NETWORK PLANNING REPORT - P005

Western Transmission System (Planning)

March 2007

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Contents

Executive Summary

As indicated in VENCorp's Network Planning Report (T005) - Western Transmission System (Timing), March 2007, a minimum pressure obligation breach will occur at Portland during a 1 in 20 October peak day demand in 2007. The proposed low cost solution, involving upgrading the Iona Compressor Station outlet cooler, will enable the pressure at Portland to be maintained above the minimum pressure obligation until 2011. Further augmentation would be required by winter 2012.

This report presents a network planning assessment of the available options to solve the identified constraint. Several augmentation options were considered, which include:

- upgrading the Iona Compressor Station;
- pipeline duplication; and
- a new injection point supplying gas from the SEA Gas pipeline near Hamilton.

Based on current modelling, the preferred solution to this constraint involves two steps:

1. Upgrade the Iona Compressor Station's outlet coolers by September 2007.
2. Upgrade (via additional compression) the Iona Compressor Station, or add a new Western Transmission System (WTS) injection point by winter 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:

- discussion of the options for augmenting the system to solve the WTS constraint; and
- detailed review of the most appropriate option.

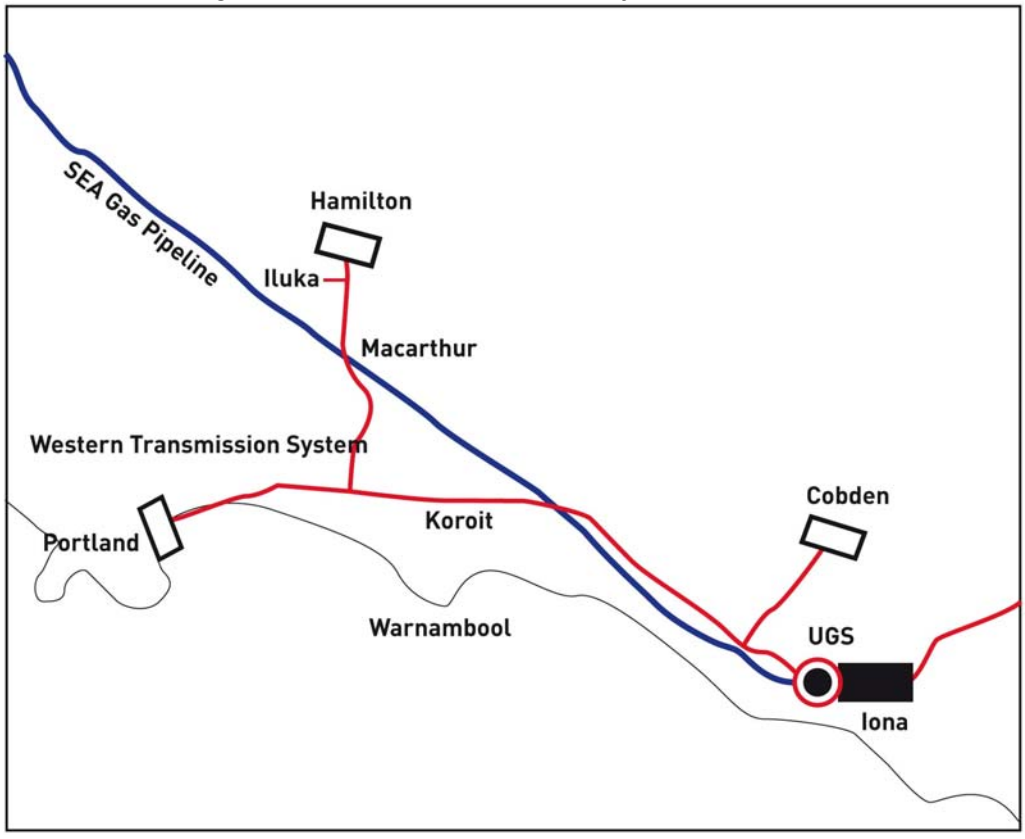
Planning Inputs

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
Western Transmission System Timing Report	VENDocs #180940

Figure 1 - Western Transmission System schematic



Constraint Timing

As indicated in the Western Transmission System (Timing) report, to solve the WTS constraint the Iona compressor outlet cooler upgrade will be required by September 2007, with further augmentation required by winter 2012.

Augmentation Options

Several augmentation options were considered, which include:

- upgrading the Iona Compressor Station;
- pipeline duplication; and
- a new injection point supplying gas from the SEA Gas pipeline near Hamilton.

Discussion

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, which is approximately 6% of the total peak WTS demand) will significantly affect Portland pressure. Iluka currently draws up to 0.6 TJ/d.

Iona Compressor Station upgrade

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

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.

A compressor upgrade to 850 kW will ensure that pressures are maintained more effectively than they are by the current 300 kW compressor.

Pipeline duplication

A steady-state analysis of pipeline duplication indicated that more than 50 km of pipeline would need to be duplicated to have an effect equal to a compressor upgrade. As this would be more costly than a compressor upgrade, pipeline duplication was not analysed in detail.

New injection point

A new injection point, connecting the SEAGas pipeline to the WTS near Macarthur, south of Hamilton, would create a new source of gas for the WTS and ensure that pressures are not breached (provided sufficient market-based supply occurs).

Assessment

The compressor upgrade and the new injection point appear to be the most appropriate options. As a result, both options were assessed in detail using the Gregg Engineering software.

Modelling Methodology

The forecast demand includes forecasts for the Iluka plant. The 1 in 20 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. All forecasts from 2012 onwards were calculated using a 1.1% pa growth rate from latest available forecast of 2011.

Table 2 lists forecast peak day demand from towns served by the WTS.

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

Location	2006	2007	2008	2009	2010	2011	2012	2015	2025
Cobden	1.14	1.16	1.28	1.32	1.34	1.36	1.38	1.42	1.58
Hamilton	2.00	2.03	2.05	2.03	2.07	2.07	2.09	2.16	2.40
Koroit	2.51	2.30	2.38	2.54	2.60	2.72	2.75	2.84	3.16
Portland	3.31	3.37	3.39	3.37	3.42	3.43	3.47	3.58	3.98
Allansford	7.54	7.60	7.75	8.01	8.16	8.22	8.31	8.59	9.54
Iluka	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Total	16.50	17.46	17.85	18.27	18.59	18.80	19.00	19.59	21.66

Modelling Assumptions

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 upgraded Iona compressor outlet cooler, reducing the pressure drop to 100kPa.
- A pressure of 4,300 kPa can be maintained at Iona, achieved if necessary by limiting withdrawals at Iona and SEA Gas. The capacity of the WTS is highly sensitive to Iona suction pressure. A 100 kPa increase in Iona suction pressure is equivalent to two years' growth. The Corio Loop will not affect this pressure, but will allow greater withdrawals at Iona or SEA Gas for a given Iona pressure.
- Iluka load of 1 TJ/d.
- 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.
- Upgraded centrifugal compressor efficiency of 72%.
- Full availability of transmission assets, with no forced outages.

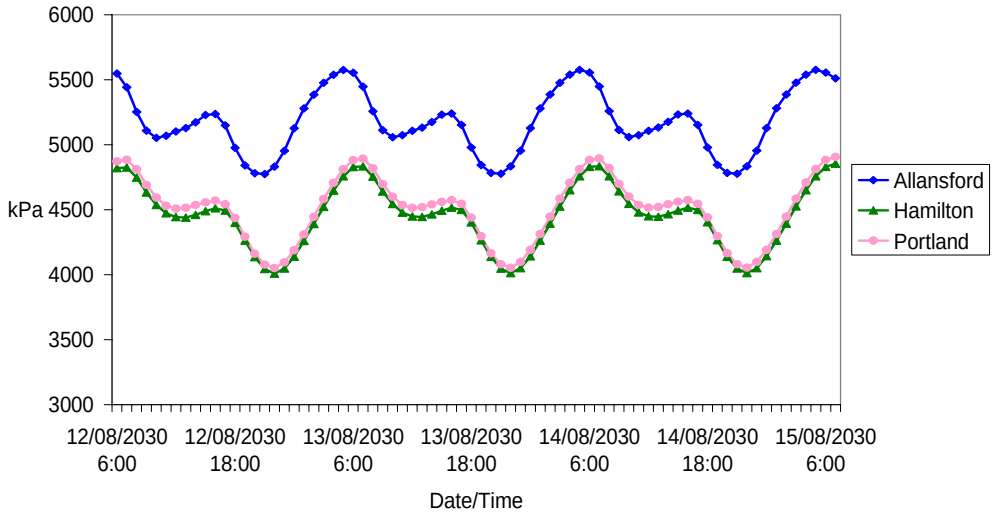
- Flat injection at the Macarthur injection point.

Results Analysis

1. Compressor upgrade

Under this scenario, the modelled compressor was upgraded to a Saturn 850 kW unit. Figure 2 shows that the upgraded compressor alone can maintain sufficient WTS pressure to meet up to 25 TJ/d, satisfying peak day demand to 2025 and beyond.

Figure 2 - 25 TJ/d

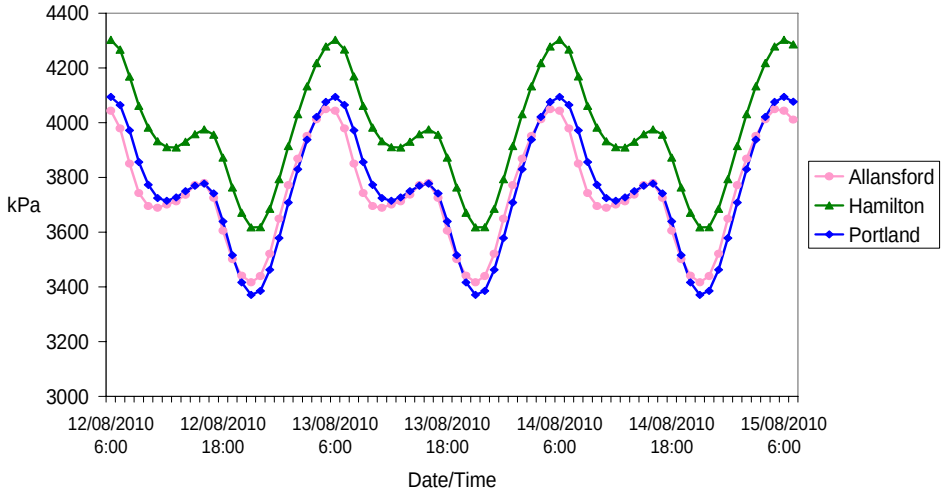


2. New injection point

Under this scenario, a new injection source, connecting the SEA Gas pipeline to the WTS near Macarthur, south of Hamilton, was modelled with estimated daily flat injections of 5 TJ/d and 10 TJ/ day.

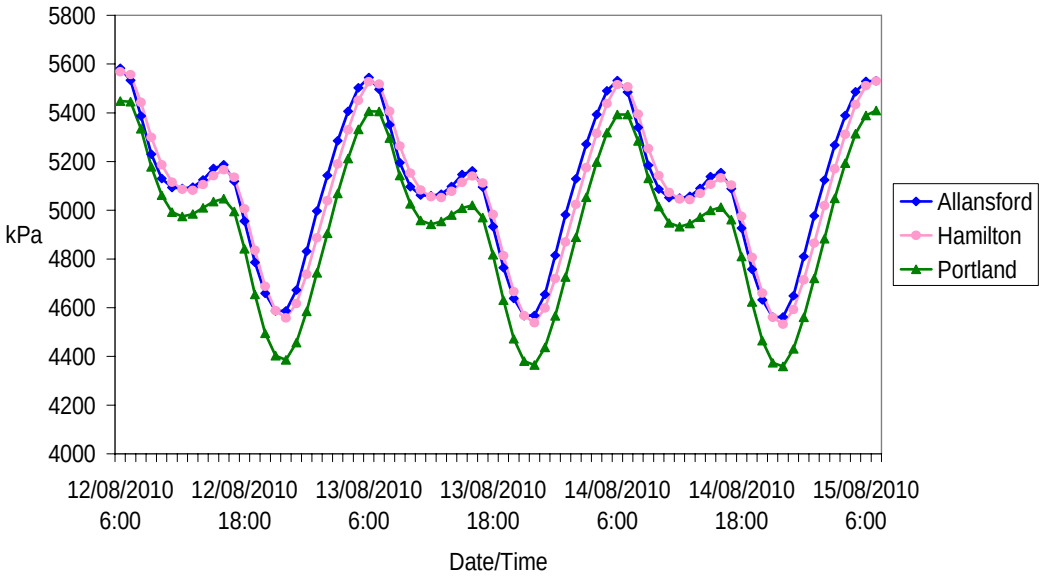
The modelling results indicate that a new injection point, injecting 5 TJ/d, can maintain WTS pressures sufficient to meet up to 25 TJ/d, provided the existing Iona compressor was running. Without the compressor, injections of 10 TJ/d (from Macarthur) would be required to deliver the same result. Figure 3 shows the modelled results.

Figure 3 - 25 TJ/d (demand), 10 TJ/d (injections), Iona compressor off



With the 300 kW compressor running and 10 TJ/d injected from Macarthur, pressures can be effectively maintained to meet 28 TJ/d (the maximum capacity of the WTS). Figure 4 shows the modelled results.

Figure 4 – 28 TJ/d, 10 TJ/d injections, Iona compressor on



Conclusion

With the addition of a compressor outlet cooler upgrade, the capacity of the WTS will only be adequate until winter 2011. Further augmentation would be required prior to winter 2012.

The upgrade of the Iona Compressor Station to 850 kW (or equivalent), or a new injection point near Macarthur, will enable pressures across the WTS to be maintained beyond 2025.

The cost of constructing a new injection point from the SEA Gas pipeline will be substantially less than a compressor upgrade. Further analysis of this option is required to assess the viability of a new injection point at Macarthur, and examine any market issues that may arise.

Due to the potential for large quantities of gas to be injected into the PTS from the developing Otway Basin gas fields, which will provide high pressures at Iona, the WTS issue should be reviewed annually as part of the Gas APR process.

Recommendations

This plan makes the following recommendations:

- Prior to September 2007, the Iona Compressor Station's outlet cooler is upgraded to alleviate the pressure decrease.
- Prior to winter 2012, either a new injection point is connected to the WTS (near Macarthur) from the SEA Gas pipeline, or the Iona Compressor Station is upgraded to 850 kW duty compression (or equivalent).

Definitions

DB	Distribution Business; a distribution pipeline network operator.
DB Connection Deed	An Agreement between VENCorp and a Distribution Business.
Gas APR	Gas Annual Planning Report, published by VENCorp by 30 November each year.
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.