

SOUTH EAST AUSTRALIA



South East Australia Gas Pty Ltd

Fitness for Purpose Report

South Australian Pipeline Licence (PL I3)



Port Campbell to Adelaide Natural Gas Transmission Pipeline

Fitness For Purpose Report (PL13) – Port Campbell to Adelaide Pipeline

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I.0 Executive Summary

In accordance with Regulation 30 of the Petroleum Regulations 2000, South East Australia Gas Pty Ltd (SEA Gas) submits this report in relation to the continued Fitness-For-Purpose of the SEA Gas natural gas transmission pipeline conducted in accordance with Pipeline Licence No. I3 (PLI3 – Port Campbell to Adelaide natural gas transmission pipeline) in relation to licence activities for the five-year period from 21 February 2002 (being the approval date for the SEA Gas Statement of Environmental Objectives) to 21 February 2007. This report summarises the review of actions and activities undertaken by SEA Gas in the five years commencing in February 2002 when Pipeline License I3 was granted. This period contains pipeline design, construction, commissioning, and approximately 3 years of operations activities.

SEA Gas has conducted its operational business to ensure legislative compliance and that the pipeline remains in good condition and continues to operate in a safe manner.

Adoption of continuous improvements processes based on the identification and management of hazards which are likely to compromise the safe operation of the SEA Gas pipeline, will ensure the ongoing fitness for propose of this critical energy infrastructure asset.

2.0 Pipeline Overview

The SEA Gas pipeline system consists of high-pressure natural gas pipelines, laterals and associated facilities, which extend from Iona in Victoria to Adelaide in South Australia.

The main Victoria to South Australia pipeline commences at the TXU Gas Plant at Iona, near Port Campbell, connects with the BHP Billiton Minerva Gas Plant via the Minerva Lateral and continues in a generally north-westerly direction to Adelaide, terminating at Pelican Point. Metering stations are provided at TXUGS, Woodside, Naracoorte, Jervois, SESA (Poolajelo), Cavan, Torrens Island Power Station and Pelican Point.

A DN350 interconnect pipeline runs parallel to the main pipeline from the Minerva Gas Plant to the South West Pipeline at Iona (SWP). A metering station is provided at SWP Iona for injection into the GasNet South West Pipeline. This interconnect pipeline is also connects to the main pipeline at Langley facility near Minerva.

Pipeline isolation is achieved via 12 Main Line Valves (MLV) which are installed along the pipeline, at meter stations and at each of the Coomandook and Miakite Compressor stations. Connections for future lateral off takes are also provided at points along the pipeline.

Two compressor stations are installed along the pipeline at Miakite, Vic (KP I52) and Coomandook, SA (KP 489). Provision has been made for the future installation of an additional compressor station at Yallamurray, SA (KP 347).

The pipeline's primary function is to provide safe, reliable transportation of high-pressure natural gas from receipt points to delivery points. Its design caters for a range of operational scenarios including flow in either direction. The design life of the pipeline and associated facilities is 80 years; however in-service life of components requiring periodic maintenance will typically have a commercial operating life less than this period. Operation is normally controlled remotely using a SCADA system, in addition to options for manual operation of critical components.

3.0 Fitness for Purpose Statement

SEA Gas operates a pipeline system in South Australia as part of its 685km transmission pipeline which conveys high pressure natural gas from the Otway Basin gas fields in Victoria. This pipeline system was designed and constructed during 2002 and 2003, with commissioning occurring thereafter, with formal operations commencing on 1 January 2004.

Utilising new materials, particularly with respect to the protective pipeline coatings, the pipeline and facilities were constructed using best practice engineering design and risk mitigation measures, with an intended pipeline design life of 80 years.

SEA Gas' operational policies, procedures and maintenance activities are underpinned by industry best practice, inclusive of adherence to the requirements of Australian Standard AS 2885 and are routinely audited both externally and internally to ensure compliance with regulatory and legislative requirements. Additionally, adherence to internal commercial and performance objectives, including a significant emphasis on safety and environmental considerations as high priorities, further underpins the fitness for purpose of this pipeline asset. SEA Gas operations and maintenance staff have significant experience and expertise in operating and maintaining high pressure pipeline system infrastructure, which has readily been demonstrated since the commencement of SEA Gas operations.

This report which was completed during April 2007, details the results of pipeline and facility maintenance, monitoring and inspection programmes, indicating that the pipeline system does not pose an unacceptable risk to the public, the environment, nor the security of supply of gas into South Australia, and that the pipeline system is fit-for-purpose for the ensuing 5 year period following the completion of this assessment.

4.0 Grounds for Fitness for Purpose

The Fitness for Purpose statement is made on the basis of the following:

- The pipeline system is very young in comparison to its design life, and operational inspections confirm it remains in excellent condition
- Results from cathodic protection surveys carried out annually confirm the pipeline is fully protected from external corrosion
- Results from gauge plate pigging confirm there are no dents greater than 5% ID present in the pipeline system
- Results of SEA Gas' review of the Risk Assessment mitigation actions confirms that operational procedures, policies and practices manage all identified risks to ALARP level
- Normal planned facility maintenance has given no grounds for concern for the integrity of facilities, or operational effectiveness of Critical Safety Systems.
- SEA Gas monitors the entire pipeline system on a continuous basis via a dedicated dual server SCADA system, with two forms of communications to all sites
- SEA Gas maintains a completely redundant control room in a separate location remote from the normal control room, capable of being manned at short notice
- SEA Gas conducts twice yearly emergency exercises to validate emergency response capabilities and continuously improve emergency procedures

5.0 Risk Assessment Activities

5.1 Risk Assessment Closeout review

The main pipeline and all laterals have been subjected to formal Risk Assessments prior to construction, in accordance with the AS 2885 requirements and methodology. For the main pipeline, the results were documented in a database form for easy review. In addition to this, all metering and compression facilities have been subjected to HAZOP and CHAZOP assessments at the time of construction.

In early 2005, SEA Gas reviewed the as-built pipeline and facility Risk Assessments, HAZOP and CHAZOP documentation. The following documents were utilised:

- Report for Risk Assessment of Common Threats to Standard Designs - SLI000-PL-RE-D-I02
- Report for Risk Assessment of Common Threats to Above Ground Facilities - non-location specific – SLI000-PL-RE-D-I37
- Report for Risk Assessment of Common Threats to Above Ground Facilities – site specific – SLI000-PL-RE-D-I42
- Report for Operating Procedures arising from HAZOP Studies – SLI000-PL-RE-B-I35
- Pipeline Risk Assessment Database
- HAZOP/ CHAZOP record sheets for Meter Stations and Compressor Stations

These reports were reviewed to determine whether current operating procedures and practices rendered the identified hazards to ALARP.

It was found that almost all current operational procedures were in compliance with the originally identified close out items. This was primarily due to the fact that the original hazard was a generic hazard which would normally be mitigated, eg noise due to venting gas, or that the original action item was to prepare a procedure for a generic task, eg venting a meter station.

A small number of site specific close out items were incorporated into the Pipeline Operations and Maintenance Manual TECH-MAN-001 (O&M Manual), and relevant procedures. These were in the following areas:

- Develop Emergency Response plan in conjunction with proximate plant owners at Torrens Island and Iona sites
- Consult with local landholders within earshot of a number of sites prior to venting gas
- Refer to the relevant Interface Agreement Party in the relevant Cavan and SWP meter station operating procedures
- Incorporate Off Spec Gas handling procedures in O&M Manual
- Add additional comments in site specific sections of the O&M Manual about site specific hazards at those sites. Note these had already been incorporated in the relevant operating procedures

SEA Gas have also compiled a list of all existing Critical Safety Systems which are required to mitigate process risks such as over pressure or under temperature conditions. Standard operating procedures which involve testing or calibrating these Critical Safety Systems have been modified to explicitly identify these systems as Critical Safety Systems to field staff.

6.0 Future Work

In accordance with its risk review and management strategies, SEA Gas will conduct a metre-by-metre, pipeline risk assessment review during 2007. This process will be conducted using the existing risk database as a prompt, with any additional risks added where identified. This risk assessment review will form an adjunct to this fitness for purpose review, the results of which will be forwarded to PIRSA Petroleum Group following completion.

The SEA Gas GIS system, alignment sheets, pipeline aerial and road patrol reports, and patrol personnel will be used to identify any physical changes to the pipeline right of way, encroachment, or increased event likelihood since the original Risk Assessment was conducted.

7.0 Asset Physical Condition and Inspection

7.1 Pipeline Integrity

Since pipeline construction, three on-off potential Cathodic Protection surveys have been conducted. All surveys confirmed the pipeline system remains fully protected according to the criteria of AS 2832.

The effects of Telluric Currents are occasionally experienced on the pipeline, these cause very short periods of under-protection from anodic excursions, however these periods are not of sufficient length to threaten the pipeline's integrity, due to the new condition of the pipeline coating.

SCADA alarming on a 30 second rolling average potential identifies to operators periods of anodic excursion which exceed this length. These typically occur as a result of the Transformer Rectifier unit developing a fault and tripping off. These faults are repaired promptly.

Transformer Rectifier current output for the pipeline system remains very low, at an average of 0.4A for a section of 100km in length.

A Direct Current Voltage Gradient survey of the line was conducted post construction in 2004. All defects over 1% IR drop (39 in total) were excavated. Of these, approximately half were found to be actual defects, and all were repaired. The defects were caused by construction pipe handling. A further DCVG survey is scheduled for 2008.

No integrity excavations have been performed. A number of excavations to attach laterals at Naracoorte, Jervois and SESA have been performed and the coating was observed to be in as-new condition.

The pipeline was pigged during 2006 with cleaning pigs. Prior to this commencing, gauge plate pig runs were completed, with 95% internal diameter plates. These plates showed minor "nicking" from internal weld slag or pig signallers. No gauge plates were bent. The pipeline was originally pigged with 93% ID plates during construction with similar results. This result indicates that no dents greater than 5% ID are present in the pipeline.

Intelligent pigging of the pipeline is presently forecast to occur in 2010.

7.2 Station Integrity

All metering and compression facilities are visited on a weekly or quarterly basis for programmed maintenance. As part of this maintenance visual inspections are performed for integrity threats such as corrosion, or minor leaks which are undetectable remotely.

Some construction faults involving dissimilar metal corrosion of small bore instrument fittings were identified with this process, and repaired as part of normal maintenance activities.

Inspections under lagging on heat traced sections of piping are performed annually and no corrosion has been reported.

Internal corrosion is not an identified risk for the stations due to the sweet dry gas product transported. Internal inspections of pipework and pig traps are performed when these areas are opened, and these confirm no corrosion is present.

Water from water bath heaters is sampled and analysed for corrosion inhibitor concentration and presence of corrosion products. Dosing is corrected should the concentration of inhibitor fall below the recommended range.

Internal inspection of a representative water bath heater for bundle corrosion and cracking is scheduled for 2008 in accordance with AS 3788. The heater will be drained, and the pipe bundle removed for inspection. The heater shell will also be inspected, although it is not a pressure vessel. Results from this inspection will set the interval for future inspections.

A comprehensive above ground piping corrosion survey will be carried out in 2008 to inspect areas not normally visually inspected; such as above/below ground pipe transitions and pipe/pipe support interfaces.

7.3 Pressure Vessel Inspections

All registered pressure vessels were inspected internally and externally in accordance with AS 3788 in 2005. These vessels included all Shafer mainline valve operators, filter vessels at meter stations and suction scrubbers at compressor stations. All vessels were in excellent condition.

7.4 Security of Supply

SEA Gas operates a high pressure natural gas transmission pipeline system which transports odourised natural gas of defined merchantable quality (i.e. – as per the natural gas specification) from Port Campbell and Iona in Victoria (currently from TRU Energy underground storage and BHP Minerva, with the Woodside facility at Port Campbell scheduled to be commissioned by late 2007), to markets in South Australia and Victoria. Currently over 50% of Adelaide's natural gas energy needs are supplied by SEA Gas, with security of supply being provided by the design and safe operation of pipeline infrastructure assets, which include compression, pressure reduction and metering facilities, isolating valves and associated infrastructure. The ongoing proactive operation and maintenance of these facilities ensures the reliability and continued safe operation of the SEA Gas pipeline.

In accordance with the intent of the Statement of Environmental Objectives, SEA Gas is mindful of its Emergency Response management assessment criteria in respect to the gas pipeline remaining on-line and that security of supply is maintained. However, in the event of an unforeseen shortfall or restriction to supply as a consequence of third party inability to supply natural gas into the pipeline, SEA Gas will endeavour to consult with the Minister with a view to determining an appropriate course of action in such circumstances.

Delivery meter stations at Pelican Point, Torrens Island and Cavan 1 and 2 have redundant metering, gas heating and pressure reduction devices. One of each device is capable of delivery of the full design flow of the meter station.

In addition, the site Remote Telemetry Unit has dual redundant processing units and communications paths to the SCADA system.

These design features produce maximum reliability, as the primary single point of failure devices are duplicated.

The main pipeline is also looped from Miakite Compressor Station at KP 151, to Coomandook Compressor Station at KP 489 in twin 14". This allows one line to be shut in for maintenance or repair if required, with the other line still flowing.

8.0 Management Systems Adequacy

SEA Gas has a comprehensive set of management systems for all areas of its operations to ensure regulatory compliance. Developed in early 2004, these systems provide a framework for operational compliance of health, safety, welfare and environmental matters, inclusive of a continuous improvement process.

A heightened emphasis on the identification and reporting of workplace hazards, near-misses and incidents amongst employees and service providers, enables strategic review of management systems for root cause analysis and pre-emptive management of operational systems, aimed at optimising opportunities for prevention.

These management systems apply equally to SEA Gas employees, contractors, service providers and visitors, providing surety that the pipeline system is operated to maximise public safety, minimise environmental hazards and maximise security of supply.

8.1 Health and Safety

SEA Gas places the health and safety of its employees, service providers, visitors and the general public foremost in its operational goals. Underpinned these values with policies, procedures and work instructions which enable safety management to be integrated into pipeline operations, through hazard identification, risk management and safety systems which include Job Hazard Analysis, Work Permits, Tagging & Lock-Out Systems, Induction and Safety Training.

Following initial induction and training, maintenance contractors were re-trained in Work Permit and Job Hazard Analysis (JHA) procedures in March of 2005. Observations from field Occupational Health and Safety audits and feedback from field staff had indicated that some clarification was required for more complex or uncommon situations such as multiple permits issued at the same site, and regular communications with the SEA Gas system control room during prolonged activities.

As a result of this feedback, a review of the Work Permit and Tagging procedures was undertaken in August of 2005, resulting in changes to strengthen the JHA and communications requirements for opening multiple permits at a single site, to ensure safe operations during multiple activities.

Periodic review of policies, procedures and other operational documentation is initiated in accordance with document control processes. Additional reviews and amendments are initiated in response to hazard identification, risk management, and legislative updates, inclusive of amendments to Australian Standards and Codes of Practice.

8.2 Environment

In the course of its operations SEA Gas has adopted environmental management principles in accordance with its Statement of Environmental Objectives, supplanted by legislative compliance requirements and industry best practice, per the APIA Code of Environmental Practice – Onshore Pipelines.

Post construction remediation and vegetative restoration of significant sites along the pipeline easement has been managed in consultation with stakeholders, resulting in a phased approach which includes collection of indigenous seed stock from sites to preserve local provenance, propagation, planting and site maintenance activities.

Scheduled site inspections have been conducted to ensure that site management activities result in stated outcomes at each site, whilst maintaining required line of site requirements per AS2885.

In addition to site restoration activities, SEA Gas has committed to significant net gain offset projects away from the pipeline easement, contributing towards the protection, restoration and biodiversity improvements. These net gain projects include:

- Enhancement of Red-tailed black cockatoo habitat, as a result of planting 8,000 feed and habitat trees at Pooginagoric;
- Enhancement of Black Fish habitat along Mosquito Creek, with the World Heritage listed Naracoorte Caves complex;
- Weed management within the Para Woodland reforestation area;
- Purchase of land for inclusion into the Mount Monster Conservation Park to secure endangered Monarto Mintbush habitat;
- Revegetation of broad acre farming property at Ki Ki;
- Sponsorship of Research into the Bitter Bush Blue butterfly; and
- Revegetation of remnant vegetation sites along the route of the pipeline.

8.3 Emergency Response & Incident Management

Since the formal commencement of pipeline operations on 1 January 2004, SEA Gas has hosted 11 emergency response exercises, which have rigorously tested the effectiveness of personnel, emergency response systems, response times and repair equipment within the context of realistic operational scenarios. Emergency response exercises have provide valuable opportunities to implement response systems in an efficient and realistic manner, intent on providing a timely response to emergency conditions that may arise at any point along the pipeline route.

Learning's from emergency response exercises have resulted in continuous improvements to emergency procedures, coupled with providing personnel with a heightened level of emergency preparedness though familiarisation with emergency procedures and the ability to make suggestions for improvements to emergency response systems.

Critical emergency management and response personnel (inclusive of contract personnel) have been provided with necessary skills and training to manage likely incident scenarios, inclusive of media management, emergency communications, crisis management and regulatory liaison.

Details of emergency response exercises have been provided to PIRSA in the course of quarterly and annual reporting programmes.

During the course of operational activities, SEA Gas has adequately managed and where deemed necessary, rehabilitated (in the context of these incidents, this has been restricted to post-incident clean-up and monitoring) areas affected by the following minor environmental incidents:

- Discharge to ground of inert grit blasting media (garnet) in the course of preparing welded joints on a 50mm steel pipeline, prior to applying a protective wrap tape coating;
- Discharge to ground of four litres of diesel fuel in the course of refuelling a mobile air compressor;
- Discharge to ground of 500ml of water bath heater corrosion inhibitor concentrate by a maintenance sub-contractor, during the course of scheduled maintenance;
- Discharge to ground of water bath heater corrosion inhibitor solution as a result of thermal expansion of the fluid at elevated temperatures, resulting in an overflow which was not captured by the spill drums beneath the heater, and
- The release of an oily mist in the course of gas venting operations associated with pipeline pigging operations at the Yallamurray Main Line Valve.

In accordance with the objectives of the SEO, the above incidents have resulted in nil adverse environmental impacts, however in response to these incidents (which albeit minor in nature, do not comply with the intent of the SEA Gas Statement of Environmental Objectives), procedures have been reviewed, modified or developed to ensure that:

- all grit blasting activities are conducted by EPA(SA) licenced contracts and in a manner which contains inert blasting media for subsequent disposal;
- refuelling operations are conducted by trained individuals and confined to designated refuelling areas, inclusive of bunding, spill response and clean-up facilities;
- water bath heater maintenance ensures that chemical dosing is conducted in a manner which mitigates the risk of spillage, inclusive of improved containment of discharge solutions within a bunded area prior to disposal; and
- No residual oily residues are present following mist discharge on SEA Gas property, via independent third party testing and the need to manage venting operations to ensure that environmental discharges are prevented.

8.4 Auditing

In accordance with its Safety and Environment Management Operating and Maintenance Plan, SEA Gas conducts scheduled audits of its operational documentation as detailed in the table below.

SEA Gas operations and maintenance activities are underpinned by the Safety and Operating Plan (SAOP) and the Statement of Environmental Objectives (SEO), which when combined with the requirements of Australian Standard AS2885 form the basis for safe operations and legislative compliance.

For the purpose of the SEA Gas annual report, audits of the SEO are conducted in conjunction with audits of the holistic safety and operating system, both on an internal basis via field validation and in conjunction with third party validation audits of the safety and environmental management system as detailed within the Safety and Operating Plan.

Audit Area	Frequency	Conducted by
Regulatory audits	As required by legislation	Regulatory Authorities
Safety and Operating Plan audit	Annual (initially)	Internal or External
Health and Safety Management System audit	Annual	Internal
Contractor's Maintenance and Safety Management Systems audits	Annual	Internal or external
Audit against Statement of Environmental Objectives	Annual	External

In addition to operations and maintenance audits, SEA Gas is subject to external auditing of its safety and operating systems by its insurers, who validate the management of risk and ensure that the pipeline asset is managed in a manner which is commensurate with their risk liability. As a result of these external insurance audits, SEA Gas has been identified as having improved its safety and operating standards within the industry.

8.5 Scheduled Maintenance

Scheduled maintenance on the pipeline is performed by the maintenance contractor. The maintenance schedule was prepared using vendor recommendations, operational risk assessment outcomes, requirements of various Australian Standards, and normal pipeline industry practices. All scheduled maintenance results in written reports which are reviewed by SEA Gas. Any urgent work required is actioned whilst on site with prior approval from SEA Gas.

The maintenance schedule is under continuous review for effectiveness. Based on two years of road patrol and Dial-Before-You-Dig data, road patrols in the Iona area were decreased from weekly to monthly, full line aerial surveys were increased from quarterly to two-monthly, and an additional monthly inspection of the Gas Chromatographs, and gas bomb sampling for independent analysis were added.

As a result of renewing the maintenance services contract, the maintenance schedule was comprehensively reviewed in early 2006. No major adjustments were made to task frequencies. A number of task scopes were refined.

8.6 Unscheduled Maintenance

Unscheduled Maintenance is handled through the Fault Action Report system. This is an in-house database package which issues and tracks unscheduled maintenance work. The system allows for the issue of work orders to maintenance contractor staff with an assigned priority, the close out and reporting of the results of the work, and archiving for data trending.

Where the unscheduled work is an urgent or call-out priority, the initial request for mobilisation is verbal, followed by the issue of the Fault Action Report.

The maintenance contractor has continuous coverage of the pipeline system, for call out response to site within 2 hours. The call out process is via verbal request to the contractor's 24 hour control room.

The maintenance contractor tracks its execution of these Fault Action Reports using a customised version of the Maximo work order system.

8.7 Work Procedures

Standard work procedures have been prepared and approved for all Scheduled Maintenance tasks. Work procedures have also been prepared for many common Unscheduled Maintenance tasks such as blowdown of a meter station, and gas filter changes.

Any work which has the potential to interrupt gas flow or release gas to atmosphere within a site must have an approved work procedure prior to being carried out.

Work procedures are approved for nominated periods of time, after which they must be reviewed and approved again. One-off work procedures are also issued for specialised tasks. These must be reviewed and approved each time they are used.

SEA Gas staff work with the maintenance contractor to streamline and improve work procedures on a continuous basis. Field staff report anomalies in work procedures, and near-miss incident reports trigger root cause analysis of work procedures.

8.8 Remote Site Monitoring

SEA Gas has a 24 hour/ 7 days a week duty System Controller who monitors all aspects of the pipeline system's operation. SEA Gas has a dedicated SCADA system which gathers operating data and raises warnings and alarms if operating parameters deviate from normal ranges.

The System Controller is responsible for the primary identification and response to potential emergencies and taking prompt action to mitigate any effects of such emergencies.

The SCADA system runs on redundant servers in the Master Control Room in the Adelaide CBD. An independent control room has been established at another location, not in the CBD, should the Master Control Room become unavailable.

Each site has two independent communications paths to the control room to minimise the likelihood of a complete communications failure.

9.0 Credible Risk Factors

The original Pipeline Risk assessment process identified a number of key credible risks which require ongoing management. SEA Gas manages these risks to ALARP using the management and operational policies outlined in this report. The key risks are listed and specifically addressed below.

9.1 Third Party Interference

Third party interference has been identified as a key risk which requires diligent management to mitigate likely risks to pipeline integrity and safe operations. SEA Gas has developed an extensive pipeline awareness programme, which includes:

- Public consultation with landholders, lease's, community groups, asset operators and transport companies;
- Pipeline safety and awareness training for emergency services along the pipeline route;
- Desktop emergency response exercises with emergency services and response agencies;
- Media coverage to highlight commissioning and subsequent operation of the SEA Gas pipeline and references to ongoing safety and awareness sessions;

- A programmed landholder/land use contact scheme;
- Subscription to land ownership update service to enable delivery of safe operating information to new landholders;
- Utilisation of the Dial Before You Dig asset referral and locations service;
- Active participation in the Engineering Functional Services Committee, for emergency management and recovery;
- Scheduled pipeline patrol activities utilising ground and aerial observers;
- Liaison with Councils and development authorities; and
- Production of a Pipeline Awareness and Safety DVD package to highlight safe operations in the vicinity of the SEA Gas pipeline.

9.2 Major Hazards or Incidents

Impact on SEA Gas facilities from incidents within or in nearby sites has been identified as a credible risk. SEA Gas sites themselves contain a limited inventory of high pressure gas which is the primary hazardous material present at each site.

Sites can be remotely isolated either by actuated valves within the site, or by actuated valves at progressively greater distance from the site. Key valves within the site are “fail-closed” valves which close under spring torque on loss of instrument gas or control signal. The inventory of gas exposed to an incident can thus be limited in stages to mitigate the effects of a gas escape. All valves on the SEA Gas pipeline system are fire safe according to API standards.

Impact on SEA Gas sites from incidents at nearby facilities presents more complex mitigation issues, but is primarily dealt with by separation distance and location. One site in South Australia was identified in the Risk Assessment where this risk was credible, at Torrens Island Meter Station. At this site the Torrens Island Power Station and the EPIC Moomba-Adelaide Pipeline are in proximity to the SEA Gas meter station.

SEA Gas has incorporated contact details for the operators of these assets in its Emergency Response Plan, and is in regular contact with their operating staff.

9.3 Site Utilities Supply Security

All sites rely on electrical power to operate. All sites are backed up with UPS (Uninterrupted Power Supply) electrical supplies, capable of operating the control systems at the site for at least 24 hours.

Mainline Valve sites are fed from mains SWER lines and remain fully operational on UPS power. Mains power failure alarms and low battery voltage alarms alert the System Controller to power system status.

Meter stations which contain water bath heaters retain full control ability, but cannot maintain water bath heater operation under power failure. The water bath heaters have forced draft fans with high power demand which cannot be sustained by a reasonably sized UPS. The heaters have sufficient thermal mass to sustain short periods (up to several hours dependent on gas flows) of power loss.

However meter stations at Pelican Point and Torrens Island are fed from the power station high integrity power feed, meaning power failures are much less likely than the domestic grid. In the three years of operation no power failures have been recorded at these sites.

Cavan I and 2 stations have recorded several power failures. Measures to reduce main line pressures can be implemented to allow these stations to continue to supply in a prolonged power outage, without water bath heater operation. This has not been required to date.

In addition to this, SEA Gas has purchased a large trailer mounted 3 phase generator, capable of operating any meter station, for black start capability or prolonged power supply issues.

9.4 Process Excursions

Process excursions outside design limits such as over pressure or under temperature are managed by Critical Safety Systems. These systems are maintained and trip tested on an annual basis for functionality. To date no Critical Safety system has failed its trip test.

Over pressure conditions are managed by at least two separate systems at all sites in accordance with AS 4041. At metropolitan meter stations and compressor stations, there are three or more systems for this function.

High flow alarms at meter stations and pressure-rate-of-change alarms at Mainline Valve sites are programmed to detect possible leakage or line break events.

Continuous gas quality monitoring at all receipt points verifies the gas receipted into the pipeline is safe to transport. Pipeline gas is also sampled monthly for independent lab testing to validate gas quality monitoring equipment.

9.5 Incorrect Operating Procedures

All operating procedures are reviewed and approved prior to site use. At least three separate people are required to review and approve each operating procedure. SEA Gas adopts a conservative approach to live gas work and all isolations for this purpose are double-block-and-bleed.

All procedures which have the potential to interrupt station flow or release gas to atmosphere require a written procedure. All maintenance tasks have written approved and field tested procedures. The site JHA may also indicate safety hazards which require a written procedure to mitigate.

SEA Gas encourages a culture where staff do not proceed with any task or procedure they feel is incorrect or unsafe. This has proved successful as a back stop in preventing incorrect procedures from being used in the field.

9.6 External Corrosion

External corrosion is a credible hazard, increasing as the pipeline ages. SEA Gas will manage external corrosion in line with *TECH-PO-019 Pipeline Integrity Management Plan*, which describes the management philosophy and major integrity management tasks and intervals.

To date external corrosion management has been limited to visual inspections and annual Cathodic Protection surveys due to the very young age of the pipeline. The first major integrity management tasks are a DCVG (Direct Current Voltage Gradient) survey in 2008 and intelligent pigging in 2010.

9.7 Bush Fire Risk

In rural areas Sea Gas sites are exposed to a bush fire risk, with a fire which propagates primarily through grass land or by flying embers representing the most credible risk to remotely located facilities.

All remotely located facilities are fully enclosed within compounds which encompass the site hazardous area, with surfaces of these compounds cleared of all vegetation and covered in gravel. Quarterly weed management and slashing of surrounding vegetation is undertaken to ensure that areas immediately surrounding compounds do not pose an additional fire risk.

Mainline valve sites and meter stations are situated away from overhanging trees and undergrowth, and where possible are located within previously cleared broad acre agricultural area which are utilised for

stock agistment or cropping activities. These areas have been identified as posing a low fuel load and will generally not support high intensity fires.

Three SEA Gas facilities are located approximately 100m from timber plantations; these being the Miakite Compressor Station and the Poolaijelo Off take Isolating Valve and the Poolaijelo Metering Facility, both of which are located in Victoria. Following recent bush fires in the areas surrounding these facilities during the 2006/2007 fires season, site manning during an extreme fire event was considered to extinguish any embers which may enter the site.

Receipt stations are all located on the border, or in between, gas plants, which have been located away from forests or other fire risk areas. Should a fire threaten these areas, the SEA Gas facilities would be protected by the same fire fighting resources which would be deployed to protect the gas plants.

Major delivery stations are located in metropolitan Adelaide. Fire risk within these areas is reduced, and response from emergency services and SEA Gas resources is considered to reduce the fire risk substantially.

All SEA Gas sites have fire safe valves according to API standards. Site piping has excess wall thickness which provides resistance to external heat. Key valves within the site are fail closed valves which will close on loss of signal or instrument gas and limit flammable inventory exposed to fire.

9.8 Site Fire Risk

A fire caused from within the site is a credible risk at compressor stations. Both Miakite and Coomandook compressor enclosures have been assessed by the manufacturer as being at risk from oil or minor gas fires.

These compressor skids contain an inventory of compressor lube oil, which is used within the turbine and compressor bearings. Downstream of the lube oil pump, the oil is at moderate pressure to enable it to feed into the thrust bearing cases. Minor oil leaks could result in spray onto hot surfaces on the turbine or compressor, with the potential for ignition.

Oil pressure and sump level monitoring are used to detect oil leaks and both trigger shutdown of the compressor package.

The compressor enclosure is also fitted with large capacity forced ventilation fans, which purge the enclosure continually. Minor gas leaks from the compressor case or instrument lines will be purged from the enclosure, preventing the build up of gas to potentially flammable levels. Gas detection is employed in the enclosure vent ducting to detect traces of gas in the purged air.

The skids are fitted with gas and fire detection sensors, which trigger an immediate shutdown and site depressurisation, as well as deluge with carbon dioxide inside the compressor enclosure. The enclosure is a confined space, and deluge is an effective means to exclude oxygen and extinguish fires.

All site huts are fitted with smoke detectors which alarm remotely to SCADA. These are tested annually. Site huts also have carbon dioxide fire extinguishers for electrical fires. The compressor station motor control rooms have a VESDA fire detection system, capable of detecting very low levels of smoke within the room, and alarming to SCADA.

9.9 Soils, Terrain and Water Crossings

During the course of its scheduled ground and aerial patrol activities and consultation with landholders, SEA Gas monitors the pipeline easement for soil erosion and trench subsidence. Sites displaying sub-

standard ground conditions (i.e. – erosion as a result of wind, heavy rainfall or water discharge or trench subsidence) are promptly repaired and restored in consultation with stakeholders, following which the site is incorporated into a monitoring programme to ensure no subsequent recurrence. In the process of repairing and restoring degraded sites due to erosion or subsidence, an assessment of reoccurrence is conducted, which may require the installation of preventative structures that may include diversionary berms to reduce erosion susceptibility; revegetation in conjunction with silt fencing; fencing to exclude stock and installation of rock beds to mitigate the risk to pipeline infrastructure.

Sections of the pipeline within Victoria along the first 5km are known to have been constructed within a landslip area. This area is subject to six monthly surveys by independent surveyors; with resulting negligible movement of the pipeline posing no risk to safe operation as such movement does not exceed the design capacity of the pipeline.

Water crossings along the pipeline are monitored primarily in the course of aerial patrols. Water crossings which have been identified as being unstable following high rainfall events (eg – Salt Creek at Pallamana, Salt Creek at Dergholm, Vic and Merino Creek, Vic) are subject to scheduled ground monitoring to ensure that these sites do not pose a risk to safe pipeline operations.

Based on monitoring, preventative measures and occurrences during the course of operational activities, risk arising from soil, terrain and water crossing issues to the safe operation of pipeline infrastructure have been reduced to As Low As Reasonably Practicable in the context of risk management.

9.10 Third Party Infrastructure

SEA Gas continues to manage third party infrastructure risks in consultation with stakeholders, in order to ensure that risks to the safe operation of pipeline infrastructure are reduced to As Low As Reasonably Practicable in the context of risk management.

Consultation has occurred in the process of a third parties requesting approval to establish their infrastructure in the vicinity of the SEA Gas pipeline. This consultation has included:

- Approval for foreign crossings by other asset operators and landholders;
- Approval for the construction of vehicular crossovers across the pipeline;
- Approvals to construct in the vicinity of, or redevelop adjoining to the pipeline; and
- Approvals to establish sand mining operations in the near vicinity of the pipeline.

9.11 Unplanned Incidents

As an identified critical infrastructure operator in South Australia, SEA Gas has conducted terrorism risk assessments in conjunction with policing authorities at both State and Federal levels, inclusive of implementation of appropriate policies and procedures to mitigate against the likely risks of unauthorised third party interference to pipeline operations.

Interference in this context also includes unauthorised cyber interference, which may impact the continued safe operation of the pipeline as a result of interference with critical SCADA systems. SEA Gas has assessed this risk and implemented appropriate mitigation strategies, including consultation with policing authorities. SEA Gas SCADA systems were subject to an external audit by Energy Safe Victoria during 2006, in order to ensure that software systems were not open to third party interference and that appropriate preventative measures had been implemented. As a consequence of

this audit, the SEA Gas SCADA system was identified as being ‘robust’ and fit for purpose and that appropriate preventative systems were in place to manage unauthorised interference.

Additional risk assessments in relation to likely effects which may arise from the effects of an avian flu pandemic have also been assessed based on statistically forecast risks associated with a viral mutation which results in human to human transmission. As a result of this assessment a basis for business continuity has been developed, which ensures as its prime focus the continued safe operation of the SEA Gas pipeline infrastructure based on available personnel resources.

SEA Gas maintains an ongoing emergency response preparedness which strives to effectively manage any unforeseen incident which may occur during the course of pipeline operations. Underpinned by the Emergency Response Plan, SEA Gas would initiate an appropriate response to unplanned incidents and where deemed necessary would consult the Minister and/or his representative in order to mitigate the risk of the incident to the safe operation of the pipeline infrastructure or security of supply.

10.0 Conclusion

South East Australia Gas Pty Ltd operates and maintains its 685km high pressures natural gas transmission pipeline in accordance with Australian Standard AS2885 and all applicable legislative and statutory requirements, in both Victoria and South Australia. Compliance with this Standard, industry best practice operations and maintenance protocols and diligence validation of compliance requirements, ensures that this critical infrastructure asset is rigorously operated and maintained to the highest practicable safety and operating standards. In the course of ensuring that the pipeline is operated and maintained in a safe manner, all identified risks arising from initial design concepts and subsequent risk reviews have been managed to ensure that the pipeline is fit for its intended purpose as required by Regulation 30 of the Petroleum Regulations 2000.