Business Case – Capital Expenditure

Compressor Station Vent Upgrade

Business Case Number BC205 AA23-27

1 Project Approvals

TABLE 1: BUSINESS CASE – PROJECT APPROVALS

Updated By	Adam Newbury	Asset Lifecycle Specialist, Asset Management
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Reviewed By	Adam Newbury	Asset Lifecycle Specialist, Asset Management
Approved By	Daniel Tucci	Victorian Asset Manager, Asset Management

2 Project Overview

Project resubmitted - deferred to fund unpiggable pipeline conversions.

TABLE 2: BUSINESS CASE – PROJECT OVERVIEW

Description of Issue/Project	The current station vents at five VTS compressor stations are not acceptable in the event of ignition and personnel or the public are within the heat flux zone • Each station needs to be assessed and vent modifications installed • The result is the risk reduction to be consistent with As Low as Reasonably Practicable (ALARP). This project was deferred in the current period and has been resubmitted.
Options Considered	The following options have been considered: Option 1: Do Nothing Option Option 2: Upgrade to Vent Stacks at Compressor Stations.
Proposed Solution	Assessment of each station and appropriate design controls or augmentation of vent stack installed.
Estimated Cost	$1,975,000
Relevant Standards	Compressor stations are operated under a Pipeline License which requires the adherence to Australian Standard AS2885. This standard requires all risks to be reduced to As Low As Reasonably Practical (ALARP) or lower There is also a requirement to comply with Occupational Health and Safety Act.
Consistency with the National Gas Rules (NGR)	The augmentation of the vent stacks complies with the new capital expenditure criteria in Rule 79 of the NGR because: • it is necessary to improve the safety of services to the public and personnel (Rules 79(2)(c)(i) and (ii)); and • it is such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services (Rule 79(1)(a)).

Key Stakeholders	Stakeholders involved with this project are: • AEMO who would need to permit a plant shutdown during construction • Adjacent landowners for the extended height of the vent stack structure • Energy Safe Victoria for alteration permission
Benefits to customers and consumers	The proposal will provide the following benefits: • Improve workplace safety for APA personnel and contractors • Improve public safety for nearby residents and members of the public who are located in land adjacent to the compressor stations • Reduce risk of an outage and improve reliability of supply for shippers and end use customers.

3 Background and Project Need

Compressor stations require the ability to vent all the gas in the station during an emergency, normal operation and normal or fast stop shutdown event. The components and piping typically vent into a high or low pressure vent header pipe which feeds a station vent stack.

The station vent stack is a tall, round pipe positioned vertically so the gas is released in a safe manner. The vents operate automatically in response to detected gas or fire events within the station and can therefore occur without prior warning.

The station vents at Longford, Springhurst, Brooklyn, Wollert B and Gooding do not meet current standards for personnel and/or public safety. In the event of vented gas ignition, harm and possible fatalities could result if personnel or the public are in reasonably foreseeable locations (heat flux zones).

There have been two reported instances where the station vent has ignited at Brooklyn. Whilst no injuries were sustained, there are no control measures that can be practicably implemented to prevent personnel or the public being exposed if the hazard were to occur again.

Preliminary assessments of the consequence are at Brooklyn, Wollert, Springhurst and Gooding suggest heat flux contour of >4.7 kW/m^2 (injury threshold) within working areas inside the station and for Brooklyn public areas adjacent to the station. This level of heat flux is sufficient to injure personnel or the public. Heat flux of 12.6 kW/m2 (fatality threshold) is possible in the public area at Brooklyn Compressor Station. The likelihood of this event occurring is foreseeable.

The compressor station upgrade program seeks to upgrade the vents at Longford, Springhurst, Brooklyn, Wollert B and Gooding Compressor Stations to mitigate risk of vent ignition.

4 Risk Assessment

The untreated risk of an ignited vent during an Emergency Shut Down (ESD) for an emergency or when the station is vented for planned maintenance could result in fatalities to personnel and/ or the public in the nearby vicinity, with varying likelihood, depending on the station concerned. The Brooklyn Compressor Station has the highest level of likelihood and the most severe consequences as the station is frequently manned and there is a public walking/bicycle track adjacent to the plant boundary and well within the zone where fatalities could occur.

TABLE 3: RISK RATING

Risk Area	Risk Level
Health and Safety	Moderate
Environment	Negligible
Operational	Low
Customers	Moderate
Reputation	Moderate

Compliance	Moderate
Financial	Moderate
Final Untreated Risk Rating	**Moderate**

Works to upgrade the vents at the five compressor stations will result is the risk reduction to ALARP.

5 Identification and Assessment of Options

5.1 Identified Options

Option 1 - Do Nothing

Option 1 Do Nothing option is to accept the consequences if the risk of ignition materialises. The only mitigation currently employed to prevent risk is the control of ignition sources and basic personal protective equipment to personnel.

Option 2 – Redesign of Vent Stacks at Compressor Stations

Option 2 involves conducting a formal engineering assessment of the heat flux contours and risk assessments for each station vent in accordance with AS2885 and American Petroleum Institute (API) standards.

The results of these assessments will require either the relocation or extension of the existing vent stack(s). In addition, to minimise the cost of the vent stack upgrade, the installation of smaller bore orifice plates on the inlet of the vent stack recognising this extends station depressurisation time.

In addition, the installation of physical boundaries (fences) where the heat flux contours remains unacceptable to prevent the access of personnel. This physical boundary is a standard design measure at new compressor stations at APA.

5.2 Assessment of Options

The following table summarises the options.

TABLE 4: SUMMARY

Option	Benefits (Risk Reduction)	Costs
Option 1	None	Indeterminate
Option 2	Consequences of harm to personnel resulting from ignited vent reduced to minor injury are reduced.	$1,975,000

Option 1 - Do Nothing is the least preferred option. The Occupational Health and Safety Act requires employers to provide a safe workplace. The consequences of an ignited vent may result in severe injuries to personnel and possibly fatalities.

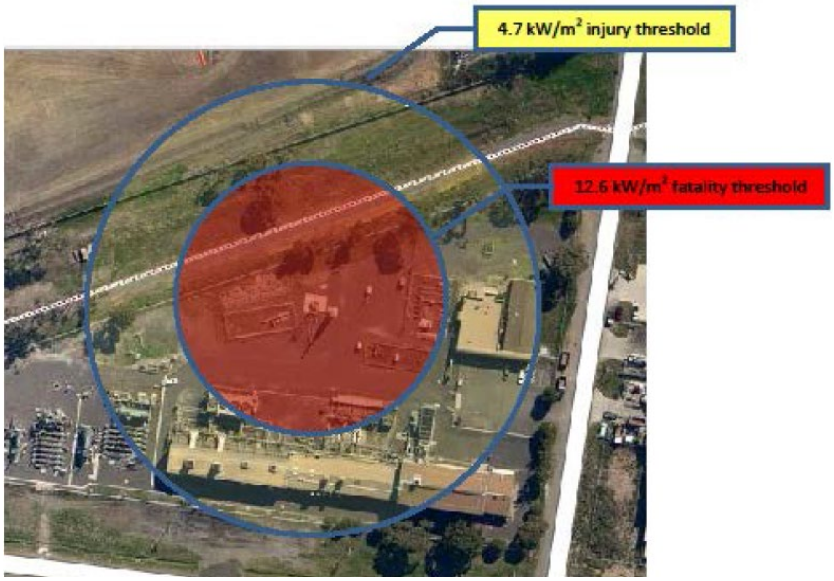
The stations are operated under a Pipeline Licence which requires the adherence to Australian Standard AS2885. This standard requires all risks to be reduced to As Low As Reasonably Practical (ALARP) or lower. Do nothing does not meet these requirements.

Option 2 - Redesign of Vent Stacks at Compressor Stations seeks to mitigate the risks and consequences of ignited vents by upgrading them to meet current standards for personnel and/or public safety. Option 2 is consistent with ALARP and better meets Occupational Health & Safety requirements.

Option 2 is the preferred option.

5.2.1 Why are we proposing this solution?

The below diagram illustrates the highest risk station vent, where two reported instances of vent ignition have occurred. The 12.6 kW/m^2 heat flux contour (red zone) is broadly accepted as a fatality threshold (i.e. probability of death). This zone encompasses areas of the station where personnel perform routine maintenance and includes the public walking track adjacent to the plant boundary.



6 Consistency with the National Gas Rules

Consistent with the requirements of Rule 79 of the National Gas Rules, APA considers that the capital expenditure is:

- Prudent – The expenditure is necessary in order to improve the safety for APA personnel and contractors and for public safety of people on land adjacent to the compressor stations. The proposed improvements is of a nature that a prudent service provider would incur.
- Efficient – The work will be undertaken in a manner consistent with APA's procurement policy and the cost estimates are based on an efficient and planned program of upgrade rather than ad hoc emergency replacement.
- Consistent with accepted and good industry practice – Addressing the risks associated with the ignition of vented gas is accepted as good industry practice. In addition the reduction of risk to as low as reasonably practicable in a manner that balances cost and risk is consistent with Australian Standards AS2885 and the Occupational Health and Safety Act.

7 Forecast Cost Breakdown

In this section, the proposed cost of the project is sectioned by station.

- Brooklyn & Gooding
  - Engineering assessment of station ESD and maximum gas venting flow rate
  - Likely augmentation to vent stack is a reduction in vent tip diameter, an extension of its height and further ignition prevention equipment (anti-static and anti-lightning devices)
  - Estimates are based on recent vent installation at T60 LV10 and Winchelsea compressor station indicate construction costs. Engineering assessment at these stations (each station has at least four compressor units) is significant.
  - However if the vent stack is replaced additional civil preparation is expected for Brooklyn in particular which has unfavourable geology.
- Wollert & Springhurst
  - Engineering assessment of the station vent and physical boundary installation
- Longford
  - Augmented flare will be used at Longford, engineering will be required to select a suitable solution.

TABLE 5: PROJECT COST ESTIMATE

Expense Description	Brooklyn	Gooding	Wollert	Springhurst	Longford	Total
Internal Labour	$100,000	$75,000	$50,000	$50,000	$50,000	**$325,000**
Materials	$350,000	$350,000	$100,000	$100,000	$100,000	**$1,000,000**
Contracted Labour	$150,000	$150,000	$50,000	$75,000	$75,000	**$500,000**
Other Costs	$150,000	$0	$0	$0	$0	**$150,000**
Total	**$750,000**	**$575,000**	**$200,000**	**$225,000**	**$225,000**	**$1,975,000**

8 Acronyms

Acronym	Definition/Description
AEMO	Australian Energy Market Operator
AGA	Australian gas association – Type B compliance governing body
API	American Petroleum Institute – publisher of standards
CHAZOP	Control system HAZOP – study of the control system functions to identify logic vulnerabilities
ESD	Emergency shutdown – control system-initiated shutdown designed to prevent incident escalation if operating parameters are breached
ESV	Energy Safe Victoria
HAZOP	Hazard and operability study
HMI	Human machine interface
ILI	Inline inspection – pipeline internal inspection
OEM	Original Equipment Manufacturer
RA	Risk Assessment
RBI	Risk Based Inspection – a process used to prioritise maintenance or inspection activities based on risk of failure.
SIL	Safety Integrity Level – an assessment used to rank control systems by their ability to fail safely
SMS	Safety Management Study
VTS	Victorian Transmission System