

VERITEK

# Gas Downstream Reconciliation Performance Audit Final Report

For

**Genesis Energy Limited**



Prepared by Steve Woods – Veritek Ltd

Date of Audit: 12/08/14 & 13/08/14

Date Audit Report Complete: 05/12/14

## 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 Genesis Energy (Genesis) in terms of compliance with these rules. The scope of the audit includes three retailer codes; GENG (Genesis non TOU), GEOL (Energy Online non TOU) and GEND (Genesis TOU).

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 the GIC in June 2013.

The summary of report findings in the table below shows that Genesis's control environment is "effective" for nine of the areas evaluated and "adequate" for the other eight. There were no areas that were considered "not adequate".

Eight of the seventeen areas evaluated were found to be compliant. Nine breach allegations are made in relation to the remaining areas. They are summarised as follows:

- Some altitude discrepancies have led to the provision of incorrect consumption information to the allocation agent.
- The use of incorrect meter pressure information has led to the under submission of consumption information to the allocation agent.
- GEOL uses the same temperature for each gas type rather than each gas gate. This approach will achieve compliance for some gas types where the relevant gas gates are all in the same region, but compliance will not be achieved for gas types where the gas gates are in different regions with different temperatures.
- There are 101 allocation group 6 ICPs with consumption between 250GJ and 10TJ, which should be recorded as allocation group 4.
- Consumption information was not submitted for 15 ICPs recorded as disconnected where consumption is recorded.
- Consumption information was not corrected for prior periods for one GENG ICP where the meter was stopped and for 1,961 of 1,978 ICPs where meter pressure corrections were made.
- Estimated TOU consumption information has been submitted to the allocation agent on a number of occasions up until June 2013.
- The initial submission accuracy did not meet the 10% requirement for all gas gates for the period August 2012 to July 2013.

- GEOL's HE processes are not compliant for some scenarios. The calculation includes a shape file value for the day of the meter read, but meter readings are deemed to have been obtained at 2400 on any given day so the calculation should use a shape value starting the next day.

## Summary of Report Findings

Issue	Section	Control Rating (Refer to Appendix 1 for definitions)	Compliance Rating	Comments
ICP set up information	2.1	Adequate	Not compliant	<p>Some time delays exist with the registry update systems and processes.</p> <p>Consumption information for eight ICPs with altitude figure errors of over 90m will be high by between 1.1% and 10%.</p> <p>A recommendation is made in relation to 436 ICPs where the altitude is recorded as zero, and may be inaccurate.</p>
Metering set up information	2.2	Adequate	Not compliant	<p>Some meter pressure and meter dial discrepancies exist between Genesis's and meter owners' records.</p> <p>I recommend that monthly validation occurs for meter pressure and dials and that meter dockets be checked for all discrepancies prior to any adjustment.</p>

Billing factors	2.3	Adequate	Not compliant	<p>GEOL uses the same temperature for each gas type rather than each gas gate. This approach will achieve compliance for some gas types where the relevant gas gates are all in the same region, but compliance will not be achieved for gas types where the gas gates are in different regions with different temperatures.</p> <p>I recommend the temperature data is refreshed and applied per gas gate rather than per gas type.</p> <p>I recommend GENG applies Joule-Thomson adjustment once network pressures are confirmed as correct.</p>
Archiving of reading data	3.1	Effective	Compliant	Robust controls are in place for the security of meter reading data.
Meter interrogation requirements	3.2	Adequate	Not compliant	There are 1011 allocation group 6 ICPs with consumption between 250GJ and 10TJ, which should be recorded as allocation group 4.
Meter reading targets	3.3	Effective	Compliant	Meter reading attainment processes are robust.
Non TOU validation	3.4	Effective	Compliant	Validation processes are robust.

Non TOU error correction	3.5	Adequate	Not compliant	<p>Consumption information was not corrected for prior periods for one GENG ICP where the meter was stopped and for 1,961 of 1,978 ICPs where meter pressure corrections were made.</p> <p>Consumption information was not submitted for 15 ICPs recorded as disconnected where consumption is recorded.</p> <p>1,978 meter pressure corrections occurred in March 2014. Genesis assumed the meter owner data was correct but the performance audit process has concluded that meter owners' meter pressure data may be incorrect by up to 10%. It is possible Genesis has changed correct meter pressures to incorrect meter pressures for up to 197 ICPs. I recommend Genesis checks the changes made in March 2014 to ensure meter pressure information is correct.</p>
TOU validation	3.6	Effective	Compliant	Robust processes are in place for TOU validation.
Energy consumption calculation	4	Effective	Compliant	There is no manual intervention in this process, and it was "proved" from end to end using a spreadsheet based calculation tool.
TOU estimation and correction	5.1	Effective	Not compliant	<p>Genesis's processes achieve compliance with the requirement to provide its "best estimate of consumption information".</p> <p>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 up until June 2013.</p>

Provision of retailer consumption information	5.2	Adequate	Not compliant	<p>The process for preparing consumption information files is compliant; however, there are some issues which have led to the submission of incorrect consumption information to the allocation agent. The specific issues are as follows:</p> <ul style="list-style-type: none"> <li>• Over recording of consumption due to incorrect altitude information.</li> <li>• Incorrect consumption information due to incorrect meter pressure.</li> <li>• Incorrect consumption information due to the use of the same temperature figure for each gas type.</li> <li>• Consumption information is not submitted for disconnected ICPs with consumption recorded.</li> <li>• Consumption information is not submitted in revision files for some ICPs where meters are stopped and for most ICPs where the meter pressure is found to be incorrect.</li> </ul>
Initial submission accuracy	5.3	Effective	Not compliant	<p>Genesis uses historic seasonal adjustment daily shape values, which are then “scaled” depending on temperature relevant to historic temperature. Although compliance has not been achieved, the process is robust.</p>
Forward estimates	5.4	Effective	Compliant	<p>Genesis uses historic seasonal adjustment daily shape values, which are then “scaled” depending on temperature relevant to historic temperature.</p>

Historic estimates	5.5	Adequate	Not compliant	Compliance was achieved for all of the GENG scenarios provided during the audit, but GEOL's HE processes are not compliant for some scenarios. The calculation includes a shape file value for the day of the meter read, but meter readings are deemed to have been obtained at 2400 on any given day so the calculation should use a shape value starting the next day. The GEOL processes are considered inadequate, however when considering the GENG and GEOL codes together I have concluded that controls designed to ensure compliance are not consistently applied, and are not fully effective, therefore I have applied a control rating of "adequate".
Proportion of HE	5.6	Effective	Compliant	Reporting has been provided as required.
Billed vs consumption comparison	5.7	Adequate	Compliant	<p>The variance between billed information and consumption information for GEOL is -3.12% over a three year period, which I consider to be too high. I recommend further analysis is conducted to identify the root cause of the variances.</p> <p>GENG variances are also high, but I am satisfied the variances are due to back billing events relating to periods outside the 12 month final allocation period between April 2011 and March 2013. The variance for the most recent two year period is 0.67%.</p>



## Persons Involved in This Audit

Auditor:

Steve Woods  
**Veritek Limited**

Genesis personnel assisting in this audit were.

Name	Title
Craig Young	Reconciliation Leader
Tara Ingram	Senior Reconciliation Systems Analyst
Marcel Green	Senior Data Reconciliation Analyst
Sarah Ainsley	Team Leader Invoice Management
David Whitfield	Technical Advisor Compliance
Theresa Bellamy	Gas New Connection CSR- GENE
Mike Allen	Gas New Connection CSR-GENE

Service providers assisting with processes within the audit scope:

Company	Processes
Wells Instrument & Electrical Services Ltd	Gathering and storing raw meter data and TOU downloads
Vector Limited	TOU downloads
GasCo North and South	TOU downloads
PowerCo	TOU downloads

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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 Gas Industry Company (GIC) in accordance with Rule 65 of the 2013 Amendment Version of the Gas (Downstream Reconciliation) Rules 2008.

### 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

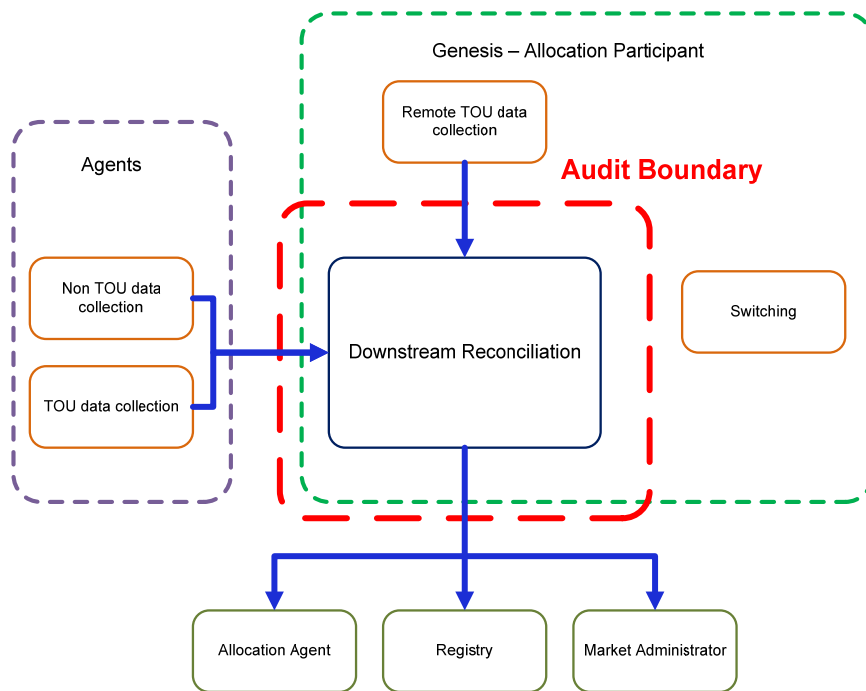
65.2.2 The systems and processes of the allocation agent or that allocation participant that have been put in place to enable compliance with these rules.

The scope of the audit includes three retailer codes; GENG (Genesis non TOU), GEOL (Energy Online non TOU) and GEND (Genesis TOU). The GEOL code uses the Orion system and the other two codes use the Gentrack system.

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 the GIC in June 2013.

The audit was carried out on August 12<sup>th</sup> and 13<sup>th</sup> at Genesis's offices in Hamilton.

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 Genesis 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 Genesis 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.<sup>1</sup>

Where calculations are performed by Genesis'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.

<sup>1</sup> 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

Genesis provided a copy of their previous audit conducted in 2010 by Veritek Ltd. 12 of the 17 areas evaluated were found to be compliant. Five 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 use of incorrect meter pressure information has led to the under submission of consumption information to the allocation agent of at least 8.9 TJ for a twelve month period.	26.2.1, & 28.2	2.2, & 5.2	Still existing
There are 231 allocation group 6 ICPs with consumption between 250GJ and 10TJ, that should be recorded as allocation group 4.	29	3.2	Still existing
Estimated TOU consumption information has been provided on a number of occasions from May 2009 to September 2010. Genesis'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	Estimated TOU consumption information is still provided
Genesis's initial submission accuracy did not meet the 15% requirement for all gas gates for the period October 2008 to September 2009.	37.2	5.3	The threshold has changed from 15% to 10% and non-compliance still exists
The process for preparing the GAS070 file does not reflect billed quantities that are contained in Gentrack for GEND (TOU information). This file is merely the GAS050 file with a one month offset. This process does not comply with the definition contained in rule 52.3.2, which requires that this information is "...sourced directly from retailer's financial records"	52	5.7	Resolved

### 1.3.2 Breach Allegations

Genesis has 2,562 alleged breaches recorded by the Market Administrator since November 2010. They are summarised as follows:

Nature of Breach	Rule	Quantity	Section in this Report
Switching Breaches		105	Not within audit scope
Submission of estimated TOU data	30.3, 31, 32 & 33	98	5.1
Initial vs final allocation variances more than the allowable threshold	37.2	2,334	5.3
Incorrect submission information	26.2.1, 28.2, 31.1	8	Various sections
Incorrect allocation groups	29	1	3.2
Incorrect GAS070 files	52	1	5.7
Late trading notification	39	15	

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

Breach Allegation	Rule(s)	Section in this report
<p>Some altitude discrepancies have led to the provision of incorrect consumption information to the allocation agent.</p> <p>Consumption information for eight ICPs with altitude figure errors of over 90m will be high by between 1.1% and 10%.</p>	28.2	2.1.2
The use of incorrect meter pressure information has led to the under submission of consumption information to the allocation agent.	26.2.1, & 28.2	2.2, & 5.2
GEOL uses the same temperature for each gas type rather than each gas gate. This approach will achieve compliance for some gas types where the relevant gas gates are all in the same region, but compliance will not be achieved for gas types where the gas gates are in different regions with different temperatures. Variations greater than approx. 3° Celsius will result in conversion errors greater than 1.1% as allowed by NZS 5259:2004.	26.2.1, & 28.2	2.3.1 & 5.2
There are 101 allocation group 6 ICPs with consumption between 250GJ and 10TJ, which should be recorded as allocation group 4.	29	3.2
Consumption information was not submitted for 15 ICPs recorded as disconnected where consumption is recorded.	26.2.1 & 26.3	3.4 & 5.2
Consumption information was not corrected for prior periods for one GENG ICP where the meter was stopped and for 1,961 of 1,978 ICPs where meter pressure corrections were made.	26.2.1 & 26.3	3.5 & 5.2
Estimated TOU consumption information has been provided on a number of occasions up until June 2013. Genesis'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 was addressed on a monthly basis until June 2013.	30.3	5.1
Genesis's initial submission accuracy did not meet the 10% requirement for all gas gates for the period August 2012 to July 2013,	37.2	5.3
GEOL's HE processes are not compliant for some scenarios. The calculation includes a shape file value for the day of the meter read, but meter readings are deemed to have been obtained at 2400 on any given day so the calculation should use a shape value starting the next day. The exception to this is when an ICP starts with GEOL or has a status change to ACTC, because the ICP is active with GEOL all day. Total consumption is not effected but the apportionment between months will be slightly incorrect, with more consumption in the current month and less in the next month	35.2	5.5



I have also made breach allegations against some distributors in relation to incorrect altitude figures on the registry. They are shown in the table below.

Breach Allegation	Participant Identifier	Rule(s)	Section in this report
Altitude figure incorrect for one ICP.	GNET	26.5.1 & 26.5.4	2.1.2
Altitude figures incorrect for seven ICPs.	POCO	26.5.1 & 26.5.4	2.1.2

## 1.4 Provision of Information to the Auditor (Rule 69)

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

Information was provided by Genesis 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 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. The following response was received.

Party	Response	Comments provided	Attached as appendix
Contact Energy	Yes	Yes	No

The comments received were considered in accordance with rule 71.1, prior to preparing the final audit report. The following changes were made to the report after considering comments:

- In Section 1.1, I have clarified the systems used by the different retailer codes.
- In the “Summary of Report Findings” section, I have clarified the process for arriving at a control rating of “adequate” for the historic estimate processes.

- In Sections 2.3.1 and 6, I recommend GEOL checks the accuracy of network pressure information used in their Joule-Thomson calculations.
- In Section 5.7, I have provided further information regarding the variation between billed and consumption information for GEOL. I have repeated the recommendation from the draft report that further analysis is conducted.

## 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. Compliance is confirmed with this rule.

## 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, 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

The process was examined for the connection and activation of new ICPs. GEOL does not offer gas new connections, only GENE deals with new connections. These are managed via the network portal (POCO or Vector’s Seibel). Progress notifications are automatically generated to GENE, who then action and load these connection details and registry details into Gentrack.

The billing team notify the new connection team of any sites that have been livened but with no metering recorded. These are investigated. Currently there is a backlog of meter dockets to be loaded. If the meter docket is missing, the site could be live but not at a status of ACTC. There is no management reporting to capture how many have missing meter dockets. Consumption information will not be provided to the allocation agent until the registry is updated, which means that for some ICPs where the status has changed to ACTC, consumption information will not be provided to the allocation agent for the initial allocation.

The event detail report was analysed in relation to status changes on the registry for March and April 2014.

Status	Total ICPs	Update greater than 5 days	Update greater than 20 days	Average update days
ACTC	2270	1,064	409	11.7
ACTV	2,082	407	84	5.4
INACT	923	310	90	13.5
INACP	24	18	7	89.3

2,082 ICPs were changed to ACTV during the same period, and 84 (5.4%) of these had registry update dates of more than 20 business days. Forward estimates would have been calculated for these until the registry was updated.

Meter pressure is manually entered from the meter docket. I found some evidence of data entry errors of information in some instances and some where the meter owner was incorrect, additionally some have switched in with incorrect meter pressures from the previous retailer. This is not being regularly validated. This is discussed further in Section 2.2 "Metering Set-up Information".

## 2.1.2 Altitude Information

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

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

1. The maximum permissible error is  $\pm 1.0\%$  where the meter pressure is below 100kPa and  $\pm 0.5\%$  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."

Genesis provided a registry list file and a random sample of ICPs per distributor was checked against "google earth" data. The sample was selected by firstly looking for obvious outliers and then increasing the sample size through random selection. The "google earth" data is based on the "Shuttle Radar Topography Mission" (SRTM) results and a number of recent studies indicate an accuracy of  $\pm 10\text{m}$  for altitude. An evaluation against this data is considered an appropriate test for "reasonableness". Altitude figures that are within approximately 90m of the actual altitude will ensure an accuracy of  $\pm 1.0\%$ . 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  $\pm 10\text{m}$ , therefore, to allow for this margin, I have checked that the registry data is within 20m of "google earth" data.

As shown in the table below the altitude data on the registry for non TOU ICPs appears to be very accurate. NGCD has six ICPs where the altitude figure differs by more than 20m. GNET has two with a 20m difference and one of these has a difference greater than 90m.

Distributor	Total ICPs	ICPs checked	Quantity within 20m	Quantity within 90m
UNLG	22,862	51	51	51
NGCD	42,393	69	63	69
POCO	45,720	53	53	53
GNET	3,521	36	34	35
<b>Total</b>	<b>114,496</b>	<b>209</b>	<b>201</b>	<b>208</b>

A further evaluation was conducted of ICPs where the altitude figure was zero on the registry. This data appears to be less accurate than when a figure other than zero is populated. The results are shown in the table below. There are 54 of 78 ICPs with an altitude difference of more than 20m and seven ICPs with an altitude difference of more than 90m.

Distributor	Total ICPs	ICPs with altitude of zero	ICPs checked	Quantity within 20m	Quantity within 90m
UNLG	22,862	271	40	10	40
NGCD	42,094	0	0	0	0
POCO	45,720	163	36	12	29
GNET	3,495	2	2	2	2
<b>Total</b>	<b>114,171</b>	<b>436</b>	<b>78</b>	<b>24</b>	<b>71</b>

I have considered whether distributors have potentially breached any rules by populating the registry with inaccurate altitude information. Distributors have responsibility for populating the registry with altitude figures<sup>2</sup> and for maintaining the accuracy of this information. Distributors must also comply with rule 26.5 of the Gas (Downstream Reconciliation) Rules 2008, which requires them to ensure that any information on the registry is accurate and complete and supports compliance with NZS

<sup>2</sup> Gas (Switching Arrangements) Rules 2008, Part A, ICP parameters maintained by Distributors and rules 41 and 58.

5259. There are eight ICPs where the incorrect altitude has resulted in consumption information being high, and outside the threshold allowed by NZS 5259, by between 1.1% and 10%. I have alleged a breach of rules 26.5.1 and 26.5.4 by GNET (1 ICP) and POCO (7 ICPs). Genesis is not in breach of the same rules but is in breach of rule 28.2, which requires retailers to comply with NZS 5259 when converting volume to energy.

Genesis is required to correct the altitude factors in their systems and they must ensure corrections are made for at least those ICPs where the altitude difference is greater than 90m. These corrections are required to flow through to the relevant revision files.

I recommend that Genesis liaise with distributors to determine whether many of the ICPs with an altitude of zero should have more accurate figures populated.

I checked the altitude figures for a selection of 30 TOU ICPs and they were all within 20m.

## 2.2 Metering Set-up Information

The data in Gentrack and Orion was compared to that of meter owners for all ICPs, to check the accuracy of meter pressure, dials and multipliers. The following discrepancies were found:

Meter Owner	Total ICPs	Meter Pressure Discrepancies	Meter Dial Discrepancies
NGC	84,956	2,097	275
Powerco	31,746	142	86
Gas Net	4,169	34	47
Nova	399	23	7
<b>Total Discrepancies</b>		<b>2,296</b>	<b>415</b>

I obtained meter docket or other records for 58 ICPs where discrepancies were found. The meter owner's data was incorrect for 3 ICPs and correct for 55 ICPs. Genesis's data was incorrect for 55 ICPs and correct for 3 ICPs. This has caused consumption information submitted to the allocation agent to be incorrect by more than  $\pm 1.1\%$  for 31 ICPs. Whilst this is a small sample size, it is sufficient to draw the following conclusions:

- There is no "database of record" for meter pressure.
- Genesis will need to confirm meter pressure in every instance where there is a discrepancy, either by checking meter dockets or by conducting field checks.
- Genesis needs to conduct a monthly check of meter pressure to identify and resolve discrepancies.

Meter Owner	Total Records Checked	Meter Owner Data Incorrect	Genesis Data Incorrect
NGC	22	2	20
Powerco	9	1	8
Gas Net	24	0	24
Nova	3	0	3
<b>Total Discrepancies</b>		<b>3</b>	<b>55</b>

The invoices for a sample of ICPs were checked where meter dial discrepancies exist and there does not appear to have been an effect on consumption information. The meter reading processes are designed to identify meter dial discrepancies that could affect meter reading accuracy. If the meter reader's hand held device is expecting more digits than the number of dials, then the reading is entered as normal and notification is made in the "readers notes" field for investigation. If the hand held is expecting fewer digits than the number of dials, then the reading is entered into the "readers notes" field and once again an investigation is conducted. Although this "safety net" appears to be robust, I recommend that meter dials validation be conducted on a monthly basis with meter owners.

The use of incorrect meter pressure information has led to the submission of incorrect consumption information to the allocation agent. I allege a breach of rules 26.2.1 & 28.2.

## 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.

Genesis has chosen option (c) and 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. GENG has advised that the source of the data is a file from NIWA that was provided in approximately 2007. Genesis believes the temperature data contained in the file may be an average of 300mm below and 300mm above ground level. I recommend that Genesis refresh this data to ensure it is accurate.

GEOL temperature data is sourced from GENG data in Gentrack. GEOL uses the same temperature for each gas type rather than each gas gate. These figures are based on the average of the relevant gas gates per gas type. This approach will achieve compliance for some gas types where the relevant gas gates are all in the same region, but compliance will not be achieved for gas types where the gas gates are in different regions with different temperatures. Gas type X covers South Auckland to Whangarei and NIWA's National Climate Database shows temperature differences on the same day and time of 4° Celsius. Gas type T covers Belmont to Hastings and these temperatures can vary by 6° Celsius. Variations greater than approx. 3° Celsius will result in conversion errors greater than 1.1% as allowed by NZS 5259:2004.

I recommend the temperature data is refreshed and applied per gas gate rather than per gas type.

GEOL adjusts for the Joule-Thomson effect and the calculation is correct. The accuracy of network pressure populated in the registry is unknown. I recommend GEOL checks these figures to ensure they are accurate.

GENG does not apply the Joule-Thomson effect adjustment because network pressure information on the registry is not accurate. 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 0.5° 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-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 NZS5259.

I recommend GENG applies Joule-Thomson adjustment once network pressures are confirmed as correct.

### 2.3.2 Calorific Values

Gas composition data is sourced from the Open Access Transmission Information System (OATIS) and is loaded into Gentrack. The accuracy of the Gentrack information was checked by comparing an OATIS file with the contents of Gentrack and Orion for some recent months. In all cases, the information was correct.

## 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 GEOL securely archives data for a period in excess of 30 months. Read files for GENE were available back to May 2013. Some files are available further back but it appears files aren't necessarily being archived beyond 14 months. The raw data is held for a period in excess of 30 months by the meter reading agents.

Some data provided by Genesis's meter reading contractor was checked and it was found that the readings matched the data in Gentrack. This proves the end-to-end process. This data is transmitted via FTP, which ensures its security and integrity.

### 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 will be installed and the installation will be assigned to allocation group 4.

Genesis conducts analysis of consumption on a periodic basis to ensure ICPs are in the correct allocation groups. The most recent report was reviewed, which contained 101 allocation group 6 ICPs with consumption between 250GJ and 10TJ. 69 of these ICPs have consumption over 300GJ and nine have consumption over 1 TJ. Compliance has not been achieved with rule 29.



### 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.

Genesis provided a list of ICPs not read in the previous 12 months for GENG and GEOL. GENG list contained 523 and GEOL contained ICPs 28 ICPs. 13 records were checked and found seven had reads recorded, five had been decommissioned and only one had genuine access issues. The report appears to be over recording these instances. I recommend the selection criteria be reviewed to ensure the correct ICPs are captured. Genesis has robust processes in place including letters and phone calls to customers to obtain meter readings and resolve on-going access issues. The current process achieves compliance.

Genesis provided a copy of the GAS080 reports for GENG and GEOL for March 2014.

The table below shows the GAS080 results for March 2014.

Target	Reading Percentage (GAS080)	Reading Percentage (GAS080)
	GEOL	GENG
Rolling 4 months (target 90%)	98.85%	98.54%
12 months (target 100%)	99.24%	99.50%

Genesis 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 reading validation occurs at multiple levels.

At source, the handheld data input devices perform a localised validation, to ensure that the reading is within expected high-low parameters. These parameters are set as a "high/low" limit, based on an agreed setting with Genesis.

Readings that fail this initial validation must be re-entered, and if the second reading is the same, it will be accepted; if it is different (indicating an error with the first reading) then it must be re-entered. Once the same reading has been entered twice consecutively, it will be accepted.

The second level of validation occurs when the data reaches Genesis. This validation looks for obvious file errors or file corruption and invalid metering information.

Readings are then subject to “billing validation”. Each bill produced is subject to a number of individual validation checks. Bills that fail validation end up on an “exceptions” list and any issues are investigated and resolved prior to sending the bill. These validation checks include:

- Short read period
- Long read period
- High dollar amount
- Zero consumption
- Negative consumption
- Consumption on inactive and vacant premises. The registry status checked in these instances and is updated as required.

Meter readings are not edited during this process. If a reading fails validation and an incorrect meter reading is suspected then a check reading will be performed.

A final level of consumption validation occurs for GENG during “submission validation” in the “consumption validation manager” tool. Each ICP is allocated to a “customer load profile” group and readings are either accepted or rejected based on whether they fit within an expected consumption band. Those readings that fail validation are recalculated to fit the expected profile. Readings that fail validation at this point have already been “billed” so notification is made back to the billing team when recalculation has occurred.

Genesis checks for consumption at ICPs where their records indicate the ICP is disconnected or vacant. The most recent reporting shows 15 disconnected ICPs and 10 vacant ICPs with consumption. Consumption information for vacant ICPs is submitted to the allocation agent. I checked the ICP level GAS040 file to confirm this. Consumption information for ICPs disconnected for non-payment is not submitted. The Market Submission system does not have the “NPAY” field updated from Gentrack so estimates of zero are generated. This is correct for most cases but not for the 15 ICPs where meter readings indicate consumption is present. The total consumption for the 15 ICPs is 147GJ. Compliance is not achieved with rules 26.2.1 and 26.3. The registry has these ICPs recorded as ACTC which appears correct, given that consumption is present.

### 3.5 Non TOU Error Correction

The process for error correction was examined to ensure that consumption information for prior consumption periods is included in the revision process and provided to the allocation agent.

Error correction was examined by a “walk through” of the process and by examining five examples where meters had stopped recording and five examples where the meter pressure was corrected.

The normal process for stopped meter correction is to remove the meter from Gentrack at an estimated reading, higher than that recorded on the register, to cater for the consumption during the period the meter was not recording. Previous incorrect meter reads are invalidated to ensure the consumption is apportioned to the correct months for revision purposes. This process was followed for four of the five examples, but for one example there was no correction undertaken. This does not

achieve compliance with rules 26.2.1 and 26.3. All five examples were for GENG, there were no examples to examine for GEOL.

I examined five examples where the meter pressure was corrected and in all cases, there was no correction for prior periods. This is a breach of rules 26.2.1 and 26.3. I recommend a process is established to ensure meter pressure correction results in correct consumption information for prior periods. The policy is to only correct for prior periods if the consumption is greater than 500 kWh per month. In all other cases, the correction occurs from the date the update occurs. In March 2014, Genesis corrected meter pressure for 1,978 ICPs, using the meter owner's meter pressure as the correct figure. 17 of 1,978 ICPs had correction conducted for prior periods. As recorded in Section 2.2, the meter owner's meter pressure figures are not considered accurate enough to use without additional checks. The performance audits to date found the meter owner's data was incorrect for 15 of 153 discrepancies checked. This is a small sample size but it indicates an error rate of up to 10%. It is possible Genesis has changed correct meter pressures to incorrect meter pressures for up to 197 ICPs. I recommend Genesis checks the changes made in March 2014 to ensure meter pressure information is correct.

As mentioned in Section 3.4, Consumption information for ICPs disconnected for non-payment is not submitted to the allocation agent.

### 3.6 TOU Validation

Genesis's TOU data is collected using the Master Link system. Manual downloads are conducted if there is an equipment failure and data cannot be obtained automatically. Clock synchronisation occurs in the field and is checked as part of the periodic accuracy checks. Event log and alarm log reporting is not reviewed as part of the validation process. It is recommended that this is included as a validation step.

Once the data has been collected it is then imported into an Access database that is used to create the GAS050 file for submission to the allocation agent. Prior to the preparation of this file, validation occurs visually in a spreadsheet. This validation includes a check against previous data and a check of the consumption profile in a graphical format.

There is an additional check against the billed values, which are derived from meter register readings.

## 4. Energy Consumption Calculation (Rule 28.2)

To evaluate this calculation a spreadsheet was prepared which converts volume between meter readings to volume at standard conditions and then to energy consumption. The relevant information for several non TOU and TOU ICPs was entered into the spreadsheet and the resulting energy value was compared to that calculated by Gentrack and Orion. This comparison confirmed the accuracy of the Gentrack calculation and confirmed compliance with NZS 5259.

Compressibility adjustment occurs for all GENG ICPs where the meter pressure is above 50 kPa. GEOL ICPs all have a compressibility factor of 1. There are no GEOL ICPs with a pressure above 50 kPa. I checked that TOU ICPs had the appropriate adjustment for altitude where the corrector type was "TG" (adjustment for temperature and gauge pressure). Compliance is confirmed.

## 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, Genesis uses mechanical readings or the consumption and profile from similar time periods to create estimates, which are appropriately identified.

Nine examples were examined. Genesis's processes achieve compliance with the requirement to provide its "best estimate of consumption information".

Up until June 2013, the existence of any estimated TOU consumption information was 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)

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

A GAS040 file for a recent month was examined and compared to the data in Genesis's systems at ICP level; the totals matched which confirms compliance. This also proves that Genesis's consumption information provided to the Allocation agent is calculated at ICP level and then aggregated.

As noted in previous sections, there are some issues which have led to the submission of incorrect consumption information to the allocation agent. The specific issues are as follows:

- Over recording of consumption due to incorrect altitude information.
- Incorrect consumption information due to incorrect meter pressure.
- Incorrect consumption information due to the use of the same temperature figure for each gas type.
- Consumption information is not submitted or disconnected ICPs with consumption recorded.
- Consumption information is not submitted in revision files for some ICPs where meters are stopped and for most ICPs where the meter pressure is found to be incorrect.

### 5.3 Initial Submission Accuracy (Rule 37.2)

Final allocations are complete for the months October 2008 to September 2009. 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 for the months analysed is 10%.

GENG did not meet this requirement for a number of gas gates during the 12 month period shown. The results are summarised in the table below.

Month	Total Gas Gates	Number Within 10%	% Compliant	Within +/-10% or < 200 GJ	% Compliant or immaterial
August 2012	83	63	76%	78	94%
September 2012	83	60	72%	75	90%
October 2012	83	31	37%	65	78%
November 2012	83	31	37%	66	80%
December 2012	83	43	52%	73	88%
January 2013	83	52	63%	79	95%
February 2013	83	48	58%	80	96%
March 2013	83	41	49%	77	93%
April 2013	83	45	54%	75	90%
May 2013	83	22	27%	61	74%
June 2013	82	35	43%	61	74%
July 2013	81	53	65%	73	90%

The following table for GENG shows the difference between consumption information for initial and final submissions at an aggregated level for all gas gates.

Month	Initial Submission All Gas Gates (GJ)	Final Submission All Gas Gates (GJ)	Percentage Variation
August 2012	467,499	459,754	1.7%
September 2012	405,570	381,426	6.3%
October 2012	345,154	312,447	10.5%
November 2012	281,428	250,120	12.5%
December 2012	189,507	182,472	3.9%
January 2013	169,709	161,672	5.0%
February 2013	154,517	152,905	1.1%
March 2013	180,509	178,970	0.9%
April 2013	213,965	227,285	-5.9%
May 2013	335,897	391,967	-14.3%
June 2013	424,659	507,073	-16.3%
July 2013	499,521	534,505	-6.5%

GEOL did not meet this requirement for a number of gas gates during the 12 month period shown. The results are summarised in the table below.

Month	Total Gas Gates	Number Within 10%	% Compliant	Within +/-10% or < 200 GJ	% Compliant or immaterial
August 2012	24	13	54%	24	100%
September 2012	26	12	46%	26	100%
October 2012	26	15	58%	26	100%
November 2012	26	14	54%	26	100%
December 2012	27	3	11%	27	100%
January 2013	27	10	37%	27	100%
February 2013	29	12	41%	29	100%
March 2013	29	16	55%	29	100%
April 2013	28	6	21%	28	100%
May 2013	27	1	4%	25	93%
June 2013	30	6	20%	28	93%
July 2013	29	17	59%	29	100%

The following table for GEOL shows the difference between consumption information for initial and final submissions at an aggregated level for all gas gates.

Month	Initial Submission All Gas Gates (GJ)	Final Submission All Gas Gates (GJ)	Percentage Variation
August 2012	3,341	3,349	-0.26%
September 2012	2,947	2,875	2.53%
October 2012	2,762	2,496	10.67%
November 2012	2,303	2,121	8.58%
December 2012	2,056	1,613	27.46%
January 2013	1,663	1,493	11.42%
February 2013	1,502	1,329	13.02%
March 2013	1,693	1,623	4.33%
April 2013	1,838	2,158	-14.82%
May 2013	2,667	3,825	-30.27%
June 2013	4,059	5,081	-20.11%
July 2013	5,363	5,582	-3.94%

The tables above show that the consumption information submitted to the allocation agent for the initial submission was over estimated from the period September to March. The opposite scenario exists for the months April to August, where the consumption information submitted to the allocation agent for the final allocation is higher than that submitted for the initial allocation.

## 5.4 Forward Estimates (Rules 34 & 36)

The rules do not prescribe how forward estimates are to be calculated. GENG uses an “estimated seasonal profile model (ESPM) for forward estimation. In summary this model uses historic seasonal adjustment daily shape values which are then “scaled” depending on temperature relevant to historic temperature. GEOL uses the historic daily consumption as the basis for forward estimates.

## 5.5 Historic Estimates (Rules 34 & 35)

To assist with determining compliance of the historic estimate processes, Genesis was supplied with a list of scenarios. For each scenario, a manual calculation was performed using the relevant seasonal adjustment shape file, and this was compared to the calculation performed in Genesis’s system. This test also proves that the correct shape file is used in each case.

<b>GENG HE Scenarios</b>			
<b>Test</b>	<b>Scenario</b>	<b>Test Expectation</b>	<b>Result</b>
A	ICPs become inactive part way through a month.	Consumption is only calculated for the Active portion of the month.	Compliant
B	ICPs become active then inactive within a month.	Consumption is only calculated for the Active portion of the month.	Compliant
C	ICPs become inactive, then active, then inactive again within a month.	Consumption is only calculated for the Active portion of the month.	Compliant
D	ICPs start on the 1 <sup>st</sup> day of a month.	Consumption is calculated to include the 1 <sup>st</sup> day of responsibility.	Compliant
E	ICPs end on the last day of the month.	Consumption is calculated to include the last day of responsibility.	Compliant
F	ICPs start part way through a month.	Consumption is calculated to include the 1 <sup>st</sup> day of responsibility.	Compliant
G	ICPs end part way through a month.	Consumption is calculated to include the last day of responsibility.	Compliant
H	ICP’s are lost and won back in a month.	Consumption is calculated for each day of responsibility.	Compliant
I	ICPs start on 1 <sup>st</sup> and end on last day of month.	Consumption is calculated for each day of responsibility.	Compliant
J	Rollover reads	Consumption is calculated correctly in the instance of meter rollovers.	Compliant

GENG’s HE processes are compliant for all scenarios.



<b>GEOL HE Scenarios</b>			
<b>Test</b>	<b>Scenario</b>	<b>Test Expectation</b>	<b>Result</b>
A	ICPs become inactive part way through a month.	Consumption is only calculated for the Active portion of the month.	Not compliant
B	ICPs become active then inactive within a month.	Consumption is only calculated for the Active portion of the month.	No examples
C	ICPs become inactive, then active, then inactive again within a month.	Consumption is only calculated for the Active portion of the month.	No examples
D	ICPs start on the 1 <sup>st</sup> day of a month.	Consumption is calculated to include the 1 <sup>st</sup> day of responsibility.	Compliant
E	ICPs end on the last day of the month.	Consumption is calculated to include the last day of responsibility.	Not compliant
F	ICPs start part way through a month.	Consumption is calculated to include the 1 <sup>st</sup> day of responsibility.	Compliant
G	ICPs end part way through a month.	Consumption is calculated to include the last day of responsibility.	Not compliant
H	ICP's are lost and won back in a month.	Consumption is calculated for each day of responsibility.	No examples
I	ICPs start on 1 <sup>st</sup> and end on last day of month.	Consumption is calculated for each day of responsibility.	No examples
J	Rollover reads	Consumption is calculated correctly in the instance of meter rollovers.	Compliant

GEOL's HE processes are not compliant for some scenarios. The calculation includes a shape file value for the day of the meter read, but meter readings are deemed to have been obtained at 2400 on any given day so the calculation should use a shape value starting the next day. The exception to this is when an ICP starts with GEOL or has a status change to ACTC, because the ICP is active with GEOL all day. Total consumption is not effected but the apportionment between months will be slightly incorrect, with more consumption in the current month and less in the next month. This does not achieve compliance with rule 35.2.

## 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. The relevant files were examined and compliance is confirmed.

## 5.7 Billed vs Consumption Comparison (Rule 52)

The content of the GAS070 files was proved for Genesis by selecting some gas gates and checking the bills in Gentrack and Orion for all ICPs at that gate, against the total in the GAS070 files. This confirmed the accuracy of the data.

The table below shows a comparison between quantities billed and consumption information submitted to the allocation agent for a three year period. The consumption information is lower than quantities billed for GENG by 1.44% and for GEOL by 3.12%. I considered these differences to be too high and not able to be explained by the fact that the revision and normalisation processes for billed data are different to those for consumption data. Further analysis was conducted for GENG of all large differences per gas gate per month over the entire period. 25 gas gates were examined down to ICP level and a number of examples were found where billing corrections had occurred for previous periods, prior to April 2011, so the consumption information appears in the GAS070 file in the month of the bill but does not all appear in GAS040 files. There was an ICP at PLN24201 in May 2011 where approx. 30TJ was back billed to 2005. Another ICP at WST03610 had 10TJ back billed in March 2012 to 2008. These two ICPs alone reduce the discrepancy from 1.44% to 1.10%. I am satisfied the variances are due to back billing events relating to periods outside the 12 month final allocation period between April 2011 and March 2013. The variance for the most recent two year period is 0.67%.

<b>GENG Billed vs Consumption</b>				
<b>Year ending</b>	<b>Billed GJ</b>	<b>Consumption GJ</b>	<b>Difference GJ</b>	<b>% Difference</b>
Mar-12	3,968,921	3,853,113	-115,807	-2.92%
Mar-13	3,853,763	3,798,669	-55,094	-1.43%
Mar-14	3,800,938	3,804,845	3,907	0.10%
<b>Total</b>	<b>11,623,621</b>	<b>11,456,627</b>	<b>-166,994</b>	<b>-1.44%</b>

The variance for GEND is 0.06% which is considered acceptable.

<b>GEND Billed vs Consumption</b>				
<b>Year ending</b>	<b>Billed GJ</b>	<b>Consumption GJ</b>	<b>Difference GJ</b>	<b>% Difference</b>
Mar-12	1,279,384	1,298,825	19,440	1.52%
Mar-13	1,346,721	1,347,696	975	0.07%
Mar-14	1,781,765	1,763,955	-17,810	-1.00%
<b>Total</b>	<b>4,407,870</b>	<b>4,410,475</b>	<b>2,605</b>	<b>0.06%</b>

The variance for GEOL is -3.12% which I consider to be too high. In the draft report, I recommended further analysis be conducted by GEOL to identify the root cause of the variances. GEOL conducted some further analysis and recorded some variances on a month to month basis caused by backdated billing events; however these variances would not cause a 3.12% error over a three year period. The only billing issues that can cause variances are those that occurred for periods prior to April 2011. There were no specific gas gates with high variation percentages; it appears to be small variances over most gas gates. The long period (3 years) and the fact that the GAR080 includes the one month offset should "smooth" most issues. I recommend further analysis is conducted into these variances.

<b>GEOL Billed vs Consumption</b>				
<b>Year ending</b>	<b>Billed GJ</b>	<b>Consumption GJ</b>	<b>Difference GJ</b>	<b>% Difference</b>
Mar-12	15,359	14,528	-830	-5.72%
Mar-13	28,812	27,892	-920	-3.19%
Mar-14	42,095	41,153	-942	-2.24%
<b>Total</b>	<b>86,266</b>	<b>83,573</b>	<b>2,693</b>	<b>-3.12%</b>

## 6. Recommendations

As a result of this performance audit the following recommendations are made in relation to Genesis:

- 436 ICPs have “zero” populated in the registry altitude field. I recommend that Genesis liaise with distributors in relation to this matter to determine whether many of these ICPs should have more accurate figures populated.
- 2,296 meter pressure discrepancies were found between Genesis’s and meter owners’ records. Meter dockets were examined for 58 ICPs and it was found that for 3 of the 58, the meter pressure originally notified by the meter owner was incorrect. I recommend that monthly validation occurs for meter pressure and dials and that meter dockets be checked for all discrepancies prior to any adjustment.
- 1,978 meter pressure corrections occurred in March 2014. Genesis assumed the meter owner data was correct but the performance audit process has concluded that meter owners’ meter pressure data may be incorrect by up to 10%. It is possible Genesis has changed correct meter pressures to incorrect meter pressures for up to 197 ICPs. I recommend Genesis checks the changes made in March 2014 to ensure meter pressure information is correct.
- GENG uses temperature data that was supplied by NIWA in approximately 2007. This data seems to be different to more recent data. I recommend that GENG refreshes this data and records its source and the date it was loaded into Gentrack. I recommend GEOL applies temperature data per gas gate rather than per gas type.
- Joule-Thomson adjustment does not occur for GENG. I recommend GENG considers adjusting for the Joule-Thomson effect once network pressure is confirmed as correct, in line with the GIC recommendations. Joule-Thomson adjustment does occur for GEOL. The accuracy of network pressure populated in the registry is unknown. I recommend GEOL checks these figures to ensure they are accurate.
- The variance between billed information and consumption information for GEOL is -3.12% over a three year period, which I consider to be too high. I recommend further analysis is conducted to identify the root cause of the variances.

## Appendix 1 – Control Rating Definitions

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