Business Case – Capital Expenditure

Compressor Station Vent Upgrade

Business Case Number 205

1 Project Approvals

TABLE 1: BUSINESS CASE – PROJECT APPROVALS

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Reviewed By	Alan Burt, *Engineering Manager Development APA Group*
Approved By	Craig Bonar, *Manager East Coast Grid Engineering, APA Group*

2 Project Overview

TABLE 2: BUSINESS CASE – PROJECT OVERVIEW

Description of Issue/Project	The current station vents 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 ALARP
Options Considered	The following options have been considered: 1. Option 1 : Do Nothing Option 2. 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	$991,193
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)).
Stakeholder Engagement	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

3 Background

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 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.

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

4 Risk Assessment

The untreated risk of an ignited vent during an Emergency Shut Down (ESD) for a genuine emergency or planned maintenance could be fatalities to personnel or the public, 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**

5 Options Considered

5.1 Option 1 – Do Nothing

- The Do Nothing option is to accept the consequences if the risk materialises. The only mitigation currently employed to prevent risk is the control of ignition sources and basic personal protective equipment to personnel.
- The Occupational Health and Safety Act requires employers to provide a safe workplace. The consequences of an ignited vent are may result in severe injuries to personnel and possibly fatalities
- The 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 or lower.

5.1.1 Cost/Benefit Analysis

The benefits of the Do Nothing option are only the deferred capital.

5.2 Summary of Cost/Benefit Analysis

TABLE 4: SUMMARY OF COST/BENEFIT ANALYSIS

Option	Benefits (Risk Reduction)	Costs
Option 1	None	Nil
Option 2	Consequences of harm to personnel resulting from ignited vent reduced to minor injury are reduced.	$991,193

5.3 Proposed Solution

5.3.1 Redesign of Vent Stacks at Compressor Stations

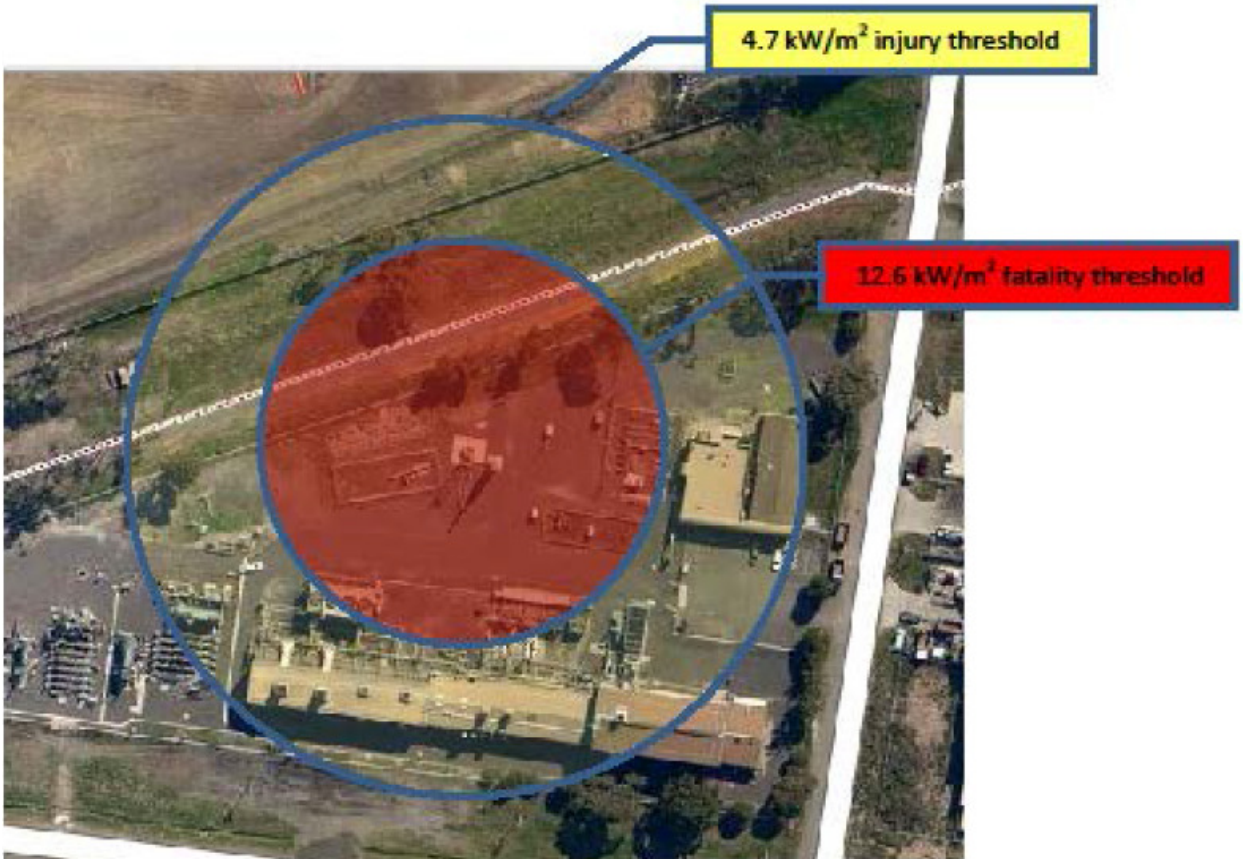
To conduct a formal engineering assessment of the heat flux contours and risk assessments for each station vent in accordance with AS2885 and API standards.

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

5.3.2 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 (ie 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.



5.3.3 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 of services to the public and personnel and 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 a an efficient 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.

5.3.4 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)
  - Recent vent installation at T60 LV10 and Winchelsea compressor station indicate construction costs of $350,000. Engineering assessment at these stations (each station has at least four compressor units) is significant and likely to be $50,000 per station.

- Costs are estimated as $400,000 per station.

- Wollert & Springhurst
  - Engineering assessment of the station vent and physical boundary installation
  - An estimate cost per station of $50,000 and reflecting the nature of the expected work compared to Brooklyn and Gooding.

- Longford
  - Augmented flare.

TABLE 5: PROJECT COST ESTIMATE,

	Total
Internal Labour	**$234,997**
Materials	**$493,691**
Contracted Labour	**$263,017**
Other Costs	**$0**
Total	**$991,193**