VERITEK

Gas Downstream Reconciliation Audit

Final Report



Prepared by Steve Woods – Veritek Ltd

 Date of Audit:
 28/07/15 & 19/08/15

 Date Audit Report Complete:
 05/11/15

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 Pulse Energy Limited (Pulse) in terms of compliance with these rules.

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

The summary of report findings in the table below shows that Pulse's control environment is "effective" for seven of the areas evaluated, "adequate" for five, not adequate for two and "unknown" for one. Five of the fifteen areas evaluated were found to be non-compliant.

Stronger validation steps are required to ensure ICP status, altitude and meter pressure information is correct because errors in this data can result in incorrect consumption information.

I found several errors in the forward and historic estimate calculations leading to the provision of incorrect consumption information to the allocation agent. The spreadsheet based system used by Vector, as an agent to Pulse, for the preparation of consumption information required some immediate improvements during the audit process in order to achieve compliance for future submissions. The overall control and validation processes for consumption information are expected to improve when Vector retires the spreadsheet based system and implements a new system.

I make the following observations and recommendations:

- I recommend status validation processes are implemented because incorrect status information can lead to incorrect consumption information being provided to the allocation agent.
- Pulse uses altitude data populated on the registry by distributors. Whilst this is appropriate, I
 recommend the introduction of some validation steps to identify "outliers" and I recommend
 validation between the data used by Pulse and the data on the registry to identify changes by
 distributors and to identify incorrect population of Gentrack.
- I recommend Pulse liaises with Vector to refresh the temperature data, which was sourced in 1994. I also recommend Gas Industry Company develops and publishes one set of data with monthly temperature figures per gas gate per month.
- Joule Thompson adjustment does not occur. I recommend Pulse considers adjusting for the Joule Thompson effect, in line with the GIC recommendations.
- I recommend consumption information is checked on a monthly basis to ensure the 250GJ threshold is not exceeded for allocation group 6 ICPs.

- Consumption information is only provided to the allocation agent where a consumer is recorded in Gentrack. There may be instances where consumption is detected at ACTV or INACT ICPs and a consumer is not recorded in Gentrack, therefore I recommend Pulse develops a process to deal with this consumption to ensure it is included in the submission process.
- I recommend Pulse establishes a "forward default estimate" figure for use in situations where the annual consumption figure in the GTN file from the losing participant is incorrect or is zero.

The matter of temperature data has been subject to considerable discussion in recent months. Allocation participants are using data from different sources which contains different temperature figures for similar regions. I haven't identified a single source of data that I consider to be more correct than other sources. I recommend Gas Industry Company develops and publishes one set of data with monthly temperature figures per gas gate per month

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	Some status and altitude data was found to be incorrect.
				I recommend validation of status and altitude information on a periodic basis.
Metering set up information	2.2	Adequate	Not compliant	Some meter pressure discrepancy discrepancies were found.
Billing factors	2.3	Adequate	Compliant	I recommend the temperature data is refreshed to ensure it is accurate and I recommend adjustment for the Joule Thompson effect.
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	Compliant	I recommend consumption information is checked on a monthly basis to ensure the 250GJ threshold is not exceeded for allocation group 6 ICPs
Meter reading requirements	3.3	Effective	Compliant	Pulse has robust and compliant meter reading processes.
Non TOU validation	3.4	Effective	Compliant	A robust validation process is in place.
Non TOU error correction	3.5	Effective	Compliant	The error correction processes have not been employed; however the documented procedures appear to be appropriate and compliant.

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.
Provision of retailer consumption information	5.1	Effective	Compliant	I recommend Pulse develops a process to deal with consumption at vacant ICPs to ensure it is included in the submission process.
Initial submission accuracy	5.2	Unknown	Unknown	This will not be checked until final submissions have occurred
Forward estimates	5.3	Not adequate	Not compliant	A number of errors were identified in the forward estimate process.
Historic estimates	5.4	Not adequate	Not compliant	A number of errors were identified in the historic estimate process.
Proportion of HE	5.5	Adequate	Not compliant	The proportion of HE was incorrectly recorded.
Billed vs consumption comparison	5.6	Effective	Compliant	Whilst the billed and consumption totals are different, the billed information is correct and the variance will reduce over a longer period.

Persons Involved in This Audit

Auditor:

Steve Woods Veritek Limited

Pulse personnel assisting in this audit were.

Name	Title
Sean Campbell	Reconciliation Manager, Pulse
Jonathan Baker	Operational Analyst, Vector

Service providers assisting with processes within the audit scope:

Company	Processes
Wells	NTOU Meter reading
Vector	Registry and submission

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1. Pre-Audit and Operational Infrastructure Information

1.1 Scope of Audit

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

65. Industry body to commission performance audits

- 65.1 The industry body must arrange at regular intervals performance audits of the allocation agent and allocation participants.
- 65.2 The purpose of a performance audit under this rule is to assess in relation to the allocation agent or an allocation participant, as the case may be, -
 - 65.2.1 The performance of the allocation agent or that allocation participant in terms of compliance with these rules; and
 - 65.2.2 The systems and processes of the allocation agent or that allocation participant that have been put in place to enable compliance with these rules.

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

The audit was carried out on July 26th 2015 at Pulse's office in Auckland and August 19th at Vector's office in Wellington.

Pulse engages Vector to manage registry population activities and to prepare and submit information to the allocation agent.

The scope of the audit includes "downstream reconciliation" only, as shown in the diagram below. Pulse only intends to deal with allocation group 6 ICPs; therefore they do not have any TOU processes or systems.



July 2015

1.2 Audit Approach

As mentioned in Section 1.1, the purpose of this audit is to assess the performance of Pulse 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 Pulse 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 Pulse'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.

1.3 General Compliance

This is Pulse's first performance audit under rule 65; therefore, there is not a previous audit report for review.

Pulse has 38 alleged breaches recorded by the Market Administrator since July 2014. These are summarised as follows:

Nature of Breach	Rule	Quantity	Section in this Report
Switching Breaches		37	N/A
Late submission	26.2.3, 32	1	5.1

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

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

Breach Allegation	Rules	Section in this report
Altitude figures are incorrect for ten ICPs. Five ICPs have consumption information error percentages greater than the allowable 1.0%. The total annual over recording of consumption information is approx. 2.0GJ for the five ICPs.	28.2	2.1.2
Four meter pressure discrepancies leading to under recording of consumption information by approx. 4.5GJ per annum.	28.2, 26.2.1	2.2
Incorrect consumption information submitted to the allocation agent as a result of inaccurate forward estimates.	26.2.1	5.3
Incorrect consumption information submitted to the allocation agent as a result of inaccurate historic estimates.	26.2.1 & 35	5.4
The proportion of HE was incorrectly recorded for newly switched in ICPs and due to a specific issue in March 2015.	40.1	5.5

1.4 Provision of Information to the Auditor (Rule 69)

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

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

Information was requested from other parties 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 2013 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. Pulse provided comments, which are attached as Appendix 2. No changes were made to the report as a result of these comments.

1.6 Transmission Methodology and Audit Trails (Rule 28.4.1)

All meter reading data is transmitted to Pulse in a secure manner; by FTP. A complete audit trail is available 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 5259:2004, for metering equipment installed at each consumer installation, for which the retailer is the responsible retailer.

GIC produced a "billing factors guideline note" in December 2011. I have referred to this during my examination of compliance.

Compliance with this rule has been examined in relation to the set-up of ICP, metering and billing information.

2.1 ICP Set Up Information

2.1.1 Registry Population Process

I examined the process for the connection and activation of new ICPs and for the establishment of new ICPs in Pulse's database.

Vector is engaged by Pulse as their agent to manage registry population. Vector provides Pulse with a file for every newly switched in ICP, which contains the GTN content and the same fields that would appear in a registry list file. New connections are managed by Pulse and they provide information to Vector for these ICPs.

Validation processes are currently limited to a check between the list provided by Pulse to Vector each month to ensure Vector has the same ICPs in their list. There is no validation of registry ICP status against either Pulse's or Vector's information. Consumption information is provided to the allocation agent for 125 ICPs with a status of ACTV and 33 ICPs with a status of INACT. These ICPs should all have a status of ACTC. Pulse has not achieved compliance with rules 26.5.1, 26.5.2 and 26.5.3, which requires that they must ensure information on the registry is accurate, complete, not misleading and is updated in a timely manner.

There were 13 status updates during 2015. The registry was updated more than five business days after the actual event date for two of the 13 ICPs. In both cases the change was made to correct an incorrect status, not as a result of a physical reconnection. The average duration of status updates on the registry is 6.8 business days. If I exclude the two backdated changes the average is 2.5 days.

When Pulse sends the list of ICPs with consumption information to Vector each month, any ICPs with zero consumption do not have a consumption row populated, they are just excluded. It may assist future validation processes if these ICPs have the consumption row populated with zero.

I recommend status validation processes are implemented because incorrect status information can lead to incorrect consumption information being provided to the allocation agent.

2.1.2 Altitude Information

It is a distributor responsibility to populate the registry with current and accurate altitude information.

NZS 5259:2004 Amendment No1, which was published in November 2009, contains two changes, which affect the way that altitude information should be managed.

- 1. The maximum permissible error has been reduced from \pm 1.5% to \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."

Pulse uses the data populated on the registry by distributors. Whilst this is appropriate, I recommend the introduction of some validation steps to identify "outliers" and I recommend validation between the data used by Pulse and the data on the registry to identify changes by distributors and to identify incorrect population of Gentrack.

Pulse provided a registry list file and I checked a sample of ICPs per distributor 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 10m for altitude. An evaluation against this data is considered an appropriate test for "reasonableness".

Altitude figures within approximately 90m of the actual altitude will ensure the conversion of volume to energy has an accuracy within \pm 1.0%. As shown in the table below, the altitude figures for all ICPs checked were within 90m.

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 10m, therefore, to allow for this margin, I have checked that the registry data is within 20m of "google earth" data.

Distributor	Total ICPs	ICPs checked Quantity within 20m		Quantity within 90m
UNLG	204	10	9	10
NGCD	413	10	10	10
РОСО	482	10	10	10
GNET	158	10	10	10
Total	1,257	40	39	40

As shown in the table below the altitude data on the registry appears to be very accurate. There is only one ICP where the altitude difference is greater than 20m, but it is within 90m.

I also checked all ten ICPs where Gentrack had either zeros or blanks in the altitude field. The table below shows the results of this analysis. The error percentage denotes the resulting error in the conversion of volume to energy, by using incorrect altitude figures.

ICP Reference	Pulse altitude	List file altitude	Google Earth altitude	Error %	Comments
ICP # 1	blank	87	91	1.01%	New connection
ICP # 2	0	0	86	1.00%	Switch in
ICP # 3	blank	40	39	0.46%	New connection
ICP # 4	0	0	41	0.47%	Switch in
ICP # 5	0	0	38	0.44%	Switch in
ICP # 6	blank	125	120	1.46%	New connection
ICP # 7	blank	164	171	1.92%	New connection
ICP # 8	0	0	23	0.26%	Switch in
ICP # 9	blank	30	40	0.35%	Switch in
ICP # 10	blank	110	115	1.29%	New connection

As shown in the table above, the altitude figure on the registry was incorrectly populated as zero for four ICPs. These were all on the UNLG network. Five of the six ICPs where Pulse has blanks in the altitude field are new connections. The percentage error is above the allowable 1.0% for five of the ten ICPs. Although the total annual consumption discrepancy is less than 2GJ, compliance has not been achieved by Pulse and UNLG.

2.2 Metering Set-up Information

Meter pressure figures are populated from switch files at the time of switch in. This information is not validated against the meter owners' information. The "Gas Registry Amendments" project will result in metering information being populated on the registry, but I recommend Pulse validates all relevant metering fields against the meter owners' data until the registry information is available for that purpose.

The "Registry Amendments Implementation Group" (RAIG) has conducted some validation between allocation participants' information and meter owner's information. Pulse was provided with a list of 17 ICPs with meter pressure discrepancies. Once the correct pressure has been confirmed Pulse intends to correct the pressure from the date of the confirmation, unless the difference is considered to be "large". A threshold for "large" differences has not been defined.

Table 3 of NZS 5259:2004 stipulates \pm 1.1% as the maximum permissible conversion error for meter pressure. The error is greater than this threshold for four ICPs, which has led to submission of incorrect consumption information to the allocation agent. Compliance has not been achieved with rules 26.2.1 and 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.

Pulse sourced their temperature data from Vector, who have chosen option (c). Pulse applies 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. Vector has advised that the source of the data is a file from NIWA that was provided in approximately 1994. Vector believes the temperature data contained in the file may be an average of ground and air temperatures. I compared Vector's temperature data to data recently provided by NIWA and the figures used appear to be approximately 1.5°c to 2.0°c lower. I recommend Pulse liaises with Vector to refresh this data and record the date this was done.

The matter of temperature data has been subject to considerable discussion in recent months. Allocation participants are using data from different sources which contains different temperature figures for similar regions. I haven't identified a single source of data that I consider to be more correct than other sources. I recommend Gas Industry Company develops and publishes one set of data with monthly temperature figures per gas gate per month.

The Billing Factors Guideline contains the following expectations, which reinforce my recommendation.

• Retailers select weather stations relevant to the area supplied by each gas gate at which they are trading. Weather stations should have at least five years of historical ground temperature data at 300 mm depth.

- Retailers obtain daily or monthly average temperature data based on the previous five years of weather records for each chosen weather station.
- Retailers use daily or monthly average temperature data to construct average temperatures for billing and reconciliation purposes.
- Retailers refresh temperature data on a regular basis, at least every five years.

Pulse does not apply the Joule Thompson effect adjustment because network pressure information on the registry is not considered 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 Thompson effect is desirable.

The Billing Factors Guideline contains the following expectations by GIC:

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

This also reinforces that adjustment for the Joule Thompson effect is desirable.

I recommend Pulse adjusts for the Joule Thompson effect.

2.3.2 Calorific Values

Gas composition data is sourced from the Open Access Transmission Information System (OATIS) and is loaded into Gentrack each day. A check is conducted each day to ensure the information has loaded correctly.

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. Pulse has not been operating for 30 months, but they intend to keep data for at least this period of time.

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.

Pulse only intends to deal with group 6 ICPs and they are read monthly.

I checked the consumption records at Vector and I confirm that no ICPs have consumption over 250GJ per annum. I recommend consumption information is checked on a monthly basis to ensure the 250GJ threshold is not exceeded.

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. A validated register reading must be obtained at least once every 4 months for 90% of consumer installations with non-TOU meters to which the retailer has continuously supplied gas for the previous 4 months.

The GAS080 files show that Pulse has obtained meter readings each month for over 99% of installations supplied for 4 months. Pulse has not yet supplied any ICPs for more than 12 months.

3.4 Non TOU Validation

Meter reading validation occurs at multiple levels. Firstly, at the handheld level where a localised validation occurs to ensure the reading is within expected high/low parameters.

Readings that fail this validation are required to be re-entered, and if the two readings are the same, the second reading will be accepted. If the second reading is different, (potentially indicating the first reading was incorrect) then the second reading is required to be re-entered.

Meter serial numbers are provided to meter readers and can be viewed in their hand held devices. This assists with ensuring that meter readings relate to the correct meter.

Further validation occurs using "sql" queries to validate the billing data within Gentrack and includes the following checks:

- Negative consumption
- High consumption (over 300%)
- Zero consumption (outbound calls are made to verify if zero is expected)
- Long billing period
- Not active with Pulse (billing will not occur)

• Vacant consumption (the metering team looks at these)

Wells is required to identify issues which may affect metering information accuracy, such as stopped or damaged meters.

A final validation occurs at "Dataprint" when the invoices are produced. The checks conducted are:

- High dollar amount (over \$1,000)
- Invoice credits of more than a set amount
- Billing periods longer than 60 days.

Dataprint sends back a complete list of what is going to be billed and some random checks are conducted prior to bills being sent.

3.5 Non TOU Error Correction

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

Changes to consumption information can only occur if changes have been made to billing information. In most situations, Pulse adopts a "reverse and rebill" process to correct billing and therefore consumption information. This process was examined and as long as the "reverse and rebill" process is used, consumption information for prior consumption periods is included in the revision process and provided to the allocation agent. There were no specific examples to examine, although meter pressure issues recorded in Section 2.2 will result in correction for some ICPs.

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 two ICPs was entered into the spreadsheet and the resulting energy value was compared to that calculated by Gentrack. This comparison confirmed the accuracy of the Gentrack calculation and confirmed compliance with NZS 5259. One ICP had consumption spanning two months and the other one had consumption within one month.

The small sample size for this comparison is considered appropriate because the calculation being evaluated is conducted entirely within the Gentrack system, with no manual intervention. Therefore, the only opportunity for error is if the incorrect factors are present within the system.

5. Estimation and Submission Information

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

Each month Pulse supplies Vector with a billing file including meter readings, dates and consumption information. Vector produces GAS040 and GAS070 files from this information using a spreadsheet based system.

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

The matter of "vacant consumption" was examined. When an ICP is vacant but still active (ACTV on the registry), meter reading still occurs but any volume that is recorded is only converted into validated consumption for inclusion in the allocation process, if it is billed. Billing will only occur if a consumer is identified. As mentioned in Section 2.1.1, there are 158 ICPs with a registry status of ACTV or INACT. All of these ICPs have consumers and therefore consumption information is correctly billed and submitted to the allocation agent. There may be instances where consumption is detected and a consumer is not recorded in Gentrack, therefore I recommend Pulse develops a process to deal with this consumption to ensure it is included in the submission process.

As noted in other sections in the report, 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.
- Some forward estimate calculations were incorrect.
- Some historic estimate calculations were incorrect.

5.2 Initial Submission Accuracy (Rule 37.2)

Compliance with this rule can only be examined once some final allocations are performed.

5.3 Forward Estimates (Rules 34 & 36)

Pulse's forward estimate process is based on a "straight line" methodology, using the annual consumption figure from the previous retailer's GTN file where no history exists and where history does exist a forward standard estimate is conducted based on the previous read to read history.

I identified some inaccuracies in the forward estimate methodology, which are listed below:

 If the previous retailer supplies an incorrect annual consumption figure of zero, this is used as the basis for Pulse's forward estimate, leading to an estimate of zero. I recommend Pulse establishes a "forward default estimate" figure for use in these situations. 65 ICPs in the July 2015 GAS040 file had estimates based on the previous retailer's annual consumption figure and for 10 of the 65 the figure was zero.

- If consumption information is calculated from the previous retailer's annual consumption figure in the GTN file, the consumption information is identified as "HE" when it should be identified as "FE".
- When reversals appear in the file from Pulse to Vector, they are merged with the main data table; however they are not always merged into the correct date order. This means that sometimes the "positive" consumption is allocated from the date of the reversal until the latest meter reading date instead of the date of the original meter reading until the reversal date. This resulted in over estimation for some ICPs based on a kWh per day figure that is higher than it should be.

Whilst the rules allow the participant to determine the method used for calculating forward estimates, rule 26.2.1 requires information to be accurate and complete. Compliance has not been achieved with rule 26.2.1.

5.4 Historic Estimates (Rules 34 & 35)

Vector conducts HE calculations for Pulse. I checked several standard scenarios and confirm the calculations are correct where meter readings and seasonal adjustment daily shape values are available for the calculation. I identified some inaccuracies in the historic estimate methodology, which are listed below:

- The consumption information for the initial allocation for gas gate WAK22801 for March 2015 was 34GJ. Gas gate WAK22801 ended on 31/03/15 and all ICPs were transferred in Vector's data table to WAK22802, therefore when the consumption information was calculated for the interim allocation for March 2015, there were no ICPs at WAK22801, therefore the consumption information was zero. Vector re-ran a GAS040 file to confirm that the consumption information for the final allocation will be correct.
- When the consumption information was calculated for April 2015 for WAK22802, the meter readings were recorded against WAK22801, which meant that any reads prior to 01/04/15 were ignored and consumption information was not calculated for any ICPs with reads prior to 01/04/15. The overall result was under recording of consumption information for the month of April 2015. 4.05GJ was submitted but it should have been 47.69GJ.
- Because gas gate WAK22802 started on 01/04/15, seasonal adjustment daily shape values are only available from 01/04/15. The calculation of historic estimates for the interim submission for the months of March and April were conducted as if the ICPs were continuously at WAK22802, rather than at WAK22801 until the end of March and at WAK22802 from April onwards. The lack of seasonal adjustment daily shape values for the March month meant all of the consumption for March and April was allocated to April.
- A further issue is that the use of readings from future months was disabled, meaning that consumption information was estimated based on historic consumption even if readings were available to allow historic estimates to be calculated. This created a greater problem in April because consumption was incorrectly over recorded and this over recorded consumption was used as the basis for forward estimates.

The matters recorded above have been resolved and consumption information for subsequent revisions will be correct. The processes initially employed did not achieve compliance with rules 26.2.1 and 35. The table below shows the original and corrected consumption information for the period March 2015 to May 2015 for gas gates WAK22801 and WAK22802 plus the total for all gas gates.

	Gas Gate	Mar-15	Apr-15	May-15
Original data	WAK22801	Null		
	WAK22802		4.05	20.15
	All gas gates	932.43	1,123.16	2,067.30
Corrected data	WAK22801	27.99		
	WAK22802		87.26	47.69
	All gas gates	931.91	1,422.00	2,627.00

5.5 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.

As recorded in section 5.3, If consumption information is calculated from the previous retailer's annual consumption figure in the GTN file, the consumption information is identified as "HE" when it should be identified as "FE".

An additional issue is that the HE percentage for March 2015 is only approx. 50%. This was caused by the use of the March GEIP (network billing data) so only consumption information based on March invoices was used instead of normalised consumption with a higher proportion of HE.

These matters have been resolved and subsequent revisions will contain correct data.

5.6 Billed vs Consumption Comparison (Rule 52)

Vector prepares and sends GAS070 files. A GAS070 file for a recent month was examined and compared to the data at ICP level; the totals matched which confirms compliance. This also proves that consumption information provided to the Allocation agent is calculated at ICP level and then aggregated.

The May 2015 GAR080 file (gas supplied vs allocation) shows a difference of 17.09%, which is considered a large variance. This can be explained by the low number of ICPs and the short period of evaluation. As mentioned above, the process for the preparation of the GAS070 file is correct.

6. Observations and Recommendations

The following recommendations are made as a result of this audit:

- I recommend status validation processes are implemented because incorrect status information can lead to incorrect consumption information being provided to the allocation agent.
- Pulse uses altitude data populated on the registry by distributors. Whilst this is appropriate, I recommend the introduction of some validation steps to identify "outliers" and I recommend validation between the data used by Pulse and the data on the registry to identify changes by distributors and to identify incorrect population of Gentrack.
- I recommend Pulse liaises with Vector to refresh the temperature data, which was sourced in 1994. I also recommend Gas Industry Company develops and publishes one set of data with monthly temperature figures per gas gate per month.
- Joule Thompson adjustment does not occur. I recommend Pulse considers adjusting for the Joule Thompson effect, in line with the GIC recommendations.
- I recommend consumption information is checked on a monthly basis to ensure the 250GJ threshold is not exceeded for allocation group 6 ICPs.
- Consumption information is only provided to the allocation agent where a consumer is recorded in Gentrack. There may be instances where consumption is detected at ACTV or INACT ICPs and a consumer is not recorded in Gentrack, therefore I recommend Pulse develops a process to deal with this consumption to ensure it is included in the submission process.
- I recommend Pulse establishes a "forward default estimate" figure for use in situations where the annual consumption figure in the GTN file from the losing participant is incorrect or is zero.

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 – Pulse Comments

Pulse accepts the findings of your report. Pulse intends to create validation processes and reports in the areas you recommended in the coming months.

Pulse agrees with your recommendation that the Gas Industry should provide all participants with temperature data, to ensure all participants are using the same data. Pulse does not intend at this time to implement the Joule Thompson effect due to limitations of its current billing engine and the significant expense which would be incurred, unless the Gas Industry made such adjustment mandatory. We also have been informed that variability in the network pressure (and accuracy of network data) means that the ability for the Joule Thompson effects to be accurately accounted for may be questionable even if the system was modified to allow for the effect.

Pulse notes that Vector have implemented processes to correct all but one of the submission issued identified, with the remaining issue to be resolved in the coming months.