NETWORK PLANNING REPORT - T003

NORTHERN SYSTEM WITHDRAWAL ZONE (Timing)

April 2007

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Executive Summary

This report presents a network planning view of the system's capacity to meet Northern system withdrawal zone (Northern Zone) demand growth and transport capacity to New South Wales through Culcairn. The analysis is based on maintaining pressures above the minimum pressure obligation and requirements stipulated by the VENCorp and Australian Pipeline Trust (APT) Culcairn Operating Agreement.

Northern Zone demand growth has averaged approximately 2.7% pa over the past six years. This report predicts the year delivery pressures on a 1 in 20 peak day will fall below the minimum pressure obligation, for three different scenarios:

1. Scenario 1 - 0 TJ/d net at Culcairn.

   This scenario represents the situation where no import is available at Culcairn. Gas has been imported to Victoria through Culcairn in winter since market start, however there are no guarantees that these imports will continue.

2. Scenario 2 - 17 TJ/d export at Culcairn.

   To allow for GasNet's allocation of 17 TJ/d of Authorised Maximum Daily Quantity (AMDQ) for export of gas through Culcairn [1].

3. Scenario 3 - 15 TJ/d import at Culcairn.

   A planning assumption based on historical system behaviour during the winter period.

The modelling results indicate the following:

- Scenario 1 - without any imports at Culcairn, a breach in the 2,400 kPa minimum pressure obligation will occur on the Echuca lateral (at Shepparton) under 1 in 20 peak conditions in 2010.
- Scenario 2 - there is currently insufficient capacity in the Northern Zone to achieve 17 TJ/d of exports through Culcairn. The Northern Zone requires immediate augmentation to achieve this.
- Scenario 3 - with 15 TJ/d import from Culcairn, no Northern Zone minimum pressure obligation breaches are expected within the next five years (to 2012).

[1] Under the MSO Rules, any exports through Culcairn up to 17 TJ/d must have priority over non-authorised loads, as long as gas is being injected to match the withdrawal.

Introduction

Since market start, gas has been imported to Victoria through Culcairn in winter. There are no guarantees that these imports will continue, and this has raised the prospect of Northern Zone minimum pressure obligation breaches during high demand days. Figure 1 shows the Northern Zone schematic.

GasNet has an Authorised Maximum Daily Quantity (AMDQ) allocation of 17 TJ/d for the export of gas through Culcairn. The AMDQ was issued at the start of the Victorian Gas Market in 1997, as an allocation of the Longford pipeline capacity of 990 TJ/d. A minimum daily average pressure of 3,200 kPa is required at Culcairn when exporting to New South Wales [2].

This report assesses two conditions:

1. maintenance of minimum pressure obligations; and
2. delivery of GasNet's 17 TJ/d AMDQ for export of gas to New South Wales at Culcairn.

For the assessment, three possible import/export scenarios at Culcairn were analysed. For each scenario, this report identifies a specific year, beyond which delivery pressures on a 1 in 20 peak day will fall below the minimum pressure obligation. The scenarios are:

- Scenario 1 - 0 TJ/d net at Culcairn.
- Scenario 2 - 17 TJ/d export at Culcairn.
- Scenario 3 - 15 TJ/d import at Culcairn.

[2] Specified in the Operating Agreement between VENCorp and Australia Pipeline Trust (APT).

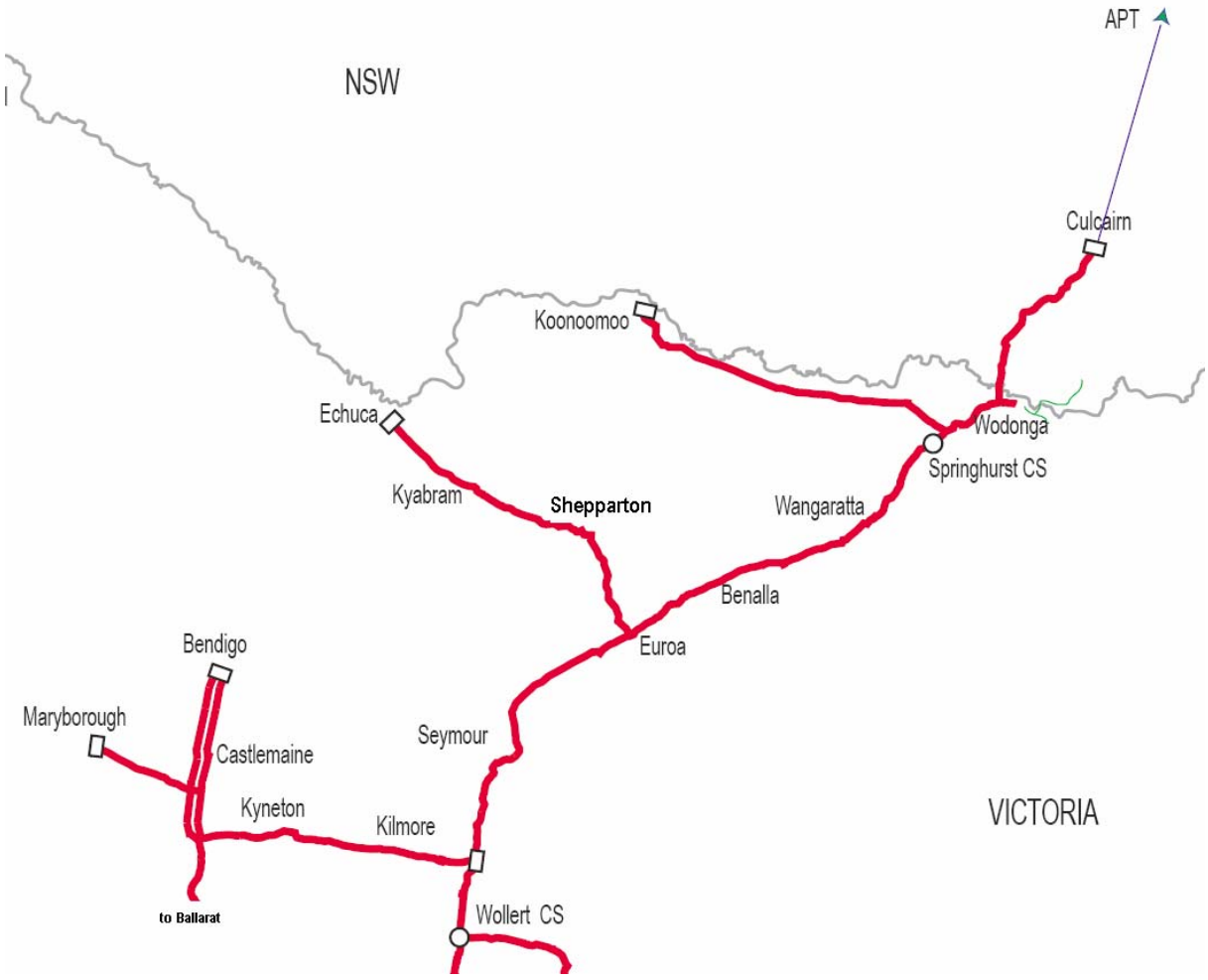
Planning Inputs

Table 1 lists the key planning inputs used in the modelling.

Table 1 - Key planning inputs

Item	Detail
Forecast demand data	Supplied by OEAM and 2005 Gas APR [3]
Historical data	Extracted from VENCorp's TADIS database
Modelling software	Gregg Engineering WinFlow version 4.060503.3081 Gregg Engineering WinTran version 4.060505.9089
Model of PTS used	Common Model version 2006

Figure 1 - Northern Zone schematic



[3] The 2005 report represents the latest information available at the time of the analysis. A later review of 2006 demand found that changes in the demand forecasts were minor and have no material impact on the timing and nature of the augmentations.

Assessment

Forecast Peak Day Demand

The forecast peak day demand for the Northern Zone continues to exhibit constant growth.

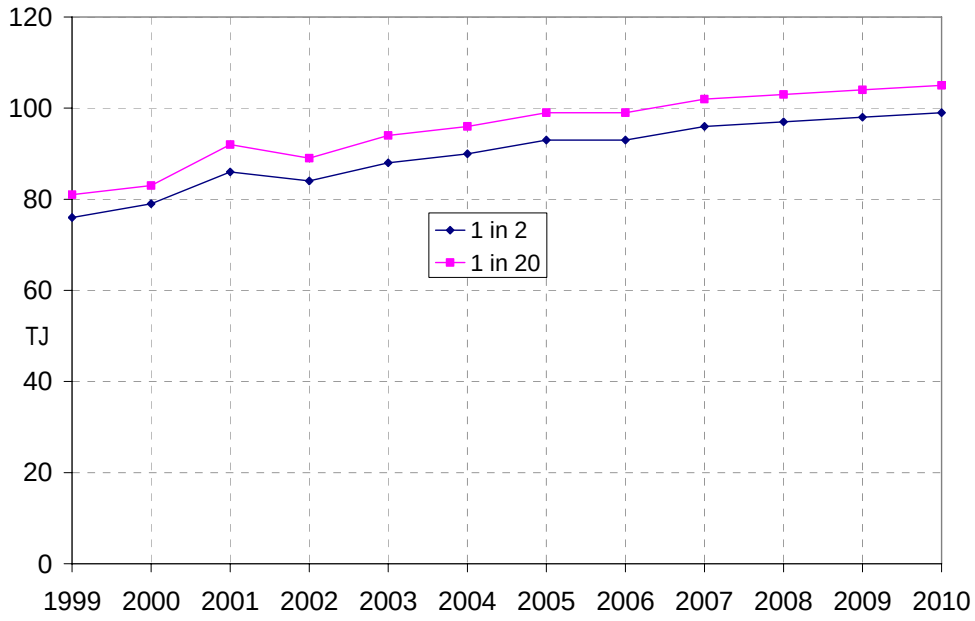
Table 2 lists the Northern Zone's historical and current forecast 1 in 2 and 1 in 20 peak days for 1999 – 2010.

Table 2 - Northern Zone peak day demand (excluding exports) (TJ/d)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1 in 2	76	79	86	84	88	90	93	93	96	97	98	99
1 in 20	81	83	92	89	94	96	99	99	102	103	104	105

The increase in Northern Zone demand in the six years to 2005 was 17 TJ/d and 18 TJ/d for 1 in 2 and 1 in 20 peak days, respectively. The average annual growth during this period is 2.7%, which is higher than the growth for the Principal Transmission System (PTS) as a whole. The current forecast demand in the Northern Zone for 2006 – 2010 continues to show a similar trend, as shown in Figure 2.

Figure 2 - Northern Zone demand (TJ/d)

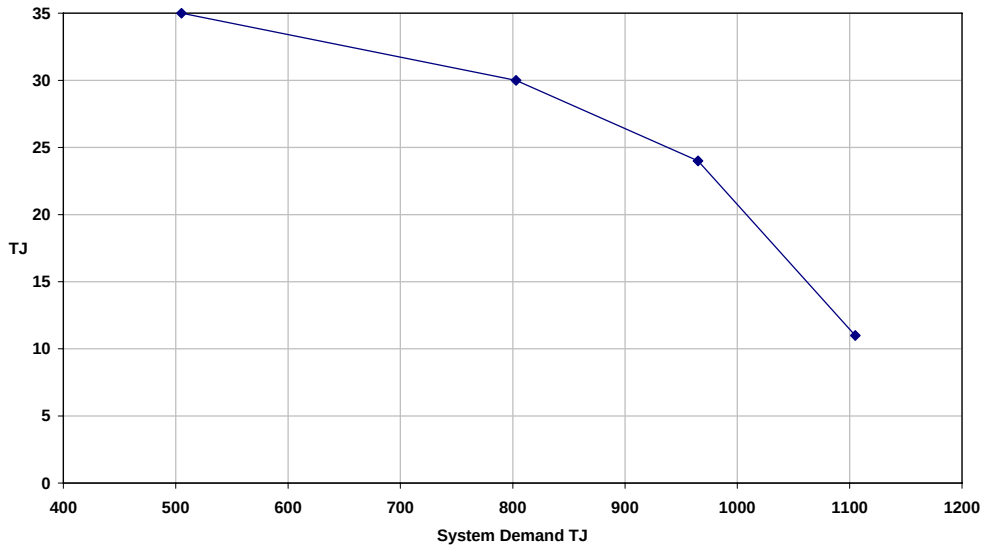


Culcairn Export Capacity

Figure 3, taken from the 2004 Gas APR, shows a graph of Culcairn export capacity for days of various total PTS (system) demand, excluding gas power generation (GPG), under ideal conditions i.e. zero linepack deficit and zero forecast error. The graph shows that 17 TJ/d could be exported through Culcairn on a PTS demand day of 990 TJ/d, but this is not necessarily achievable on any day due to the

Wollert – Wodonga pipeline gas packing that is required to enable the theoretical 17 TJ/d export capacity.

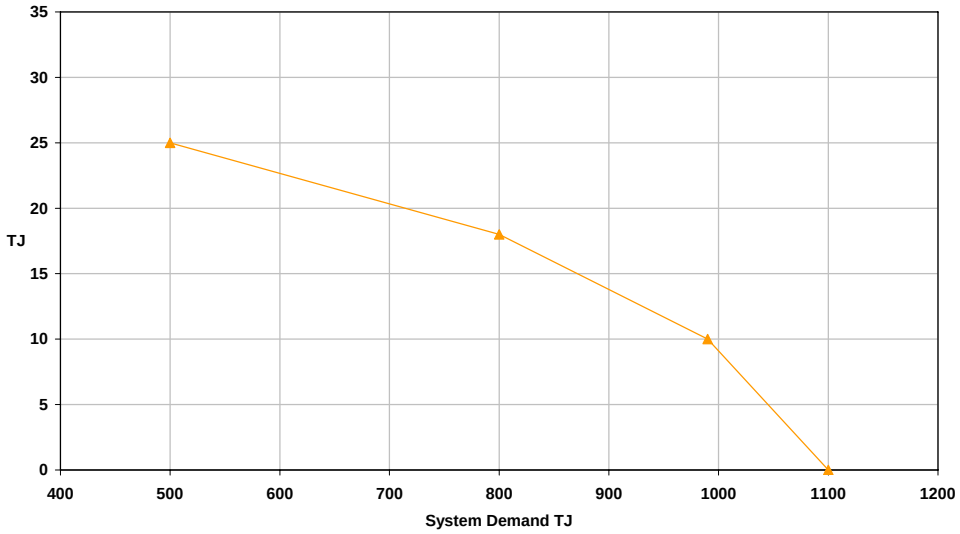
Figure 3 - Modelled Culcairn export capacity (from the 2004 Gas APR)



Additional computer modelling determined the physical export capacities to New South Wales under conditions reflecting the complexity of likely day-to-day operations and more realistic operating conditions. These assumptions included the 20 TJ beginning-of-day (BoD) linepack deficit and a 50 TJ forecast error, which were added to the assumptions identified in the 2004 Gas APR.

Figure 4 shows the graph of Culcairn export capacity, based on the maintenance of minimum pressure obligations, for days of various total PTS demand, excluding GPG, under more realistic operating conditions.

Figure 4 - Revised Culcairn export capacity



Modelling Assumptions

The latest Gregg Engineering model was used to identify the timing of the constraint for each scenario. The modelling assumptions include the following:

- The Gas APR standard approach that applies the 1 in 20 peak day with a BoD linepack deficit of 20 TJ (below target), and an initial forecast based on a 1 in 2 peak day that is rescheduled from 1300 hrs.
- Forecast demand for the Northern Zone is based on hourly peak loads provided by Origin Energy Asset Management (OEAM); other PTS loads in the system are as per the 2005 Gas APR.
- The maximum compressor power at Wollert Compressor Station is equivalent to 1,700 kW.
- It is assumed that withdrawals at Culcairn occur just north of the Culcairn meter, so withdrawals are based solely on PTS pressures.
- Injection profiles are assumed to be flat.
- Liquefied Natural Gas (LNG) is used as required to maintain Dandenong City Gate (DCG) inlet pressure.
- Full availability of transmission assets is assumed, with no forced outages.

The required minimum daily average pressure at Culcairn is 3,200 kPa[4] . The minimum instantaneous pressure at Shepparton is 2,400 kPa [5].

Result Analysis

Scenario 1 - 0 TJ/d Net at Culcairn.

[4] Based on the Operating Agreement between VENCorp and Australia Pipeline Trust (APT).
[5] Based on the Connection Deed between VENCorp and DB businesses.

Modelling results show that a breach in the 2,400 kPa minimum pressure obligation requirement will occur on the Echuca lateral at Shepparton under 1 in 20 peak day demand conditions in 2010, when there is zero flow at Culcairn. Any exports at Culcairn will advance this timing.

Scenario 2 - 17 TJ/d Export at Culcairn.

As shown in Figure 4, it was identified that up to 15 TJ/d can be exported at Culcairn on PTS demand days of up to 871 TJ/d, and up to 10 TJ/d can be exported at Culcairn on PTS demand days of up to 990 TJ/d. The 2005 Gas APR's forecast PTS demand for a 1 in 2 winter in 2007 is 1,150 TJ/d. This suggests that the capacity constraint will prevail even during a warmer than average winter. The Wollert – Wodonga pipeline has insufficient capacity to allow exports of 17 TJ/d at Culcairn under PTS demand conditions of 800 TJ/d or more.

Scenario 3 - 15 TJ/d Import at Culcairn.

Modelling results show that under 1 in 20 peak day demand conditions in 2012, 15 TJ/d of imports from Culcairn will enable Shepparton pressures in excess of 3,000 kPa. This is well above the minimum pressure obligation. Under this scenario, minimum pressure obligation breaches are not expected within the next 5 years.

Conclusion

The modelling results conclude the following:

- With no imports from Culcairn, the 2,400 kPa minimum pressure obligation at Shepparton will be breached under 1 in 20 peak day demand conditions in 2010. Any exports at Culcairn will advance this timing.
- Currently, the Wollert – Wodonga pipeline has insufficient capacity to deliver the existing AMDQ of 17 TJ/d at Culcairn.
- With imports of 15 TJ/d from Culcairn, no minimum pressure obligation breaches are expected in the Northern Zone for this forecast period.

Definitions

AMDQ	Authorised Maximum Daily Quantity.
APT	Australian Pipeline Trust.
DB	Distribution Business; a distribution pipeline network operator.
DB Connection Deed	An Agreement between VENCorp and a Distribution Business.
GPG	Gas power generation.
Minimum Pressure Obligation	The minimum pressure obligation stipulated in the System Security Guidelines and/or Distribution Business Connection Deeds that VENCorp must operate the system to maintain.
PTS	The Principal Transmission System, serving Gippsland, Melbourne, Central and Northern Victoria, Albury, the Murray Valley region, Geelong, and the western region of Victoria. The PTS is owned by GasNet and operated by VENCorp.
OEAM	Origin Energy Asset Management.
SSG	System Security Guidelines, developed and maintained by VENCorp, for the operation and security of the PTS.
SWZ	System withdrawal zone.