Gas Downstream Reconciliation Performance Audit Final Report

For

Nova Energy Limited

Prepared by Tara Gannon & Steve Woods – Veritek Ltd

Date of Audit: 22/02/17

Date Audit Report Complete: 20/05/17

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 Nova Energy Limited (Nova) 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 Nova's control environment is "effective" for 13 of the areas evaluated and "adequate" for the other six. There were no areas that were considered "not adequate".

13 of the 19 areas evaluated were found to be compliant. Seven breach allegations are made in relation to the six remaining areas. They are summarised as follows:

- One GAS050 report submitted to the allocation agent for December 2015 was not retained, and no audit trail was available.
- The registry was populated late for two new connections resulting in submission information not being provided for the initial allocation.
- TOU metering has not consistently been installed within three months of becoming aware of actual or expected rolling consumption over 10,000GJ per annum. I note that in some cases there have been 7-10 month delays between Nova requesting upgrades to TOU from meter owners, and the metering being installed.
- 82 ICPs appear likely to have an incorrect allocation group currently recorded.
- The GAS080 report included incorrect ICP counts and reading percentages, as some ICPs not continuously supplied with gas were included in the report.
- The initial submission accuracy did not meet the required accuracy percentage for some gas gates for the period August 2014 to November 2015.
- The GAS070 report should reflect the quantities in GJ billed in the previous invoice month. Invoices and credit notes are selected for inclusion based on their billing period, which can be different to the invoice month. Operators can select old billing periods when reversing invoices.

Summary of Report Findings

Issue	Section	Control Rating (Refer to Appendix 1 for definitions)	Compliance Rating	Comments
Transmission methodology and audit trails	1.5	Adequate	Not compliant	One GAS050 report submitted to the allocation agent for December 2015 was not retained, and no audit trail was available. For all other reports reviewed, reports were appropriately retained.
ICP set up information	2.1	Effective	Not compliant	The registry was populated late for two new connections resulting in submission information not being provided for the initial allocation.
Metering set up information	2.2	Adequate	Compliant	Robust validation processes are in place for all metering fields. There are sometimes delays in updating Orion where discrepancies are identified. I recommend Nova evaluates all meter pressure changes conducted in the previous 12 months to determine whether the meter pressure change has been applied from the correct date.
Billing factors	2.3	Effective	Compliant	Nova applies ground temperatures by region based on NIWA's 30 year monthly averages. Nova has used regression analysis to estimate the monthly ground temperature based on the relationship between air and ground temperature in other regions. The Joule-Thomson effect is applied.
Archiving of reading data	3.1	Effective	Compliant	Effective practices are in place for archiving of register reading data.

Issue	Section	Control Rating (Refer to Appendix 1 for definitions)	Compliance Rating	Comments
Meter interrogation requirements	3.2	Adequate	Not compliant	82 ICPs appear likely to have an incorrect allocation group currently recorded. TOU metering has not consistently been installed within three months of Nova becoming aware of actual or expected rolling consumption over 10,000GJ per annum. I note that in some cases there have been 7-10 month delays between Nova requesting upgrades to TOU from meter owners, and the metering being installed.
Meter reading requirements	3.3	Effective	Not compliant	Meter reading attainment processes are robust. The GAS080 report included incorrect ICP counts and reading percentages, as some ICPs not continuously supplied with gas were included in the report.
Non TOU validation	3.4	Effective	Compliant	A robust validation process is in place before and after invoicing.
Non TOU error correction	3.5	Adequate	Compliant	Corrected data automatically flows through to the relevant revision files for stopped meters and altitude changes. Sometimes delays exist between identification of meter pressure discrepancies and the resolution of them in the database.
TOU validation	3.6	Effective	Compliant	Robust TOU validation processes are in place.

Issue	Section	Control Rating (Refer to Appendix 1 for definitions)	Compliance Rating	Comments
Energy consumption calculation	4	Effective	Compliant	**TOU** The process to convert TOU consumption to energy is compliant. **Non TOU** Orion system is calculating pressure, altitude and temperature factors correctly for non TOU ICPs. Compressibility correction occurs for ICPs with meter pressure over 50kPa. Nova has established compressibility factor bands. For pressures 220kPa and over, under some circumstances the Orion factors could be over the maximum permissible error under NZS 5259:2015.
TOU estimation and correction	5.1	Effective	Compliant	Nova's processes achieve compliance with the requirement to provide its "best estimate of consumption information".
Provision of retailer consumption information	5.2	Adequate	Compliant	The process for preparing consumption information files is compliant.
Initial submission accuracy	5.3	Effective	Not compliant	Nova uses historic seasonal adjustment daily shape values to improve the accuracy of forward estimates. Although compliance has not been achieved, the process is robust.

Issue	Section	Control Rating (Refer to Appendix 1 for definitions)	Compliance Rating	Comments
Forward estimates	5.4	Effective	Compliant	Nova uses historic seasonal adjustment daily shape values to improve the accuracy of forward estimates.
Historic estimates	5.5	Effective	Compliant	Compliance was achieved for all of the scenarios provided during the audit.
Proportion of HE	5.6	Effective	Compliant	Reporting has been provided as required.
Billed vs consumption comparison	5.7	Adequate	Not compliant	Billed volumes have consistently been 2-3% higher than submitted volumes since December 2015. This appears to be due to the report being based on billing period rather than invoice month, and Orion allowing reversals (or credit notes) to be entered into old billing periods. Nova has re-run and re-submitted the GAS070 reports for the past 22 months.
Gas Trading Notifications	5.8	Effective	Compliant	Processes are in place to ensure that trading notifications are issued where required.

Persons Involved in This Audit

Auditors:

Tara Gannon
Veritek Limited

Steve Woods
Veritek Limited

Nova personnel assisting in this audit were:

Name	Title
Natasha Dauphin	Retail Operations Manager
Neill Deppe	Team Leader Reconciliation
Somesh Pattekar	Energy Analyst
Vibhu Sharma	Energy Analyst

Service providers assisting with processes within the audit scope:

Company	Processes
Meter Reading Services Limited	Gathering and storing raw meter data
PowerCo	TOU downloads
Vector Limited	TOU downloads
Wells Instrument & Electrical Services Ltd	Gathering and storing raw meter data and 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 Gas (Downstream Reconciliation) Rules 2008 effective from 14 September 2015. 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

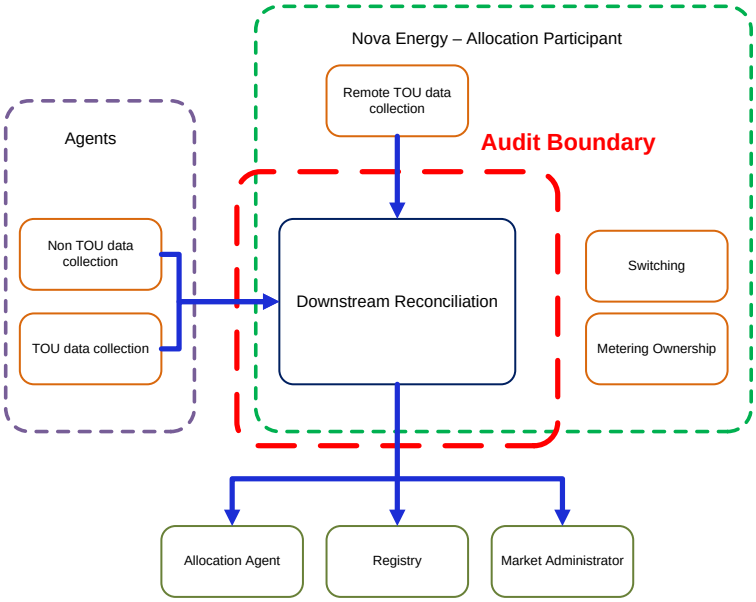
65.2.2 The systems and processes of the allocation agent or that allocation participant that have been put in place to enable compliance with these rules.

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 locations and dates the audit was carried out were as follows:

- Whakatane – 21/02/17
- Wellington – 22/02/17
- Auckland – 23/02/17

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

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

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

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

1.3 General Compliance

1.3.1 Summary of Previous Audit

Nova provided a copy of their previous audit conducted in 2014 by Veritek Ltd. Eight of the seventeen areas evaluated were found to be compliant. Nine 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
An altitude factor of "1" is used for 1,354 ICPs resulting in errors greater than those allowed by NZS 5259:2004	26.2.1, & 28.2	2.1.2	Cleared.
The use of incorrect meter pressure information has led to the submission of incorrect consumption information to the allocation agent for at least 14 ICPs.	26.2.1, & 28.2	2.2	Cleared
Nova 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. 3º Celsius will result in conversion errors greater than 1.1% as allowed by NZS 5259:2004.	26.2.1, & 28.2	2.3.1	Cleared. Nova now applies ground temperatures by region based on NIWA's 30 year monthly averages.
There are at least 32 ICPs with the incorrect allocation group recorded in the registry.	29	3.2	Still existing. 82 ICPs appear likely to have an incorrect allocation group currently recorded on the Registry. Allocation group checks are completed on an ad hoc basis.
When meter pressure is found to be incorrect, adjustment is not made for prior periods.	26.2.1 and 26.3	3.5	Cleared. When meter pressure is corrected, adjustments are made to prior period allocation reporting.

Breach Allegation	Rule	Section in this report	Resolution
Estimated TOU consumption information has been provided on a number of occasions. Nova'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	Cleared. Provision of estimated TOU consumption is no longer a rule breach.
The energy consumption calculation for TOU ICPs has the following issues: • A compressibility factor is only applied to three ICPs, although 92 of 125 ICPs have a meter pressure greater than 50kPa. This will result in conversion errors greater than the allowable error of 0.2% allowable in accordance with Table 3 of NNS 5259:2004. • An altitude factor is not applied, although most ICPs have correction for gauge pressure and temperature, not absolute pressure and temperature. Nova has over recorded consumption information for TOU ICPs by approximately 0.2%, assuming an average meter pressure of 300 and an average altitude of 60m. Whilst this is within the allowable threshold of ± 0.5% recorded in Table 3 of NZS 5259:2004, I recommend altitude adjustment is applied. • All TOU metering systems have correction for temperature; however Orion is also applying a temperature factor, so the temperature factor is applied twice. This will result in under recording of consumption information when the temperature is above 15º Celsius and over recording when the temperature is below 15º Celsius. Compliance is not achieved with rule 28.2, which requires that *"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."*	26.2.1, & 28.2	4	Mostly cleared. • A compressibility factor is applied for all ICPs with pressure greater than 50kPa. Fixed compressibility factors for non TOU ICPs with meter pressures 220kPa and over may not consistently fall within the acceptable accuracy thresholds set out in NZS 5259:2015. • Altitude factors are correctly applied for non TOU ICPs. • TOU ICPs are not corrected for temperature. Temperature is corrected for within the TOU metering system.

Breach Allegation	Rule	Section in this report	Resolution
Nova has under recorded consumption information for an ICP at the DAN05001 gas gate by approx. 8,956 GJ for the period April 2013 to April 2014.	26.2.1 and 26.3	5.1	Cleared. No further issues were identified at DAN05001.
The initial submission accuracy did not meet the required accuracy percentage for some gas gates for the period May 2012 to April 2013.	37.2	5.3	Still existing. The initial submission accuracy did not meet the required accuracy percentage for some gas gates for the period August 2014 to November 2015.

1.3.2 Breach Allegations

Nova has 18 alleged breaches recorded by the Market Administrator between 1 August 2015 and 21 February 2017. These are summarised as follows:

Nature of Breach	Rule	Quantity	Section in this Report
Initial vs final allocation variances	37.2	18	5.3

As noted in the Summary of Report Findings, this audit recorded non-compliance in six sections leading to seven breach allegations, as shown in the table below.

Breach Allegation	Rule	Section in this report
One GAS050 report submitted to the allocation agent for December 2015 was not retained, and no audit trail was available.	28.4.1	1.5
The registry was populated late for two new connections resulting in submission information not being provided for the initial allocation.	28.3	2.1.1
TOU metering has not consistently been installed within 3 months of becoming aware of actual or expected rolling consumption over 10,000GJ per annum. I note that in some cases there have been 7-10 month delays between Nova requesting upgrades to TOU from meter owners, and the metering being installed.	29.1	3.2
82 ICPs appear likely to have an incorrect allocation group currently recorded.	29.1-29.3	
The GAS080 report included incorrect ICP counts and reading percentages, as some ICPs not continuously supplied with gas were included in the report.	40.2	3.3
The initial submission accuracy did not meet the required accuracy percentage for some gas gates for the period August 2014 to November 2015.	37.2	5.3
The GAS070 report should reflect the quantities in GJ billed in the previous invoice month. Invoices are selected for inclusion based on the billing period, not the invoice date.	52.2.1	5.7

1.4 Provision of Information to the Auditor (Rule 69)

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

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

Information was requested by Nova from metering equipment owners and was provided within the requested timeframe. 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 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	Included in report
Nova Energy	Yes	Yes	Yes
Metrix	Yes	No	No
Gas Industry Company	Yes	Yes	No

The comments received were considered in accordance with rule 71.1, prior to preparing the final audit report. Nova's comments are included in the relevant sections where issues were raised. No other changes were made to the report after consideration of the comments.

1.6 Transmission Methodology and Audit Trails (Rule 28.4.1)

The audit trail was evaluated for all data gathering, validation and processing functions. This rule requires that "The consumption information supplied to the allocation agent in accordance with rules 29 to 40 is transferred in such a manner that it cannot be altered without leaving a detailed audit trail..."

A sample of initial, interim and final GAS040 and GAS050 reports submitted on the Allocation Portal were checked against the original reports on Nova's network. This check confirmed whether the original files were still available, and if they had been edited after the submission date and time.

The initial GAS050 file for December 2015 could not be located on the network. The file was modified for import into Nova's system and saved as a new version, but the original version was not retained. This is recorded as non conformance below. All other files checked were available, and had not been edited after the submission date and time.

Non Conformance	Description	Audited party comment
Regarding: Rule 28.4.1 Control Rating: Adequate	One GAS050 report submitted to the allocation agent for December 2015 was not retained, and no audit trail was available.	Response: Acknowledged. Comments: • A newline whitespace character was added at the end of Nova's copy of the GAS050 file, after the submission to the Allocation Agent, as Nova's import system expected the file to end with a blank line. • A copy of the submission file will be taken for the purposes of loading it into Nova's internal system, if a blank line needs to be added in future.

Supporting information for TOU corrections is appropriately filed and was easy to access.

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

The process was examined for the connection and activation of new ICPs.

New connections are managed via the networks' portals. Progress notifications are automatically generated and the relevant details are loaded into Orion.

One of the main issues with the new connections process is that the physical connection is made at the property when the ICP is still at the "Ready" status. At this point the consumer hasn't always registered with a retailer. Because networks will create ICPs based on a request from the customer, the retailer is not always included in the communication process. For reconnections, some customers do not sign up with a retailer until a "vacant disconnection" letter is sent.

Consumption information may not be provided to the allocation agent until the registry is updated. For some ICPs where the status has changed to ACTC, consumption information has not been provided to the allocation agent for the initial allocation. I checked all six ICPs where the update to the registry was later than 30 business days. I found that submission of consumption information to the allocation agent occurred at the beginning of the following month for four ICPs, and by the time of the interim allocation for the other two ICPs. Late field notification caused four late updates and processing issues caused the remaining two issues.

The "Maintenance Breach History Report (RET breaches)" report was examined for the period August 2015 to December 2016. This report contained 449 ICPs where the initial registry update was later than two business days.

I also examined the event detail report for the period January to December 2016. The table below summarises the registry population timeframes for new connection status changes.

New Connections					
Status	Total ICPs	Update greater than 2 days	Update greater than 30 days	Average update days	Percentage compliant
ACTC	512	243	6	5.2	53%
ACTV	0	0	0	0	N/A

The list file contained 78 ICPs at the ready status where Nova was the expected retailer. By the time of the on-site audit, the number of ICPs had been reduced to two, which are genuine pending new connections. The other 76 ICPs were mostly cancelled new connections.

Nova has a set of validation processes and reports to identify and resolve discrepancies, which were demonstrated during the audit. The validation process compares Orion data to registry data for all relevant fields, apart from network pressure, which is used as part of the Joule-Thomson calculation. Nova has commenced work on the network pressure validation report. There is a check to identify ICPs where the network pressure is lower than the meter pressure. Incorrect network pressure has not resulted in errors outside the threshold allowed in NZS 5259:2015.

I checked several of the validation reports in detail, specifically those where errors could lead to incorrect submission of consumption information to the allocation agent. The reports checked in detail included the following:

- ICP status discrepancies, including status change dates
- Altitude discrepancies – this is a monthly check between Orion and the registry, any adjustments flow through to the relevant submission and revision files
- Meter pressure discrepancies
- Gas gate discrepancies

I checked four ICPs that were ACTC but where meters were recorded as "removed" in the registry. These were all merely timing issues between the meter removal data and the status change date. There was no impact on consumption information.

Non Conformance	Description	Audited party comment
Regarding: Rule 28.3 Control Rating: Effective	The registry was populated late for two new connections resulting in submission information not being provided for the initial allocation.	Response: Accepted. Comments: • Nova agrees that the late population of the registry for 2 new connections resulted in information not being provided for the initial allocation. • Submission information was provided for the interim allocation for these 2 ICPs. • Nova Energy's processes are effective as identified in the control rating.

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."

Nova 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 ± 10m 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 ± 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 ± 10m, 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 in most areas.

Distributor	Total ICPs	ICPs checked	Quantity outside 20m	Quantity outside 90m
UNLG	6,900	20	0	0
NGCD	4,997	20	0	0
POCO	18,754	20	0	0
GNET	355	20	0	0
Total	31,006	80	0	0

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 33 of 52 ICPs with an altitude difference of more than 20m.

Distributor	Total ICPs	ICPs with altitude of zero	ICPs checked	Quantity outside 20m	Quantity outside 90m
UNLG	6,900	10	10	5	0
NGCD	4,997	0	0	0	0
POCO	18,754	42	23	8	0
GNET	355	0	0	0	0
Total	31,006	52	33	13	0

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[2] 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 5259:2015. There were no altitude discrepancies resulting in the accuracy of consumption information being outside the threshold allowed by NZS 5259:2015.

At the time of the previous audit, Nova did not adjust for altitude for any TOU ICPs. This issue has now been cleared; altitude adjustments are applied except where the metering system corrects for absolute pressure. Altitude is stored as a fixed factor in Orion. Monthly, a report is run comparing the Orion altitude factor to an altitude factor calculated based on current Gas Registry altitude information and stored Orion meter pressure for the ICP. Any discrepancies are investigated and corrected. The discrepancy report for February 2017 was reviewed, no discrepancies between Orion and the recalculated altitude factors were identified. A sample of altitude calculations within the report were

[2] Gas (Switching Arrangements) Rules 2008, Part A, ICP parameters maintained by Distributors and rules 41 and 58.

checked. All were found to be below the maximum permissible error threshold set out in table 3 of NZS 5259:2015.

2.2 Metering Set-up Information

Nova compares their metering fields against registry metering fields on a daily basis. There were some time delays between identification of meter pressure discrepancies and the updating of Orion for five ICPs checked during the audit. The discrepancies were identified in July 2016 when the registry was updated by the meter owner, but the corrections were not made until November 2016 for four ICPs, and no correction has been made for the other ICP. One ICP had a change to the correct pressure for July 2016, then a change back to the incorrect pressure up until November 2016 when it was corrected again.

Meter pressure is a static field in Orion. The corrected value will be used in the pressure factor calculation for all invoices and reconciliation submissions created after the date and time Orion pressure is updated. This includes any wash up submissions created for earlier periods.

Meter pressure changes populated on the registry by the meter owner (NGCM) all had the same event date as the data entry date, but the meter serial numbers were the same, which suggests the errors may have been in existence since the meters were first installed. I recommend Nova evaluates all meter pressure changes conducted in the previous 12 months to determine whether the meter pressure change is applied from the correct date.

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. This "safety net" appears to be robust and meter dials are checked against the registry on a daily basis.

Recommendation	Audited party comment
I recommend Nova evaluates all meter pressure changes conducted in the previous 12 months to determine whether the meter pressure change has been applied from the correct date.	Response: Recommendation Accepted. Comments: • Nova Energy is reliant on the accuracy of the metering data supplied to us by the meter owner and via GTN files to ensure metering specific invoicing factors are correct. • Without having absolute validation from the metering provider that the information is correct on the registry the meter pressure used by Nova Energy may be incorrect. • Nova Energy will implement a review of meter pressure changes over the past 12 months as per the recommendation.

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.

Nova 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.

Nova applies ground temperatures by region based on NIWA's 30 year monthly averages. Nova has used regression analysis to estimate the monthly ground temperature based on the relationship between air and ground temperature in other regions.

At the time of the last audit, Nova applied one temperature average per gas type. Now temperatures are applied by region (e.g. Palmerston North, Wellington, Napier), so gas gates with the same gas type have different average temperatures. The region that a gas gate is assigned to is determined by comparing the GPS coordinates for the NIWA weather station to the GPS coordinates for ICPs connected to the gas gate. Gas gate regions were reviewed and confirmed to be reasonable.

Temperatures were last reviewed and updated at the end of 2016, and Nova intends to review and update the temperatures every five years. Given that the temperatures are based upon 30 year averages, I believe this is reasonable.

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. Nova applies the Joule-Thomson effect adjustment and the formula was checked and confirmed correct.

The accuracy of the Joule-Thomson adjustment is dependent on correct inputs, including network pressure. Nova does not validate the network pressure in Orion vs the registry so there may be some errors. This validation is in the process of being developed and I have made a recommendation to ensure visibility of this matter. There are eight ICPs where the network pressure and the meter pressure are the same, but the resulting adjustment is not outside the threshold allowed by NZS 5259:2015.

Recommendation	Audited party comment
Continue with plans to validate network pressure against the registry and make required corrections and revisions once the data is available.	Response: Recommendation Accepted. Comments: • Nova Energy implemented the process we were developing to validate the network pressure in Orion Vs the Registry. • Failed validations are assessed, corrections undertaken and revisions occur

2.3.2 Calorific Values

Gas composition data is sourced from the Open Access Transmission Information System (OATIS) and is loaded into Orion.

Each day is initially populated with an average value, which is the same for all gas types, before replaced by the actual figures from OATIS once they are available.

The accuracy of the Orion information was confirmed by comparing an OATIS file with the contents of Orion.

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 Nova securely archives data for a period in excess of 30 months.

Some data provided by Nova's meter reading contractor was checked, and it was found that the readings matched the data in Orion. This proves the end-to-end process.

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. Other installations should be assigned to allocation group 6.

Nova conducts ad hoc analysis of consumption to ensure ICPs are in the correct allocation groups. The January 2017 analysis by Nova found the following:

- Nine allocation group 6 ICPs have has estimated annual consumption exceeding 250GJ.
    - Three have now been updated to allocation group 4.
    - 1001154173QT5E4 has no read history with Nova, but has estimated annual consumption of 494GJ, and switched from the previous retailer as allocation group 4.
    - Three are very close to 250GJ per annum (244-260GJ) will be monitored to confirm whether consumption is likely to remain over 250GJ.
    - One ICP had a likely misread in its history, and another had an incorrect forecasted annual consumption. Allocation group 6 appears reasonable for both these ICPs.

- 120 allocation group 4 ICPs have estimated consumption under 250GJ per annum.
    - 48 are assigned to vacant accounts and have been left as group 4 until a new tenant moves in.
    - Of the remaining 72 ICPs, 68 use between 200 and 250GJ and have been left as allocation group 4 in case their consumption increases.
    - The remaining four ICPs have been supplied for less than one year, so annual load cannot be accurately determined. One of these ICPs (0003025821NGCEE) appears unlikely to use over 250GJ per annum.

- 10 allocation group 4 ICPs connected to allocated gas gates have consumption greater than 10TJ per annum. Of these:

- Five ICPs are due to have correctors installed during the week of 6 March 2017. Nova began the process to have correctors installed by AMS for one of the ICPs on 13/05/16, and the others on 28/07/16.
- Three ICPs are awaiting a date for corrector installation, jobs were raised with AMS on 12/12/16.
- It is difficult to install a corrector for one ICP due to a lack of space and challenging location. Alternative options to allow corrector installation are being discussed with the customer.
- One is very close to the threshold, with estimated consumption between 9,934 and 10,072GJ. It will be monitored to confirm whether consumption is likely to stay high and TOU metering is required.

- Two ICPs had blank or RPS recorded as their allocation group. Both have now been corrected to allocation group 6 in Orion and on the Registry.

Late installation of TOU metering is alleged as a breach of rule 29.1, and incorrect allocation groups are alleged as a breach of rules 29.1-29.3. I recommend Nova conducts allocation group validation on a monthly basis, to identify and update any incorrect allocation groups, and confirms the allocation group for ICP 1001154173QT5E4.

Non Conformance	Description	Audited party comment
Regarding: Rule 29.1 Control Rating: Adequate	TOU metering has not consistently been installed within 3 months of becoming aware of actual or expected rolling consumption over 10,000GJ per annum. I note that in some cases there have been 7-10 month delays between Nova requesting upgrades to TOU from meter owners, and the metering being installed.	Response: Acknowledged. Comments: • Nova Energy has enhanced current processes to more accurately monitor expected annual rolling consumption over 10TJ per annum. • The enhanced monitoring will be used to request upgrades sooner to support achievement of this rule.

Non Conformance	Description	Audited party comment
Regarding: Rule 29.1 to 29.3 Control Rating: Adequate	82 ICPs appear likely to have an incorrect allocation group currently recorded.	Response: Noted. Comments: • Nova has implemented regular analysis of consumption. • The reviews allow Nova to more closely monitor the actual or expected 12-month rolling consumption. • Nova will change allocation groups where it can be established that the expected consumption falls consistently above or below the threshold from month to month.

Recommendation	Audited party comment
Conduct analysis of consumption to ensure ICPs are in the correct allocation groups monthly, and update any incorrect allocation groups.	Response: Recommendation Accepted. Comments: • Nova has implemented regular allocation group reviews.

Recommendation	Audited party comment
Review 1001154173QT5E4 to determine whether it should be moved to from allocation group 6 to 4, based on information provided by the customer and/or previous retailer.	Response: Recommendation Accepted. Comments: • Nova Energy has reviewed ICP 1001154173QT5E4 and allocation group 4 has been assigned.

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

Each month, retailers must report the number and percentage of validated meter readings obtained in accordance with rules 29.4.3 and 29.5 in the GAS080 report.

An error was found in the GAS080 report. Some ICPs not continuously supplied with gas were being included in the four and 12 month ICP count totals. This also resulted in the percentage of ICPs read being understated.

The Orion GAS080 report relies on responsibility end dates for customer accounts to determine whether an ICP has been continuously supplied with gas. The responsibility end date field is not consistently populated by operators when customer responsibility ends. Where the end date is not populated, the ICP is assumed to be continuously supplied for the purpose of the GAS080, and included in the ICP counts. This is recorded as non conformance below.

Non Conformance	Description	Audited party comment
Regarding: Rule 40.2 Control Rating: Effective	The GAS080 report included incorrect ICP counts and reading percentages, as some ICPs not continuously supplied with gas were included in the report.	Response: Acknowledged. Comments: • The GAS080 report was overstating the number of unread installations by counting some ICPs, which had switched away, as continuously supplied installations that had not been read. • GAS080 submissions to the Allocation Agent for February 2017 onwards have been made using the corrected report checked during the audit.

In future, Nova intends to run its electricity meter reading compliance report for gas gates to produce the GAS080. The electricity report relies on statuses, instead of responsibility end dates. A sample report was reviewed for January 2017 and appeared reasonable when compared against the registry list and known numbers of unread ICPs.

All consumer installations with non-TOU meters must have validated register readings recorded at least once every 12 months unless exceptional circumstances prevent such an interrogation. 90% of consumer installations with non-TOU meters must have a validated reading every four months.

All ICPs are read monthly and various methods are employed to obtain readings in instances where a reading is not obtained on the first attempt. Estimation processes are used as a last resort. All commercial ICPs are read as close as possible to the end of the month. Nova's meter reading processes appear robust and reduce the reliance on forward estimates to ensure submission accuracy.

To confirm compliance with the meter reading frequency rules, Nova provided a copy of the GAS080 report for November 2016, and the electricity meter reading compliance report (run for gas) for January 2017.

GAS080 (November 2016)

Target	Reading Percentage (GAS080 November 2016)
Rolling 4 months (target 90%)	97.12%
12 months (target 100%)	96.93%

Electricity Meter Reading Compliance Report (gas for January 2017)

Target	Reading Percentage (Meter reading compliance report January 2017)
Rolling 4 months (target 90%)	99.84%
12 months (target 100%)	99.97%

Compliance with the four month reading target (29.4.3) is confirmed.

Compliance with the 12 month reading target (29.4.2) was established using the GAS080, the electricity meter reading compliance report, and a list of ICPs known not to have received an actual read for the last 12 months. I found that there were seven ICPs continuously supplied with gas for the last 12 months, which were not read during that period. Of those, six were vacant accounts and one was a customer account where Nova had difficulty in obtaining a key. Nova has attempted to gain access on several occasions for these unread sites and I consider that exceptional circumstances exist.

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 Nova.

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 Nova. This validation includes the following checks:

- Meter not found for a premise
- High reading
- Low reading
- Meter reading already present in the system
- Another reading exists for the same day
- Meter could not be read
- Meter reading date is earlier than existing billed reads.

Readings that fail validation are manually investigated and any issues resolved.

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:

- High dollar amount
- Negative dollar amount
- Long billing days
- Short billing days
- High percentage variation from previous bill
- Electricity consumption without gas consumption.

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.

3.5 Non TOU Error Correction

The process for error correction was examined to ensure that corrected consumption 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 three examples where meters had stopped recording, and five examples where the meter pressure was corrected.

The correction process for stopped meters includes a step to remove the old meter from Orion at a higher estimated reading to include the estimated unrecorded volume. This process results in consumption information appearing in the relevant revision files.

As recorded in Section 2.2, when meter pressure corrections are made, the corrected value will be used in the pressure factor calculation for all invoices and reconciliation submissions created after the date and time Orion pressure is updated. This includes any wash up submissions created for earlier periods. Pressure changes often occur due to data correction, but there may be a genuine pressure upgrade or downgrade on a specific date. A recommendation has been made in section 2.2 to evaluate meter pressure changes conducted in the previous 12 months to ensure the pressure change is applied from the correct date.

3.6 TOU Validation

Nova's TOU data is collected manually for 25 of 27 AG1 ICPs; data is collected remotely using MasterLink for two ICPs. Data is collected manually for all AG2 ICPs. The files are imported through a validation system, then directly loaded into Orion.

A check of clock time occurs in the field and is checked as part of the periodic accuracy checks.

TOU validation checks occur manually each month in the Auckland office and include 50 individual checks, including the following:

- File formats
- Invalid dates and times
- Status
- Missing data, including temperature and pressure data
- Negative corrected volume
- Minimum and maximum pressure
- Minimum and maximum temperature
- Uncorrected data calculation vs corrected data.

A checklist and signoff process is in place for all new TOU ICPs (switched in or new connections). This process appears to be robust and contains an invoice check as well.

Prior to submission of the GAS050 report, consumption is reviewed. Refer to section 5.2 for an explanation of the checks completed. Compliance is confirmed.

4. Energy Consumption Calculation (Rule 28.2)

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 some TOU and non TOU ICPs was entered into the spreadsheet and the resulting energy value was compared to that calculated by Orion. This comparison confirmed the accuracy of the Orion calculation and confirmed compliance with NZS 5259:2015.

When non TOU reconciliation submissions are prepared, a conversion factor for the submission month, rather than the read period is applied. This is discussed further in section 5.5.

TOU Energy Consumption Calculation

All the TOU conversion calculation issues raised in the last audit have now been cleared:

- A compressibility factor is applied for all TOU ICPs.
- An altitude factor is applied for all temperature and gauge pressure corrected ICPs. Altitude factor is correctly set to 1 for temperature and absolute pressure corrected ICPs.
- The issue relating to temperature factor being incorrectly applied has been cleared as a misunderstanding, arising from factors being printed incorrectly on Orion TOU invoices. Orion invoices have been updated to show the correct factors.

Non TOU Energy Consumption Calculation

Testing confirmed that the Orion system is calculating pressure, altitude and temperature factors correctly for non TOU ICPs. However, if any inputs into these calculations are incorrect, including Orion static data, errors will occur. This is discussed further in section 2.

Compressibility correction occurs for ICPs with meter pressure over 50kPa. Nova has established compressibility factor bands. ICPs within a certain meter pressure range will have the same fixed compressibility factor applied. A sample of non TOU ICPs were checked in Orion, and all were found to have the expected compressibility factor assigned for their pressure range.

The fixed compressibility factors for each band were checked for reasonableness by recalculating the compressibility factor for the minimum and maximum meter pressure in each band, considering the minimum and maximum gas composition and temperature values for gas type T between 2008 and 2017. For pressures below 220kPa, I found that the Orion factors were within the maximum permissible error of ± 0.25% set out in table 3 of NZS 5259:2015.

For pressures 220kPa and over, it is possible that the Orion factors could be over the maximum permissible error, particularly where low gas composition and temperature values are applied. There was a significant increase in the Orion compressibility factor for pressures above 420kPa, which could result in recalculations using both minimum and maximum gas composition and temperature values being outside the permissible error limits.

A very small number of ICPs have high meter pressure. The number of non TOU ICPs which fall within each pressure band according to a January 2017 registry list are shown below:

Pressure Band	Count of ICPs
221-300kPa	12
301-360kPa	5
361-420kPa	2
>420kPa	0

Although no specific instances of compressibility factor non-compliance were identified during the audit, compliance with rule 28.2 may not consistently be achieved for the 19 ICPs recorded in the table above. A recommendation has been raised to review fixed compressibility factors for meters with pressure over 220kPa.

Recommendation	Audited party comment
Nova should review fixed compressibility factors for meter pressures exceeding 220 kPa, to ensure they consistently fall within the acceptable accuracy thresholds set out in NZS 5259:2015. At higher pressures variation in the compressibility factor increases. I recommend Nova considers using smaller meter pressure ranges for fixed compressibility factors, for pressures over 220 kPa.	Response: Recommendation Accepted. Comments: • No specific instances of compressibility factor non-compliance was identified during the audit. • Nova will assess the Auditors recommendation to use smaller meter ranges for pressures exceeding 220 kPa.

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. Estimation and correction activities are conducted by the Account Managers and the data is appropriately labelled.

Various methods are used depending on the nature of the issue. If data is missing and a register reading is available then a profile is created by using a similar previous period. The customer may be consulted if the profile is unclear. If data and register readings are missing then previous consumption periods are used in conjunction with customer liaison to determine a likely profile.

Ten examples were examined and I conclude Nova's processes achieve compliance with the requirement to provide its "best estimate of consumption information" for all ICPs. There were two examples where the difference between the estimate and the actual was quite high and this was due to them being new ICPs without register readings, and without detailed history to base the estimates on. Compliance is confirmed.

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

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

GAS040 non TOU energy submissions

Nova validates their non TOU consumption information at gate level prior to submission. This validation includes the following checks:

- A registry match to identify any ICPs that have been included or excluded incorrectly
- A comparison against the previous month
- A comparison against the previous revision
- Meter count for the supporting ICP level file
- Missing shape files.

GAS040 consumption and customer numbers for September, October and November 2015 were examined and compared to the data in Nova's system at ICP level for a sample of gas gates; the totals matched which confirms compliance. This also proves that Nova's consumption information provided to the allocation agent is calculated at ICP level and then aggregated.

GAS050 TOU energy submissions

Prior to submission, GAS050 files are checked for completeness and accuracy including:

- A registry match to identify any ICPs that have been included or excluded incorrectly
- Checks of top and bottom 10 gas consumers for the month
- Graphs of total GJ - if discrepancies are found, ICP level data is reviewed.

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.

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. A sample of active vacant ICPs were reviewed, and found to be correctly included in the GAS040 submissions.

When an ICP is vacant, a "dummy" customer is "moved in" to the account to ensure credit processes continue as expected and to ensure the consumption information is identified, validated and submitted. A sample of vacant ICPs with consumption were reviewed. In cases where the consumption was genuine, consumption was reported and the status updated. Where consumption occurred due to an error (e.g. misread or incorrectly recorded opening read) no consumption was reported.

5.3 Initial Submission Accuracy (Rule 37.2)

Final allocations are complete for the months August 2014 to November 2015. 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.

Nova did not meet this requirement for some gas gates during the 16 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 2014	77	66	86%	75	97%
September 2014	77	55	71%	74	96%
October 2014	77	52	68%	73	95%
November 2014	77	63	82%	75	97%
December 2014	77	40	52%	71	92%
January 2015	77	51	66%	75	97%
February 2015	76	63	83%	75	99%
March 2015	76	66	87%	76	100%
April 2015	76	41	54%	68	89%
May 2015	77	47	61%	68	88%
June 2015	77	59	77%	71	92%
July 2015	75	60	80%	73	97%
August 2015	75	62	83%	72	96%
September 2015	75	53	71%	69	92%
October 2015	76	42	55%	66	87%
November 2015	76	59	78%	73	96%

The table below 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 2014	568,767	579,249	-1.81%
September 2014	479,014	476,411	0.55%
October 2014	430,055	432,148	-0.48%
November 2014	387,886	390,698	-0.72%

Month	Initial Submission All Gas Gates (GJ)	Final Submission All Gas Gates (GJ)	Percentage Variation
December 2014	340,259	331,451	2.66%
January 2015	276,378	269,999	2.36%
February 2015	282,143	284,175	-0.72%
March 2015	329,360	323,423	1.84%
April 2015	371,533	364,820	1.84%
May 2015	487,599	483,169	0.92%
June 2015	545,517	546,642	-0.21%
July 2015	590,555	591,517	-0.16%
August 2015	556,775	567,552	-1.90%
September 2015	506,769	512,448	-1.11%
October 2015	413,752	421,698	-1.88%
November 2015	377,959	385,173	-1.87%

The tables above show that the consumption information submitted to the allocation agent for the initial submission was sometimes over estimated and at other times under estimated. This analysis does not show any specific trends that cause concern.

Nova monitors variances at gas gate and ICP level and this reporting showed the variances reported relate to seasonal loads.

Non Conformance	Description	Audited party comment
Regarding: Rule 37.2 Control Rating: Effective	The initial submission accuracy did not meet the required accuracy percentage for some gas gates for the period August 2014 to November 2015.	Response: Noted. Comments: • Nova Energy's performance in respect of rule 37.2 is effective. • There are processes in place to resolve these breaches across all industry participants.

5.4 Forward Estimates (Rules 34 & 36)

The rules do not prescribe how forward estimates are to be calculated. Nova has prepared and uses historic seasonal adjustment daily shape values based on gas gate DDR (daily delivery report) data. This model enables Nova to achieve a more accurate result than a "flat" estimate would.

5.5 Historic Estimates (Rules 34 & 35)

To assist with determining compliance of the historic estimate processes, Nova 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 Nova's system. This test also proves that the correct shape file is used in each case. Compliance is confirmed for all historic estimate scenarios.

Test	Scenario	Test Expectation	Result
A	ICP's become Inactive part way through a month.	Consumption is only calculated for the Active portion of the month.	Compliant
B	ICP's become Active then Inactive within a month.	Consumption is only calculated for the Active portion of the month.	Has not occurred
C	ICP's become Inactive, then Active, then Inactive again within a month.	Consumption is only calculated for the Active portion of the month.	Has not occurred
D	ICP's Starts on the 1st day of a month.	Consumption is calculated to include the 1st day of responsibility.	Compliant
E	ICP's Ends on the Last Day of the month.	Consumption is calculated to include the last day of responsibility.	Compliant
F	ICP's Starts part way through a month.	Consumption is calculated to include the 1st day of responsibility.	Compliant
G	ICP's 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	ICP's Start on 1st and End on Last day of month.	Consumption is calculated for each day of responsibility.	Has not occurred
J	Rollover Reads	Consumption is calculated correctly in the instance of meter rollovers.	Compliant

Nova's reconciliation submissions are produced using an Access database which contains information from the Orion billing system. This database is refreshed before each reconciliation submission is produced. The Orion system calculates a kWh conversion factor for each reconciliation period, based on average inputs for that calendar month, including temperature and calorific value.

When calculating historic estimates, the reconciliation month conversion factor is applied to consumption for the read period. For example, if a read period is 03/06/16 to 05/07/16:

- For June 2016, GJ for the read period will be calculated as
  CM during the read period (03/06/16 to 05/07/16) x **June 2016 conversion factor**

- For July 2016, GJ for the read period will be calculated as
  CM during the read period (03/06/16 to 05/07/16) x **July 2016 conversion factor**

This means that the June profiled consumption + July profiled consumption ≠ total consumption for the read period June to July. We expect the conversion factor for the read period to always be applied, and then the consumption profiled between the reconciliation periods.

A sample of these conversion factor differences were reviewed. All were found to be within the permissible error tolerances set out in NZS 5259:2015, so the use of reconciliation period conversion factors is not raised as non conformance. Instead, a recommendation is raised relating to the application of the conversion factor.

Recommendation	Audited party comment
Nova should apply the conversion factors for the read period, and then profile consumption between the reconciliation periods. This will ensure that the conversion factors that applied at the time the gas was consumed are used, and will increase consistency where read periods span more than one reconciliation period.	Response: Noted. Comments: • Nova will assess the Auditors recommendation.

5.6 Proportion of Historic Estimates (Rule 40.1)

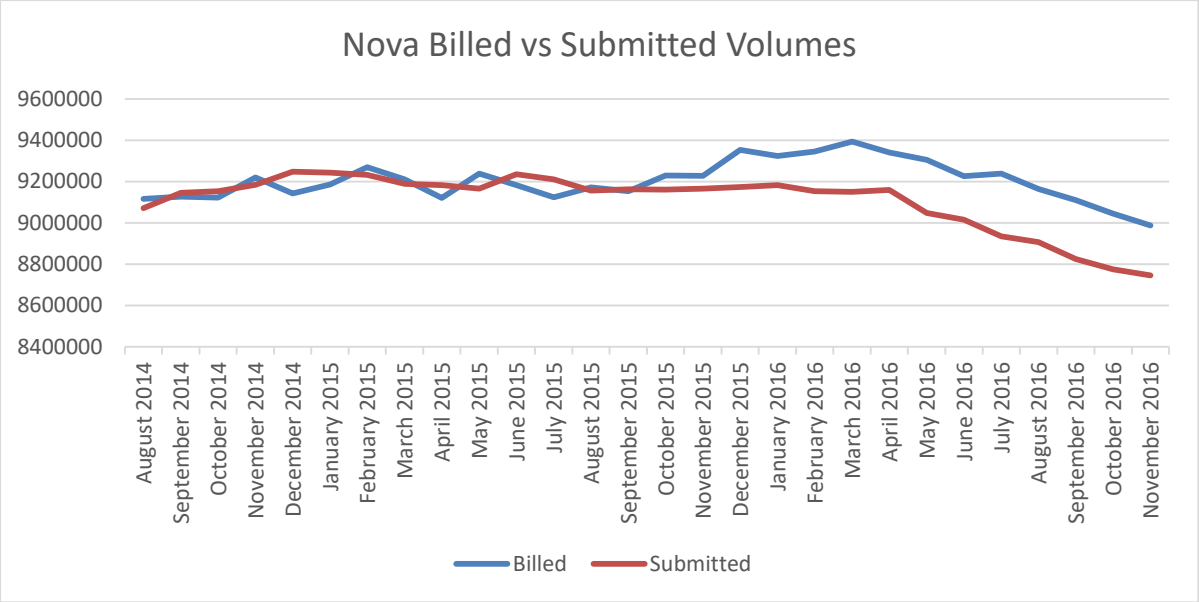
This rule requires retailers to report to the allocation agent the proportion of historic estimates contained within the consumption information for the previous initial, interim and final allocations. The relevant files were examined and compliance is confirmed.

5.7 Billed vs Consumption Comparison (Rule 52)

The content of the GAS070 files was proved by selecting some gas gates and checking the invoices in Orion for all ICPs at those gates, against the total in the GAS070 files for January 2017. This confirmed the accuracy of the data.

The chart below shows a comparison between rolling annual quantities billed and rolling annual consumption information submitted to the allocation agent for a 28-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.

Comparison between Rolling Annual Submitted Volumes and Gas Supplied



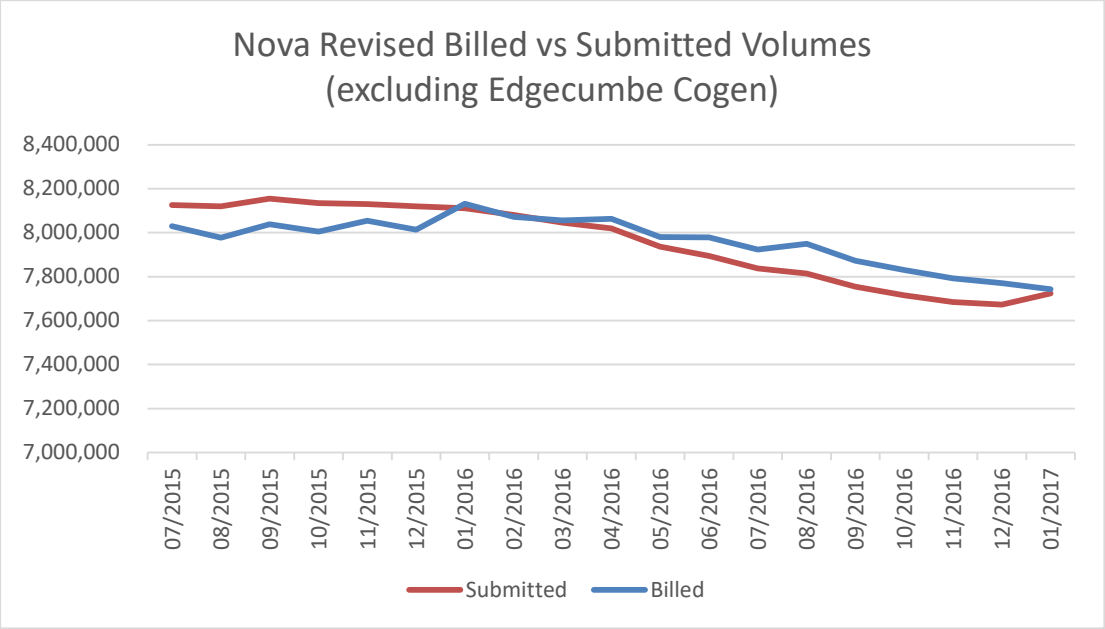
Year ending	Annual Billed GJ	Annual Consumption GJ	Percentage Difference
November 2015	9,228,156.836	9,166,783.922	-0.7%
November 2016	8,988,012.179	8,745,693.86	-2.8%

Over time, the gap between billed and submitted volumes has increased. There appear to be several reasons for this:

- Edgecumbe Cogen is invoiced based on daily nominated quantities, not the energy measured by the meter. This can cause large differences between the billed and submitted volumes. With the Edgecumbe Cogen data removed from the billed and submitted totals, the fluctuations between rolling annual submitted and as billed are much lower, as illustrated in the chart and table below.
- Billed consumption is included in the GAS070 report based on the billing period, rather than invoice date. Each invoice generated in Orion is assigned to a billing period. In most cases, the billing period date and invoice date will fall within the same calendar month, as they did in the sample checked. However, it is possible for the invoice and billing period dates to fall in different months, most commonly around month end, or when an ICP is billed late. This is recorded as non conformance.
- When an invoice is reversed (or credited) and rebilled, it is possible for the operator to manually select the billing period for the reversal. Because only one invoice is allowed per billing period, a process change was implemented by the billing team to create reversals in older billing periods, so that re-invoicing could occur in later periods. This can result in

reversals being assigned to periods which have already had GAS070 submissions created and therefore not being reported, with re-bills included in future GAS070 reports.

Nova has re-run and re-submitted the GAS070 reports for the past 22 months, which include any reversals completed in older billing periods. The re-submitted rolling annual billed data has been compared to the rolling annual submitted data below, both excluding Edgecumbe Cogen.



Year ending	Annual Billed GJ excl Edgecumbe Cogen	Annual Consumption GJ excl Edgecumbe Cogen	Percentage Difference excl Edgecumbe Cogen
November 2015	8,134,594	8,130,048	0.06%
November 2016	7,715,335	7,684,676	0.40%

The fluctuations between the revised billed and submitted data are much lower, and are in line with expectations. The comparison does not indicate issues with under or over reporting.

Non Conformance	Description	Audited party comment
Regarding: Rule 52.2.1 Control Rating: Adequate	The GAS070 report should reflect the quantities in GJ billed in the previous invoice month. Invoices are selected for inclusion based on the billing period, not the invoice date.	Response: Acknowledged. Comments: • The GAS070 report was overstating billed volumes by counting rebills of installations, without the corresponding offsetting reversal, where the reversal was in a historical billing period. • GAS070 wash up submissions have been made to the Allocation Agent for March 2015 onwards, and will continue to be made in order to include any reversals in historically dated billing periods, until the report is changed to select invoices based on invoice date.

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.

Nova showed that their last trading notification under this rule was on 30/09/2013. Processes are in place to ensure that the trading team informs the reconciliation team of changes to supplementary agreements, and to check for changes to supplementary agreements prior to 1 October each year. 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 Nova's participant audit, I compared billed and submitted data for each ICP connected to MMU08001, PPA33201 or TRG07701 between August 2012 and August 2016. The largest GJ differences over the whole period were investigated (over ± 5% and ± 250GJ).

In all cases there were reasonable explanations for the differences, including:

- The ICP switched in prior to August 2012, so not all reconciliation data is included and the first invoice included covers more than one month.
- A vacant ICP with consumption was unbilled for November 2015 - August 2016. The ICP was moved to a customer and billed after August 2016.
- Estimated reads later being corrected with actuals, resulting in fluctuations in billed data.

- ICPs read early in the month can have a high forward estimate component for the current month, and their billing data relates mainly to the previous month.

No issues with the data reported for Bay of Plenty were identified.

6. Recommendations

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

- I recommend Nova evaluates all meter pressure changes conducted in the previous 12 months to determine whether the meter pressure change has the correct date and whether revisions need to be conducted.
- Continue with plans to validate network pressure against the registry and make required corrections and revisions once the data is available.
- Conduct analysis of consumption to ensure ICPs are in the correct allocation groups monthly. Currently analysis is on an ad hoc basis.
- Review 1001154173QT5E4 to determine whether it should be moved to from allocation group 6 to 4, based on information provided by the customer and/or previous retailer.
- Nova should review fixed compressibility factors for meter pressures exceeding 220 kPa, to ensure they consistently fall within the acceptable accuracy thresholds set out in NZS 5259:2015. At higher pressures variation in the compressibility factor increases. I recommend Nova considers using smaller meter pressure ranges for fixed compressibility factors, for pressures over 220 kPa.
- When converting volumes to energy for gas reconciliation, Nova should apply the conversion factors for the read period, and then profile consumption between the reconciliation periods. This will ensure that the conversion factors that applied at the time the gas was consumed are used, and will increase consistency where read periods span more than one reconciliation period. Currently a reconciliation period conversion factor is applied.

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 – Nova Energy Comments

Nova would like to thank Veritek Ltd for conducting the 2017 audit