PIPELINE CAPACITY DISCLOSURE

Relating to
Gas (Information Disclosure) Regulations 1997

Year Ending 30 June 2007

August 2007

1. INTRODUCTION

This document comprises the Pipeline Capacity Disclosure of Vector Gas Limited ("VGL") [formerly NGC New Zealand Limited] pursuant to the Gas (Information Disclosure) Regulations 1997 (the "Regulations"), Schedule 1, PART 5, for the year ending 30 June 2007.

As far as practicable main section headings mirror those of Schedule 1, PART 5 of the Regulations. For additional clarity the relevant clause number of Schedule 1 PART 5 is given alongside each main section heading, and some sub-section headings.

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Terminology

In this report terminology generally matches that in the Regulations. Some terms differ from those currently used in VGL's Transmission System Information Memorandum and transmission services agreements. For example:

Term in this Report:	Equivalent VGL Term:
Intake Point	Receipt Point
Offtake Point	Delivery Point
transmission system	pipeline (ie *part of* the "Transmission System")

Exclusions

This report covers the transmission pipelines specified in the Regulations. Some parts of VGL's Transmission System, specifically minor laterals off the Maui pipeline, are not covered. These include the Te Awamutu North lateral, the Te Kuiti South and the Te Kuiti North laterals.

Disclaimer

Except in the case of a pipeline with a single Intake Point supplying a single Offtake Point it is difficult to describe a pipeline's capacity in simple terms. VGL's pipelines serve multiple Offtake Points most of which are entirely independent of each other notwithstanding that they may supply similar loads, for example dairy factories, or be subject to similar influences, such as the weather.

In addition, since gas is a compressible fluid the quantity of energy stored within

a pipeline (“line pack”) may change significantly over time as pressures change. As a consequence the flow at a pipeline’s Intake Point need not necessarily equate to the sum of the offtakes at any given time. This has a significant bearing on a pipeline’s ability to supply the various Offtake Points.

It is the interaction of all the time-varying offtakes along its length that determines a pipeline’s capacity to transport gas from the Intake Point to a given Offtake Point. Therefore capacity must generally be defined as the ability to transport gas from the Intake Point to a given Offtake Point *subject to* what is happening at other Offtake Points at the same time. Where there are multiple large Offtake Points a significant change at any one of them may materially affect the capacity available to the others.

Information contained in this report is presented in good faith in order to comply with the Regulations and to give an overview of the capacity of VGL's transmission systems.

However, shippers or potential shippers should not base their business decisions on the information contained in this report without consulting VGL.

VGL will accept no responsibility for the consequences of any misunderstanding, misinterpretation or misuse of information contained in this report.

While reasonable care has been taken in the preparation of this report, VGL takes no responsibility for the consequences of any errors that may be contained herein.

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2. TRANSMISSION SYSTEMS

(Ref. Schedule 1 Part 5, Clause 1)

The attached map and pipeline schematics (sheets 01 to 06) depict VGL's high-pressure gas transmission pipelines. They show all Intake and Offtake Points, other pipeline stations including compressor stations, pressure reductions stations and main line (ie line-break isolation) valves, pipe sizes and other information.

Distances between any two stations on the same pipeline can be calculated from the respective station numbers shown on the schematics, as follows:

> The last 4 digits of each station number give the distance in km (ie wxy.z km) of that station from the origin of the particular pipeline or lateral on which it is located.
>
> *Example 1:* Gisborne Sales Gate has the station number 5052013. This means that this station is on the 505 lateral, which starts at the Gisborne Offtake Station near Kawerau, and is 201.3 km downstream of that point.
>
> *Example 2:* The distance between the Southdown and Henderson Delivery Points (on the North System) is found by subtracting the upstream station number from the downstream, ie:
>
> | | | |
> |---|---|---|
> | Henderson station number | = | 4300355 |
> | Southdown station number | = | 4300015 |
> | | | |
> | Distance between these points | = | 34.0 km |

Tables 2.7.1, 2.7.2 and 2.7.3 show the station number, location and map grid reference of each Intake and Offtake Point.

Clause 23 (4) of the Regulations requires VGL to treat the following four transmission pipelines as separate transmission systems:

- North (ie north of Rotowaro)
- Central (ie Kapuni to Rotowaro including the Morrinsville sub-system)
- Bay of Plenty (ie east of Pokuru)
- South (ie south of Kapuni)

The Central System is currently divided into two sections, the Central (North) and Central (South). There is an interconnection between the Central (South) System and the Bay of Plenty System at Pokuru (No.2).

As in last year's disclosure this report includes the Frankley Rd to Kapuni transmission pipeline. This reflects VGL's treatment of the Frankley Rd to Kapuni pipeline as a separate system for pricing purposes.

Therefore the transmission pipelines presented in this disclosure are:

- **North:** extending from the end of the Maui pipeline at Rotowaro (near Huntly) to Auckland, then through to Kauri north of Whangarei;

- **Central (North):** extending from Rotowaro to Hamilton (Temple View) and including the Morrinsville sub-system;

- **Central (South):** extending from the Kapuni Gas Treatment Plant to the interconnection to the Bay of Plenty System at Pokuru ("Pokuru No.2 Offtake");

- **Bay of Plenty:** extending east from Pokuru (near Te Awamutu) on the Maui line to Tauranga, Taupo and Gisborne, etc;

- **South:** extending south from the Kapuni Gas Treatment Plant to Wellington and Hastings;

- **Frankley Rd to Kapuni:** extending from the Frankley Rd Offtake Station on the Maui pipeline near New Plymouth to the Kapuni Gas Treatment Plant, including laterals to the TCC Power Station and the Ammonia-Urea Plant.

For convenience a certain amount of information has been extracted from the attached schematics and presented in the following tables. Note that "MAOP" means the maximum allowable operating pressure of the pipeline.

Table 2.1 North System

The pipeline consists of the following main sections:

Pipeline Segment	Nominal Bore (mm)	Length (km)	MAOP (bar g)
Rotowaro - Papakura East PRS	350	60.8	86
Papakura East PRS - Westfield	350	26.7	66
Rotowaro - Papakura West	200	60.8	86
Ingram Rd - Glenbrook	150	23.0	86
Westfield - Henderson	200	35.5	66
Henderson - Whangarei Offtake	150	145.4	86
Whangarei - Kauri	100	21.5	86

Table 2.2 Central (North) System

This pipeline consists of the following main sections

Pipeline Segment	Nominal Bore (mm)	Length (km)	MAOP (bar g)
Rotowaro - Te Kowhai	200	25.8	86
Te Kowhai - Te Rapa Offtake	150	6.3	86
Te Rapa lateral	200	1.3	86
Te Rapa Offtake - Horotiu East	150	1.0	86
Horotiu East - Kuranui Rd	100	24.8	86
Kuranui Rd - Cambridge	80	22.7	86
Kuranui Rd - Morrinsville	150	8.5	86
Morrinsville - Waitoa	100	9.4	86
Te Kowhai – Hamilton (T/V)	200	9.7	86

Table 2.3 Central (South) System

This pipeline consists of the following main sections

Pipeline Segment	Nominal Bore (mm)	Length (km)	MAOP (bar g)
Kapuni - New Plymouth Offtake	200	52.9	86
New Plymouth lateral	100	10.5	86
New Plymouth - Mahoenui Cpr.	200	81.7	86
Mahoenui Cpr. – Pokuru No.2 Offtake	200	84.0	86
Pokuru No.2 O/T – Temple View MLV	200	24.5	86

Table 2.4 Bay of Plenty System

This pipeline consists of the following main sections.

Pipeline Segment	Nominal Bore (mm)	Length (km)	MAOP (bar g)
Pokuru - Kinleith	300	78.8	86
Kinleith - Kawerau	200	103.1	86
Kawerau - Whakatane	100	13.7	86
Kawerau - Gisborne	100/200	184/17.3	86
Lichfield - Mt Maunganui Offtake	150/100	34.3/43.7	86
Taupo lateral	100/150	18.2/20.7	86
Rotorua lateral	80	18	86

Table 2.5 South System

This pipeline consists of the following main sections. This system is extensively looped. Loops are tabulated separately.

Pipeline Segment	Nominal Bore (mm)	Length (km)	MAOP (bar g)
Kapuni GTP – Hawera	200	17.8	86
Hawera – Wanganui	200	79.9	86
Wanganui – Himatangi	200	51.4	86
Himatangi - Palmerston North O/T	150/80	23.8/23.8	86
Palmerston North – Hastings	150/200	5.8/123.5	86
Himatangi – Wellington	200	104.1	86

The looped sections of the system are:

Pipeline Segment	Nominal Bore (mm)	Length (km)	MAOP (bar g)
Hawera – Kaitoke Compressor	300	87.3	86
Otaki Tie-In – Belmont	300	55.7	86

Table 2.6 Frankley Rd to Kapuni System

This pipeline consists of the following main sections.

Pipeline Segment	Nominal Bore (mm)	Length (km)	MAOP (bar g)
Frankley Rd - Derby Rd Compressor	500	22.3	66
Derby Rd – Pembroke Rd	500	5.5	66
Pembroke Rd – TCC Power Station	500	8.6	66
Pembroke Rd – Kapuni GTP	500	18.8	66
Kapuni – Ammonia Urea Offtake	100	0.4	86
Ammonia Urea Offtake - Lactose	100/200	1.8/1.3	86

3. INTAKE POINTS (Ref. Schedule 1 Part 5, Clause3)

In the year ending 30 June 2007 the Intake Points for VGL's transmission pipelines were as follows:

North System

There was only a single Intake Point, at Rotowaro. All gas entering the North System there was received from the Oaonui – Rotowaro pipeline owned by Maui Development Limited.

South System

There were two major Intake Points for the South System, namely the Kapuni Gas Treatment Plant and the Mokoia Mixing Station, south of Hawera.

Central System

Rotowaro was the sole Intake Point for the Central (North) System.

The sole Intake Point for the Central (South) System was the Kapuni Gas Treatment Plant. The McKee Mixing station near Tikorangi was de-commissioned during the year.

Bay of Plenty System

Gas entered the Bay of Plenty System either through the Pokuru No.1 Intake Point (from the Maui pipeline) or the Pokuru No.2 Intake Point (from the Central (South) System).

The Pokuru No.2 Offtake is not a determining factor in the capacity of the Bay of Plenty System. The Pokuru No.1 and Pokuru No.2 Intake Points are located within a hundred metres or so of each other, adjacent to the Pokuru compressor station.

Frankley Rd System

During 2006 the Frankley Rd System became “bi-directional”. Means of injecting gas into the system at Kapuni were installed, while metering at the Frankley Rd Intake Point was changed to allow two-way flow. (The latter change reflected the introduction of “open access” on the Maui pipeline; in effect Frankley Rd became both an Intake Point and an Offtake Point.)

In practise however, the great bulk of the gas which entered the Frankley Rd System did so via the Intake Point from the Maui pipeline at Frankley Rd.

The Kaimiro Intake Point was not used during the year and is currently not able to be used.

The TAW Interconnection point at Stratford was used very little.

Therefore the Frankley Rd Intake Point was treated as the sole Intake Point for the Frankley Rd System.

4. OFFTAKE POINTS (Ref. Schedule 1 Part 5, Clause 4)

Tables 4.1 to 4.6, respectively, give the following information for each pipeline:

- Date of the system peak week
- The throughput of each Offtake Point in the system peak week
- For each Offtake Point with a throughput in the system peak week greater than 2,000 GJ, the dates of the Offtake Point's peak week
- For each Offtake Point with a throughput in the system peak week greater than 2,000 GJ, the Offtake Point's peak week throughput
- The average throughput in the system peak week of all Offtake Points with a throughput in the system peak week less than 2,000 GJ
- Total system throughput in the system peak week
- The numerical factor (ie multiplier) by which the throughput of each Offtake Point with a throughput in the system peak week greater than 2,000 GJ could have been increased, assuming:
    - the same load profile at each Offtake Point; and
    - no capital expenditure (ie no system expansion); and
    - no change in throughput at other Offtake Points
- The *increase* in weekly throughput after applying the above factor. (NB: If the factor is "x" the *increase* is (x-1) × weekly throughput.)

5. FURTHER DISCLOSURE: OFFTAKE POINTS WITH THROUGHPUT LESS THAN 2,000 GJ/WEEK

(Ref. Schedule 1 Part 5, Clause 5)

Tables 4.1 to 4.6, respectively, also show for each pipeline the following information in respect of each Offtake Point with a throughput in the system peak week less than 2,000 GJ:

- Throughput of each such Offtake Point in the system peak week
- Total throughput of all such Offtake Points in the system peak week
- Average throughput of all such Offtake Points in the system peak week

6. CRITICAL POINTS OF TRANSMISSION SYSTEMS

(Ref. Schedule 1 Part 5, Clause 6)

Tables 6.1 to 6.6, respectively, show for each pipeline the following information in relation to each Offtake Point with a throughput in the system peak week greater than 2,000 GJ:

- The factor by which the throughput of the Offtake Point could have been increased in the system peak week assuming no capital expenditure on the Offtake Point for the increased throughput.
- The critical point or section of pipeline providing the first or principal constraint on increased throughput at the Offtake Point in the system peak week
- A brief statement of *a* possible means to remove the constraint
- An estimate of the increase in throughput at the Offtake Point given the removal of the constraint
- An estimate of the capital cost to remove the system constraint on the estimated increased throughput

7. METHODOLOGIES (Ref. Schedule 1 Part 5, Clause 7)

Intake Points (Ref. Clause 3)

South System

The actual flow rates in the system peak week for Kapuni and Mokoia were used in the modelling. When determining the numerical factors for possible throughput increases with Kapuni as the Intake Point, the Kapuni supply pressure was fixed at 84barg, and the Mokoia flow rate was fixed at the system peak week actual flow.

When determining the numerical factors for possible throughput increases with Mokoia as the Intake Point, Mokoia supply pressure was fixed at 74barg, and the Kapuni flow rate was fixed at the system peak week actual flow. 74barg was the maximum possible pressure at Mokoia that would allow the flow from Kapuni while preventing the Kapuni supply pressure from exceeding 84barg.

Offtake Points (Ref. Clause 4)

Information disclosed as required by Clause 4 (4) of the Regulations was determined as set out below.

Peak Week Dates (Ref. Clause 4 (4) (a))

For Systems

For all Offtake Points with gas measurement systems incorporating electronic data storage capability (the vast majority) reports are available from the transmission billing system showing the daily throughput at each Offtake Point.

For each transmission system a spreadsheet was compiled showing the daily throughput of all Offtake Points for the whole year. Aggregate daily and weekly throughputs were then calculated.

In all cases, the system peak week was taken to be the week, ie 00:00 hours on Monday to 24:00 hours on Sunday, in which the aggregate offtake was greatest.

For Individual Offtake Points

The date of each Offtake Point's *individual* peak week was obtained from the spreadsheets of daily throughput for each system referred to above.

Peak Week Throughput (Ref. Clause 4 (4) (b))

For the System

In all cases, system peak week throughputs were obtained from the spreadsheets of daily throughput for each system referred to above.

For the Offtake Points

Individual Offtake Point peak throughputs were obtained from the spreadsheets of daily throughputs for each system referred to above.

Throughput Increase in System Peak Week

(Ref. Clause 4 (4) (c))

General Considerations

The numerical factor (multiplier) by which the throughput of each Offtake Point could have been increased in the system peak week was determined using VGL's transient flow model (the "Model", as defined below). In accordance with the requirements of the Regulations this was done (i) assuming no capital investment to increase existing system capacity and (ii) no change in throughput at other Offtake Points on the system.

- Using data from SCADA or electronic correctors as applicable, flow rates (in standard m^3/s) were calculated for each hour of the system peak week for each Offtake Point. The data was assembled into "flow profiles" of the form required by the Model, then loaded into the model. (A hard copy of each flow profile is included in Appendix 1.)

- For the few Offtake Points for which hourly data was not available (those having metering without electronic data storage capability, ie generally sites with very small throughput) an average flow rate was calculated from meter readings and entered into the Model.

- Each of the defined transmission systems was modelled separately. The Model was first run with actual loads in the system peak week to generate appropriate starting conditions for subsequent simulations.

- An Offtake Point was then selected and a multiplier applied to its flow profile. This factor affected only the hourly flow rates for the chosen Offtake Point.

- Each simulation was continued until it became evident either that the increased load was unsustainable or conversely a larger factor could be applied. A new factor was selected and the simulation repeated. This process was continued until the maximum factor consistent with the acceptability criterion (see below) was identified.

- The above process was applied in turn to each Offtake Points on the system with a throughput greater than 2,000 GJ in the system peak week.

- The acceptability criterion applied to determine whether the increased throughput would have been achievable or not was whether the pipeline pressure at the most critical point of the system remained above the minimum acceptable value. For the Northland section of the North System, this was taken as 20 bar g; for other systems, this generally was taken as 25 - 30 bar g. A lower pressure criterion would have resulted in only an insignificant increase in throughput. No account was taken of the rate of pressure decay to the minimum acceptable value or the "volatility" of the pressure at the critical point resulting from the increased throughput.

- Where the pressure drop in a lateral or section of pipeline was observed to be exceptionally high given the increased throughput the maximum velocity of gas in the pipeline was checked. In some cases this constituted the limit on increased throughput.

- Where compression at the Intake Point was not modelled (see below) the maximum flow rate through the Intake Point during each simulation was noted. This was later checked against the known capacity of the existing compression to verify the adequacy of such compression.

- The Model is set up to model only high pressure pipelines. Offtake Points are not modelled. Attempting to simulate flow through the heater, regulators or control valves, piping and meter of each Offtake Point on the system would result in an unwarranted increase in complexity and simulation running time. As a consequence no account was taken of the ability of an existing Offtake Point to handle increased throughput. It was assumed that an Offtake Point could be upgraded if required. *(This is a significant assumption in view of the possibility of additional land being required and/or more stringent operating restrictions being imposed by statutory authorities as a condition of any significant upgrade being permitted. Readers of this report should take note.)*

- Modelling was undertaken without regard to shippers' current capacity reservations or the probability of the increased throughput ever being required at any particular Offtake Point.

<u>System Specific Considerations</u>

North System

- Capacity of the Rotowaro compressor station, Intake Point for the North System, is directly proportional to the pressure available from the Maui pipeline. The Rotowaro compressor station comprises two gas turbine-driven centrifugal units plus two gas engine-driven 4-cylinder reciprocating units. These units are able to run with a suction pressure corresponding to the minimum contractual Maui delivery pressure, ie 30 bar g, and still achieve a discharge pressure equal to the maximum working pressure of the downstream pipelines (86 bar g).

- For the sake of simplicity compression at Rotowaro was not modelled. Instead a fixed pressure of 84 bar g was assumed in all simulations. The peak throughput of the Rotowaro Intake Point was noted in each simulation. This was added to the peak throughput of the Central (North) System for which Rotowaro is also the Intake Point. The total

peak Rotowaro throughput was compared to the capacity of the compression installed there to check that the latter would have been sufficient.

- Additional criteria applied in the case of the North System were that pipeline pressures at the Otahuhu B and Southdown Offtake Points be not less than about 35 and 53 bar g, respectively, in order that contractual delivery pressure obligations could be met.

- During the year, the Westfield offtake point discharge pressure was adjusted . This has resulted in redistribution of flow throughput into Auckland distribution system amongst Westfiled, Papakura, and Henderson offtake points. The availability of capacity at each offtake point in North system were impacted as a consequence.

- In the system peak week, NZ Refinery Company was using gas. However, because the supply to NZRC is interruptible, the refinery's load was removed from the system while modelling.

Central (North) System

- Rotowaro is the Intake Point for the Central (North) System. As noted above, compression at Rotowaro was not modelled. A fixed pressure of 84 bar g at the Intake Point was assumed in all simulations.

Central (South) System

- Installed compression at the Kapuni Gas Treatment Plant, Intake Point for the Central (South) System, exceeds current requirements. Therefore for simplicity compression at Kapuni was not modelled. A fixed pressure of 84 bar g at the Intake Point was assumed in all simulations.

- The only existing "Offtake Point" north of New Plymouth is the interconnection to the Bay of Plenty System, ie Pokuru No.2 Offtake. In simulations to determine the maximum throughput at this location the existing Mahoenui compressor station was modelled, with a discharge pressure of 84 bar g. A flat load profile (ie constant flow rate) was assumed for Pokuru No.2.

- The Pokuru No.2 Offtake incorporates piping connections to both the suction side and the discharge side of the Pokuru compressors. Simulations to determine the maximum throughput were based on a suction-side connection. The principal criterion was then to deliver the throughput at sufficient pressure, ie 45 bar g, for a single Pokuru unit to be able to compress it into the BOP System.

Bay of Plenty System

- Compression at Pokuru was modelled. The pressure available from the Maui pipeline was assumed to be fixed at 36 bar g. This pressure is lower than that normally available from the Maui line. However, MDL is not obliged to deliver gas from the Maui pipeline at more than 30 bar g. Therefore it was considered prudent to take a conservative view in relation to Maui delivery pressure.

- With a Maui delivery pressure of 36 bar g, both Pokuru compressors

would be required to run (though not at full load) in order to deliver actual flows in the BOP system peak week, let alone any increases in throughput. Because that would leave no spare compression to cover breakdowns, by that criterion the BOP system can be considered to have reached its capacity. Hence the factors in table 4.4 are all zero.

South System

- As noted above installed compression capacity at the Kapuni Gas Treatment Plant exceeds current requirements. Therefore for simplicity compression at Kapuni was not modelled. A fixed pressure of 84 bar g at the Intake Point was assumed in all simulations.

- In simulations of the existing system requiring compression at Kaitoke the smaller (No.1) unit was modelled.

- The discharge pressure set point at Kaitoke was 84 bar g. The No.1 unit was able to maintain this pressure during most simulations.

- The Offtake Points that supply Wellington city are Tawa A (for Powerco's distribution network) and Tawa B (for Nova's distribution network). However, for many years the South transmission system has ended at Waitangirua, some 7.7 km north of Tawa. Since then the section of the original (200 mm) transmission pipeline from Waitangirua to Tawa has operated as a distribution system at a nominal pressure of 19bar. This distribution line was not modelled; factors for Tawa A and B, respectively, therefore technically apply at Waitangirua.

Frankley Rd to Kapuni System

- A fixed pressure of 39 bar g was assumed to be available from the Maui pipeline at the Frankley Rd Intake Point. This pressure is lower than that normally available from the Maui line. However, MDL is not obliged to deliver gas from the Maui pipeline at more than 30 bar g. Therefore it was considered prudent to take a conservative view in relation to Maui delivery pressure. (In reality, compression at Derby Rd was not required at any time during the year.)

- Compression at Derby Rd was modelled. Two of the three compressors were assumed to be running. The discharge pressure set point was 64 bar g. (The Frankley Rd line has a lower design maximum working pressure than the other Systems.) This discharge pressure could not be maintained during simulations, indicating that the capacity of the pipeline exceeded that of the compressors.

- An addition criterion in all simulations was to maintain a minimum delivery pressure of 42 bar g to the Kapuni Gas Treatment Plant.

- Currently Derby Rd compressor station is not operational and will require upgrading work to enable it to be brought back to service.

Further Disclosure Relating to Transmission Systems

(Ref. Clause 5)

Throughputs for Offtake Points with a throughput less than 2,000 GJ in the system peak week were determined in the same way as those for Offtake Points with throughputs greater than 2,000 GJ. (See above.)

Critical Points of Transmission Systems

(Ref. Clause 6 (2))

- During modelling pursuant to Clause 4 (4) (c) of the Regulations the critical point or section of each system constraining further increases in throughput at each Offtake Point was noted.

- For each Offtake Point in turn system a reinforcement option was selected capable of removing the constraint. The appropriate Model files were then amended accordingly.

- For each Offtake Point in turn further simulations were carried out to determine the increased throughput deliverable from the reinforced system. Essentially the same methodology as described earlier (see "Throughput Increase in System Peak Week (Ref. Clause 4 (4) (c))" above) was followed.

- In all simulations a fixed pressure was modelled at the Rotowaro, Pokuru, and Kapuni Intake Points, respectively. The throughput displayed by the Model for each of these Intake Points was noted. In the case of Rotowaro the *existing* flow into the Central (North) System was added to the *increased* flow into the North System. In the case of Kapuni the *existing* flow into the Central (South) System was added to the *increased* flow into the South System. Additional compression requirements (if any) were then calculated from the flow, suction and discharge pressure.

- Where additional compression along the pipeline was considered to be a suitable means of removing a constraint, for example as at Henderson, Horotiu, Frankley Rd, a compressor "module" available within the Model was used in simulations. The compressor throughput, suction and discharge conditions were noted and used to select and cost suitable compression later on.

- Estimates of the cost to remove the constraint affecting each Offtake Point contained in Tables 6.1 to 6.6 were developed using historic average construction rates for pipelines and other facilities. Please note: on no account does VGL wish to imply that the means of increasing system capacity identified in these tables would necessarily be optimum, taking into account the requirements of the system as a whole, or that VGL would necessarily employ such means. The costs are "order of magnitude" only; Vector does not warrant their accuracy.

- No account was taken of RMA-related issues in identifying means to remove constraints on the transmission system. Readers of this report should bear in mind that VGL no longer enjoys the rights of access to private land for the purposes of constructing pipelines and related facilities that it once did.

- Values for the numerical factor by which the throughput of each Offtake Point could have been increased are set out in Tables 6.1 to 6.6 respectively, were in all cases determined through further modelling.

Transient Flow (Capacity Simulation) Model

(Ref. Clause 7 (2))

Modelling of pipeline systems undertaken pursuant to this disclosure was carried out using Stoner Pipeline Simulator (SPS) software, version 9.30, written by Stoner Associates of the USA. The SPS was installed on a PC. Vector has only a single user licence.

A hard copy of the input data (a flow profile for each Offtake Point) is provided in Appendix 1 of this disclosure. This data will be provided on request in Microsoft Excel spreadsheet format.

8. GAS RESERVED IN TRANSMISSION SYSTEMS

(Ref. Schedule 1 Part 5, Clause 8)

Tables 8.1 to 8.6, respectively, show the following information in relation to Intake and Offtake Points on each pipeline for the first, third and fifth financial years after the financial year to which this report refers.

- *Aggregate* reserved capacity (GJ of MDQ) at each Offtake Point by Vector-owned, and non-Vector owned companies, respectively.
- The allowable *aggregate* MHQ at each Offtake Point for both Vector-owned and non-Vector owned companies. (*NB: In most cases MHQ = MDQ ÷ 16, in accordance with Vector's standard Transmission Services Agreement.*)
- Delivery pressures, where non-standard.

Vector's financial year ends on 30th June annually. VGL's contract year (for transmission services) however ends on 30th September annually.

The tables include transmission capacity reserved annually by shippers under VGL's standard transmission services agreement *plus* transmission capacity made available to shippers under non-standard contracts. The former includes capacity reserved by shippers supplying the reticulated gas market; the latter include "long-term" contracts relating to transmission of gas to various power stations.

Those shippers who reserve capacity annually do so prior to the start of the contract year. Thereafter they may transfer capacity between Offtake Points, and/or trade capacity with other shippers for periods as short as one day, subject to certain conditions as set out in transmission services agreements.

Shippers may also purchase additional capacity from Vector (or other shippers) during a contract year, subject to the provisions of transmission services agreements.

Shippers who reserve capacity annually are under no obligation to reserve the same level of capacity in subsequent years.

As at the date of this report those shippers who reserve capacity annually have not confirmed their capacity requirements for the 2007-2008 contract year. Shippers' capacity reservations for the financial year to 30 June 2008 have therefore been taken as their actual reserved capacity as at the end of July 2007.

As it is not known what capacity shippers will reserve in future, these same reservations have been assumed for the years ending 30 June 2010 and 2012, respectively.

In the case of shippers with long-term contracts, the transmission capacity provided under such contracts has been used.

APPENDIX 1

FLOW PROFILES

Note: Associated with the flow profile for each Offtake Point is the weekly load in TJ. These weekly loads are for checking purposes only and are not used in the Model. They were calculated by multiplying the hourly flow rates by a typical average CV.
The resulting values may therefore differ somewhat from those shown in Tables 4.1 – 4.6, which were determined using daily average CV's.
Rounding of flow rates to two decimal places may also have contributed slight differences.