
Apr-14	62.621	67.985	5.364	-7.9%
May-14	129.434	144.247	14.813	-10.3%
Jun-14	19.778	228.401	208.623	-91.3%
Jul-14	30.297	154.32	124.023	-80.4%
Aug-14	77.041	113.023	35.982	-31.8%
Sep-14	91.807	109.119	17.312	-15.9%
Oct-14	48.306	71.691	23.385	-32.6%
Nov-14	89.738	109.021	19.283	-17.7%
Dec-14	50.395	96.027	45.632	-47.5%
Jan-15	43.75	39.189	-4.561	11.6%
Feb-15	36.052	36.316	0.264	-0.7%
Mar-15	68.815	68.826	0.011	0.0%
Apr-15	98.47	98.47	0	0.0%
May-15	83.754	92.354	8.6	-9.3%
Jun-15	85.467	107.576	22.109	-20.6%
Jul-15	116.359	116.359	0	0.0%
Aug-15	192.206	197.368	5.162	-2.6%
Sep-15	50.07	69.258	19.188	-27.7%
Oct-15	84.313	84.313	0	0.0%
Nov-15	98.874	98.874	0	0.0%
Dec-15	39.375	55.43	16.055	-29.0%
Jan-16	265.529	264.358	-1.171	0.4%
Feb-16	317.925	317.925	0	0.0%
Mar-16	241.78	241.78	0	0.0%

Alleged breaches of the initial submission accuracy requirements prior to the addition of the materiality limit are recorded in section **1.3.2.**

5.4 Forward Estimates (Rules 34 & 36)

GGNZ only uses a forward estimate process on rare occasions when a read cannot be obtained.

If a read cannot be obtained for an allocation group 6 customer, it is typically because the customer is away. GGNZ forward estimates zero consumption for these ICPs due to the property being vacant.

Forward estimate is created manually for allocation group 4 customers, in consultation with the Allocation Agent. I reviewed two examples of forward estimate for allocation group 4 customers in May 2017, and found the prior month consumption for the ICP was applied as agreed with the Allocation Agent. The estimates were replaced with actuals in the GGNZ's system once they became available.

Compliance is confirmed.

5.5 Historic Estimates (Rules 34 & 35)

GGNZ's allocation group 4 and 6 customers are typically read very close to the last day of the month. The consumption between the month end meter readings is recorded as historic estimate.

- Where no actual readings are received during the month, and an actual reading is received in a later month, GGNZ applies the historic estimate process to apportion the consumption between the months in the reading period. There were no examples where an actual read was not received during the audit period, so this process could not be reviewed.
- Where actual readings are obtained on the last day of the month, and the last day of the previous month, historic estimate is correctly calculated.
- Where actual readings are not recorded on the last day of the month, GGNZ treats the readings recorded near the end of the month as permanent estimates on the last day of the month, and uses these readings to calculate historic estimate. A permanent estimate reading is not entered into GGNZ's system. As reads are normally very close to month end, this will not result in a material volume difference, but is not compliant with rules 34.1 and 35. If the actual reading occurs before the end of the month, forward estimate should be created from the day after the last reading until the last day of the month. If the actual reading occurs after the last day of the month, the historic estimate process should be applied.

Non Conformance	Description	Audited party comment
Regarding: Rules 34.1 and 35 **Control Rating**: Adequate	Historic estimate is not calculated in accordance with rules 34 and 35 where actual readings are not received on the last day of each month.	Response: We will review our calculation method and processes as a result of this finding.

5.6 Proportion of Historic Estimates (Rule 40.1)

This rule requires retailers to report to the allocation agent the proportion of historic estimates contained within the consumption information for the previous initial, interim and final allocations.

GAS040 files were examined for December 2015, January 2016, February 2016 and February 2017 and confirmed that historic estimates are contained within the consumption information.

GAS040 consumption for a sample of gas gates for December 2016, January 2017 and May 2017 was examined and compared to the data in GGNZ's system at ICP level for a sample of gas gates; 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.

Although there is non conformance recorded in section **5.5** relating to calculation of historic estimates, the proportion of historic estimate reported matches the historic estimate that GGNZ has calculated.

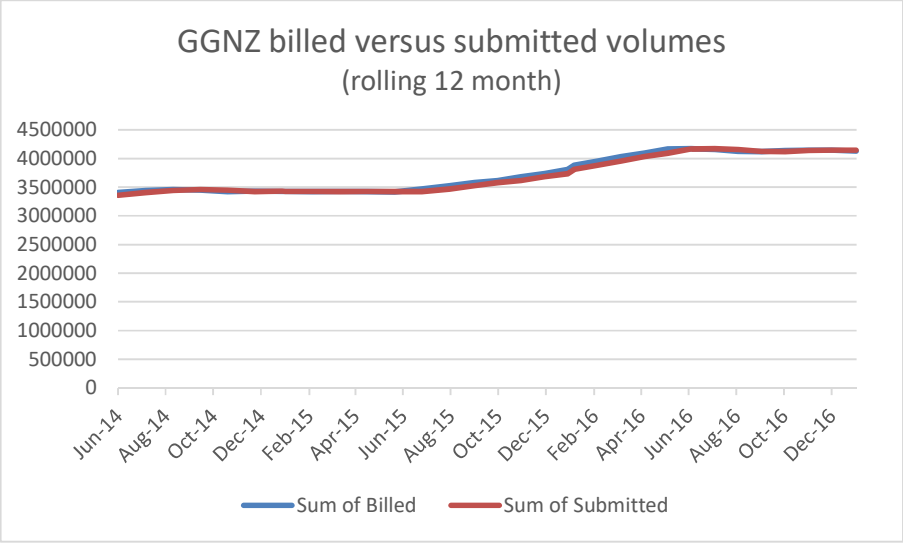
5.7 Billed vs Consumption Comparison (Rule 52)

The GAS070 (provision of aggregate monthly as-billed data) files were examined for the months June 2014 to January 2017. 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 four gas gates for May 2017 month.

The chart below shows a comparison between rolling annual quantities billed and rolling annual consumption information submitted to the allocation agent for a 32-month period. Although the figures cannot be directly compared, as the submitted data is normalised, they can provide a useful indicator of whether under or over reporting of consumption is occurring.

The larger difference in late 2015 to early 2016 was caused by estimates being submitted for one TOU site, which later washed out once the TOU data was available.

Comparison between Rolling Annual Submitted Volumes and Gas Supplied



Year ending	Annual Billed GJ	Annual Consumption GJ	Percentage Difference
January 2015	3425739.762	3427740.362	0.06%
January 2016	3885096.539	3809856.74	-1.97%
January 2017	4128169.77	4147034.505	0.45%

5.8 Gas Trading Notifications (Rule 39)

A retailer must give notice to the Allocation Agent where they commence or cease to supply gas under a supplementary agreement to a transmission services agreement, or amend information required to be provided under the supplementary agreement under rule 39.2.

GGNZ have a process in place to ensure that trader notifications are issued where required. I saw evidence of a trader notification issued for a new switch in which a supplementary agreement applied to effective 01/07/2015. Compliance is confirmed.

5.9 Bay of Plenty Event Audit

In March 2016, Langford Consulting completed an event audit of unusually large amounts of UFG at Greater Tauranga and Greater Mt Maunganui.

As part of GGNZ's participant audit, I identified ICPs connected to the affected gas gates and investigates whether there had been any issues with the data submitted.

Both ICPs were in allocation group 1. No issues with the data reported for Bay of Plenty were identified during the audit.

6. Recommendations

As a result of this audit I recommend the following:

- Consider applying a compressibility factor for non TOU ICPs with meter pressures over 50 kPa.
- The Allocation Agent Functional Specification dated 1 February 2017, states that GAS050 consumption should be rounded to three decimal places. Currently GGNZ's reports show a higher number of decimal places. I recommend rounding the GAS050 submission data to three decimal places.

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.

Appendix 2 – GGNZ Comments

GGNZ has reviewed this report, their comments are contained in the audited party comment box for each non conformance and recommendation.

Appendix 3 – Response to Contact Energy Comments

Section	Comment	Response
3.6	This section is silent on whether GGNZ's agent AMS has had their TOU data processes audited as part of a performance audit. Can you please confirm that this has been the case and if so by who?	AMS' TOU data processes are within the scope of their upcoming meter owner audit.
3.6	Also where GGNZ retrieve TOU data via Masterlink – can you please confirm that GGNZ review and validate the measured temperature and pressure values for any unexpected values.	Yes, this process was reviewed during the audit.
3.6	The audit is silent on reviewing the meter event logs to ensure that there are no issues impacting or about to impact meter integrity such as battery alarms or transducer failures - Are you able to confirm that GGNZ do monitor meter event logs for the ICP they interrogate on a regular basis? Also the report is silent on the time synchronisation validation requirements under NZS 5259 Appendix B paragraph B4. Are you able to confirm that GGNZ do monitor time synchronisation in line with NZS 5259?	Review of meter events and time synchronisation was not in the terms of reference, so is not described in the report.