NETWORK PLANNING REPORT - T005

Western Transmission System (Timing)

March 2007

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Executive Summary

Western system withdrawal zone (SWZ) forecast demand growth raises the prospect of delivery pressures at the extremes of the Western Transmission System's (WTS) capability, resulting in Portland falling below the 2,800 kPa minimum pressure obligation. This could occur during:

- a winter peak demand day; and
- summer, when higher demand results from increased food and dairy industry activity.

This report presents a network planning view for the maintenance of minimum delivery pressure along the WTS. The report uses historical data, demand forecasts, and the Gregg Engineering model of the Principal Transmission System (PTS) to predict the year delivery pressures are likely to fall below the minimum pressure obligation.

The modelling results indicate that:

- with the current compressor outlet cooler issues, a breach in minimum connection pressure will occur at Portland under 1 in 20 October peak day conditions in 2007.
- after the proposed outlet cooler upgrade, a breach in minimum connection pressure will occur at Portland under 1 in 20 October peak day conditions in 2012.

Introduction

The Western Transmission System (WTS) comprises approximately 220 km of 150 mm diameter pipeline that is located between the Iona Compressor Station and the Portland City Gate. Figure 1 shows the WTS schematic. This pipeline system supplies the towns of Cobden, Hamilton, Koroit, Portland and Warrnambool. A new meter has been installed to enable supply to the Iluka minerals separation plant, south of Hamilton. The meter has been recently commissioned and the Iluka plant is currently taking up to 0.6 TJ/d. The plant has a potential load of up to 1 TJ/d, which is approximately 6% of total WTS load.

This report presents a:

- review of historical demand and delivery pressures along the WTS for the period 2000–2005; and
- brief analysis of the forecast demand and delivery pressures for the period 2007–2012.

The report also identifies a specific year, beyond which delivery pressures on a winter peak day will regularly fall below the stipulated minimum pressure.

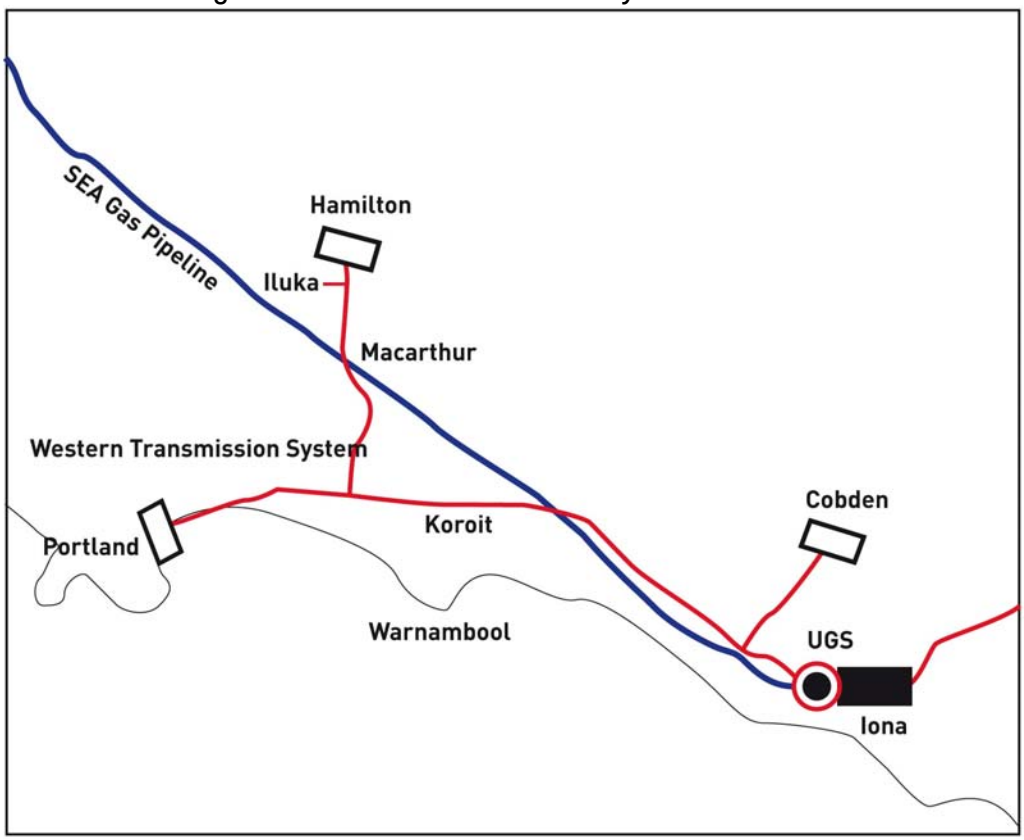
Planning Inputs

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

Table 1 - Key planning inputs

Item	Detail
Forecast demand data	Supplied by SP AusNet and VENCorp's CTM Forecast 2007-2011
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 - Western Transmission System schematic



Assessment

Historical Demand and Minimum Pressure Review

When pressures in the WTS are at their lowest, Portland is the critical location, due to its generally lower pressures compared to other locations in the WTS, and its relatively high minimum pressure obligation of 2,800 kPa. Portland experiences the lowest pressure for the majority of the time, with Hamilton being only slightly higher. On a number of occasions, Hamilton's pressure has fallen below Portland's.

On 16 July, 2005, the minimum pressure in the WTS was 3,457 kPa at Portland. Figure 2 shows Hamilton pressure (left axis - kPa) and demand (right axis - GJ/h) over time on that day, and includes the stipulated minimum pressures for Hamilton (1,200 kPa) and Iluka (2,500 kPa).

Figure 2 - Hamilton pressures: 16 July 2005

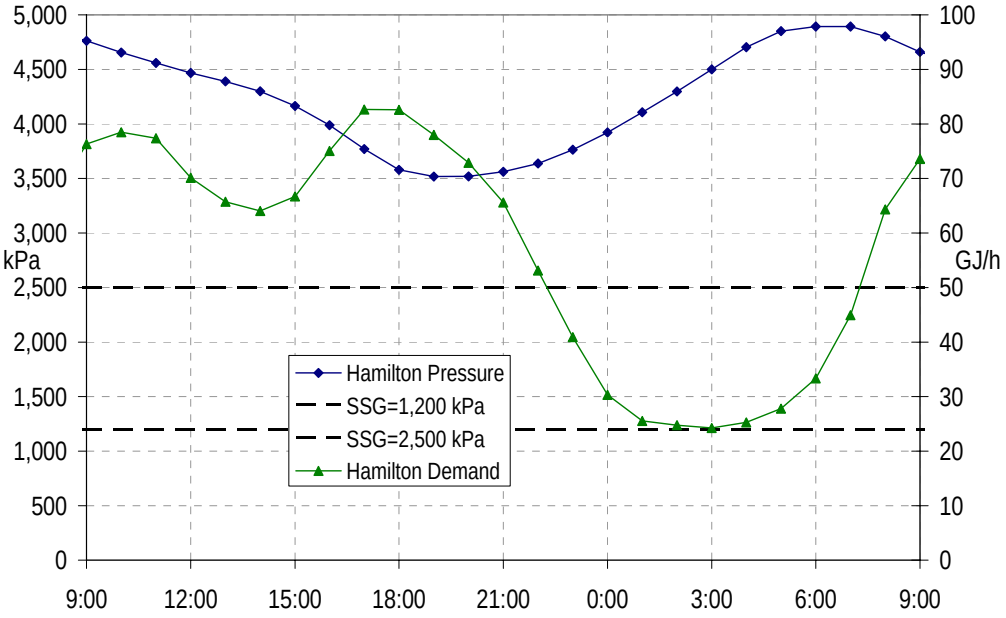
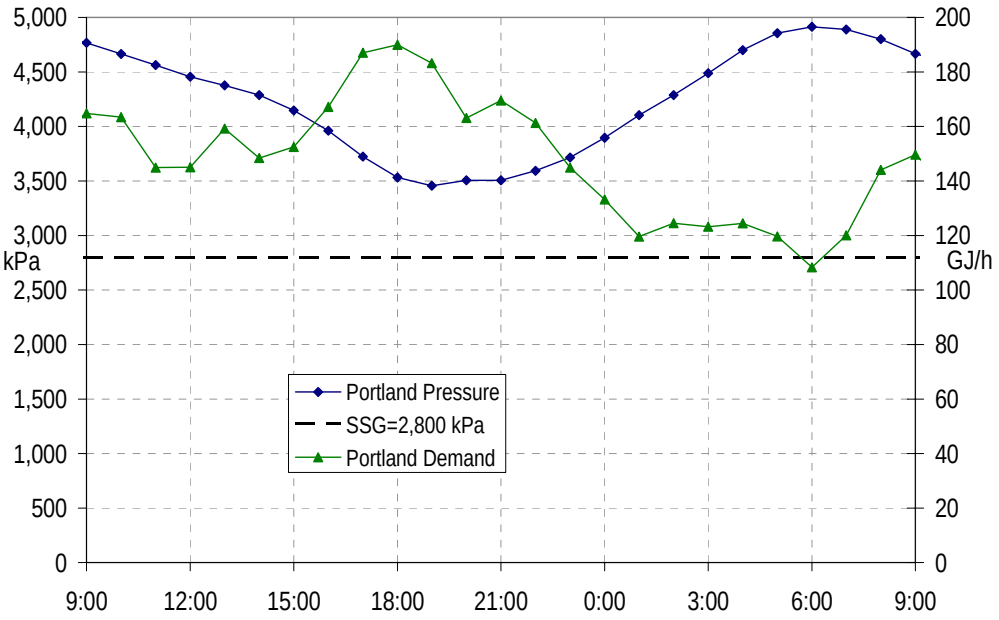


Figure 3 shows Portland pressure (left axis - kPa) and demand (right axis - GJ/h) over time on the same day, and includes the stipulated minimum pressure for Portland (2,800 kPa).

Figure 3 – Portland pressures: 16 July 2005

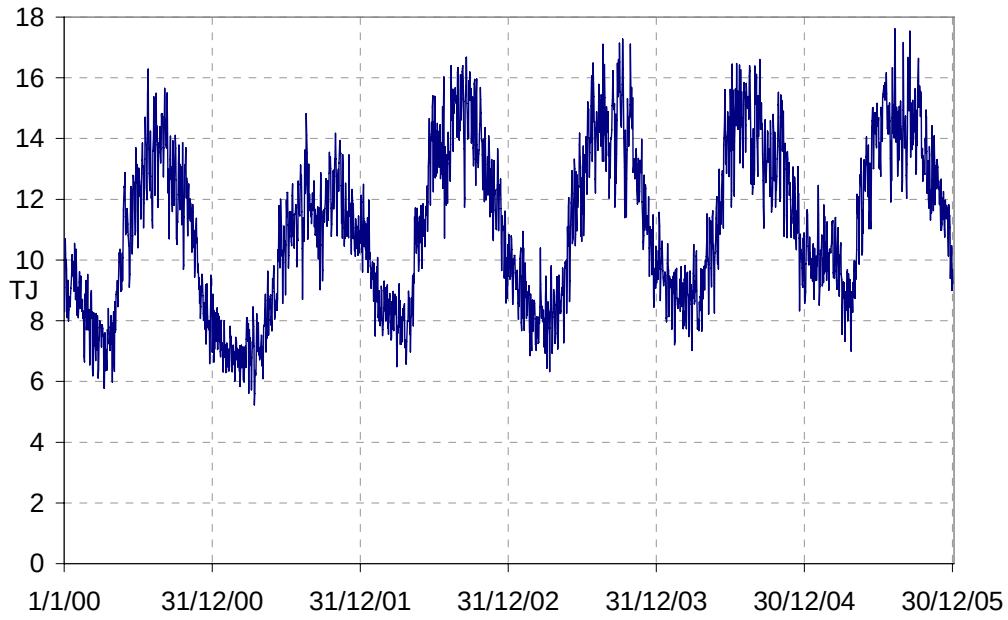


Generally, pressures at the locations of Hamilton and Portland are currently well above the minimum pressure obligation. However, the recently commissioned Iluka plant's forecast demand (up to 1 TJ/d) will significantly affect both Portland's and Hamilton's pressures. Iluka currently draws up to 0.6 TJ/d.

The seasonal nature of dairy industry demand can lead to the WTS experiencing a peak day in October.

Figure 4 shows the daily total WTS demand (TJ) for the period 2000–2005. In 2003, a high demand day, slightly lower than the year's peak day, occurred on 28 October. If this were to occur again when Iona was not injecting gas, an Iona compressor would have to be employed. However, if Iona pressure is too low, the compressor's capacity is insufficient to prevent Portland's pressure from dropping below the minimum pressure obligation.

Figure 4 - Total WTS demand (TJ)



Forecast Demand

The forecast demand includes the forecasts for the Iluka plant. The 1 in 20 historical demand data for 2002–2005 is weather normalised to the 1 in 20 winter peak day standard. The forecast winter peak day demand for 2006–2011 was established using forecast data provided by the relevant distribution business (DB), together with the system demand forecasts included in the 2006 Gas APR.

Table 2 lists the forecast peak day demand from towns served by the WTS. The forecast peak day demand also assumes a maximum Iluka plant load of approximately 1 TJ/d (due to insufficient historical data).

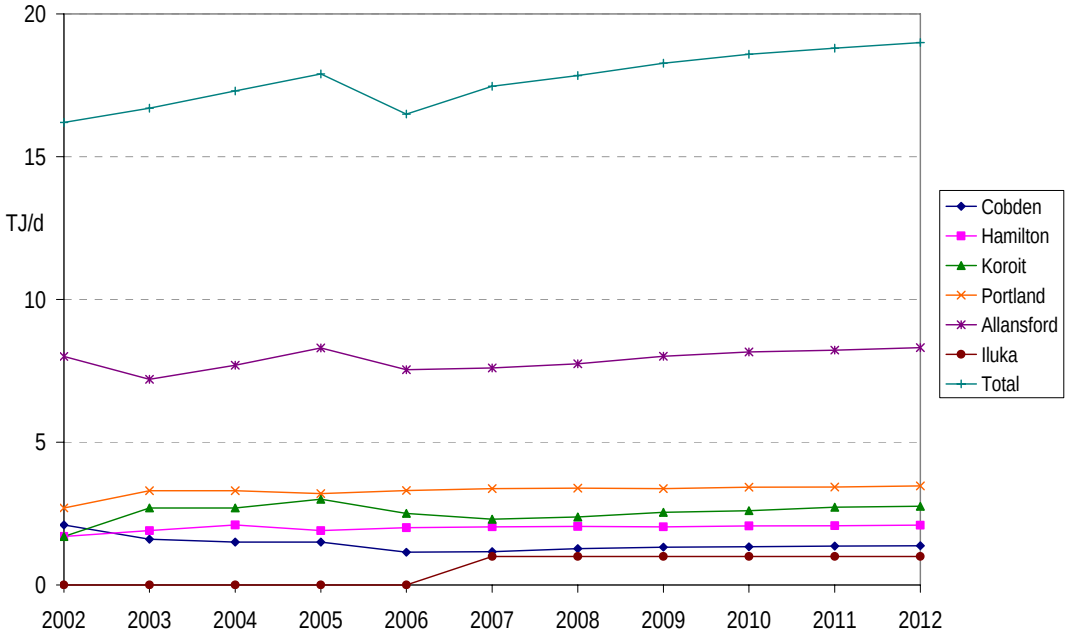
Table 2 - 1 in 20 forecast peak day demand (TJ)

Location	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012 [1]
Cobden	2.1	1.6	1.5	1.5	1.1	1.2	1.3	1.3	1.3	1.4	1.4
Hamilton	1.7	1.9	2.1	1.9	2.0	2.0	2.0	2.0	2.1	2.1	2.1
Koroit	1.7	2.7	2.7	3.0	2.5	2.3	2.4	2.5	2.6	2.7	2.8
Portland	2.7	3.3	3.3	3.2	3.3	3.4	3.4	3.4	3.4	3.4	3.5
Allansford	8	7.2	7.7	8.3	7.5	7.6	7.7	8.0	8.2	8.2	8.3
Iluka	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0
Total	16.2	16.7	17.3	17.9	16.4	17.5	17.8	18.2	18.6	18.8	19.1

[1] Demand for 2012 was calculated using a 1.1% growth rate from the latest available forecast of 2011.

Figure 5 shows the same data, which highlights the significant step increase in total demand due to the commencement of load at Iluka in 2007.

Figure 5 - 1 in 20 forecast peak day demand (TJ)



The analysis also considers effects with and without the Iluka load.

Forecast Pressures

Modelling was carried out using Gregg Engineering software to determine when the WTS minimum connection pressure will be breached.

Currently, the Iona compressor outlet coolers have a significant pressure drop that effectively reduces WTS capacity. A temporary solution, implemented by GasNet, involved installing a bypass valve around the cooler, resulting in higher pressure (and gas temperatures). A long-term solution involves a cooler upgrade, as proposed by GasNet.

Modelling Assumptions

The model incorporates all withdrawal points on the WTS (which incorporates all pipes west of Iona). The modelling assumptions include the following:

- Constant pressure at Iona, representing underground storage (UGS) compressor suction pressure control when withdrawing from the South West Pipeline (SWP).
- An assumption that a pressure of 4,300 kPa can be maintained at Iona, achieved, if necessary, by limiting withdrawals at Iona and SEA Gas. The Corio Loop will not affect this pressure, but will allow greater withdrawals at Iona or SEA Gas for a given Iona pressure.
- Loads as per the VENCorp customer transfer meter (CTM) peak day forecast.
- Hourly demand profiles as per standard peak day planning data.

- Reciprocating compressor efficiency (95%) and performance based on data provided by GasNet and used in the Reciprocating type 2 model, which accurately simulates the manufacturer's recommended efficiency and power across the full range of the performance map.
- Full availability of transmission assets is assumed, with no forced outages.
- 600 kPa pressure drop through the current outlet cooler.
- 100 kPa pressure drop through an upgraded outlet cooler.

Results Analysis

Table 3 lists the modelling results.

Table 3 - Forecast 1 in 20 winter peak day pressures (kPa)

Location	Minimum pressure SSG /DB Deed (kPa)	2007 (without cooler upgrade)	2007	2008	2009	2010	2011	2012
Cobden	1,200	4,337	4,821	4,769	4,731	4,688	4,660	4,602
Hamilton	1,200	2,441	3,115	3,034	2,946	2,857	2,801	2,667
Koroit	3,000	2,911	3,527	3,449	3,358	3,278	3,221	3,107
Portland	2,800	2,475	3,152	3,072	2,984	2,893	2,835	2,699
Allansford	3,000	3,322	3,902	3,832	3,750	3,678	3,633	3,536
Iluka	2,500	2,440	3,115	3,034	2,946	2,857	2,801	2,666

These results indicate that:

- with the current outlet cooler setup, a breach in minimum connection pressure will occur at Portland and Koroit under 1 in 20 October peak day conditions in 2007; and
- the proposed outlet cooler upgrade will enable the maintenance of WTS pressures above the minimum connection pressures until 2011. After this upgrade, Portland's minimum connection pressure will be breached under 1 in 20 peak day conditions in 2012.

Conclusion

The Iona compressor outlet coolers need to be upgraded prior to September 2007.

Based on current demand forecasts, an upgraded outlet cooler would enable the maintenance of minimum WTS pressures to 2011, however, additional augmentation would be required prior to winter 2012. This additional augmentation was discussed in the Western Transmission System (Planning) report.

Definitions

DB	Distribution Business; a distribution pipeline network operator.
DB Connection Deed	An Agreement between VENCorp and a Distribution Business.
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.
SSG	System Security Guidelines, developed and maintained by VENCorp, for the operation and security of the PTS.
SWZ	System withdrawal zone.
WTS	The Western Transmission System, comprising the transmission pipelines west of Iona, serving Port Campbell to Portland and the Western District.