Gas Access Arrangement Review
– Network Step Changes

Appendix 6E

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ISSUE/AMENDMENT STATUS

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1 Document overview

1.1 Purpose

This document provides an overview and supporting commentary on step changes in operational expenses expected to be incurred on SP AusNet's gas distribution network from 2012 to 2017.

The document is for use by:

- Internal staff and senior management; and
- Regulators - Economic, Technical and Safety.

1.2 Document Structure

This document is structured as follows:

- **Regulatory obligations** – An overview of the regulatory framework in relation to acceptable operating expenditure.
- **Summary of network Step Change Expenditure** – Summary of expenditure and phasing requirements of identified network step changes.
- **Individual program definition and justification** – Step change justification including program of work, drivers and expenditure requirements.

1.3 Scope

This document only addresses operational step changes that are related to the operation of SP AusNet's gas distribution network. SP AusNet has identified a number of other step changes that are not related to network operations. Refer to SP AusNet's Gas Access Arrangement Review (GAAR) submission document for further information.

1.4 Relationship with other Management Documents

This document was created to provide supporting commentary to SP AusNet's GAAR submission for the fourth regulatory period (2013-2017). It should be read in conjunction with this document.

1.5 Phasing and Financial Disclosure

All financial figures quoted within this document - unless otherwise stated - have the following characteristics:

- Real Expenditure / Cost (reference year = 2011);
- In units of $1,000 (i.e. $'000),
- Before allowance for input price escalation

2 Regulatory Obligations

The economic regulation of the Gas Distribution industry is subject to a national regulatory framework. The framework is governed by the National Gas Law (NGL), and contained in the National Gas Rules (NGR).

In relation to the former, Section 23 of the NGL outlines the National Gas Objective (NGO):

"The objective of this Law is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas."

Rule 91 of the NGR outlines the "criteria governing operating expenditure", which in turn underpins the AER's assessment of SP AusNet's proposed operating expenditure requirements, including step changes. Rule 91 states:

1. Operating expenditure must be 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 delivering pipeline services.
2. The AER's discretion under this rule is limited.

SP AusNet is proposing a number of network related step changes within its submission to the AER for the fourth regulatory period (2013-2017). It is SP AusNet's assessment that the proposed step changes comply with the NGL as their inclusion within the operational expenditure benchmark is consistent with SP AusNet operating as an efficient service provider acting efficiently and in line with accepted industry practices.

3 Summary of Network Step Change Expenditure

SP AusNet is proposing five (5) network step changes for introduction within the fourth regulatory period. See the corresponding sections within this document for an overview of each.

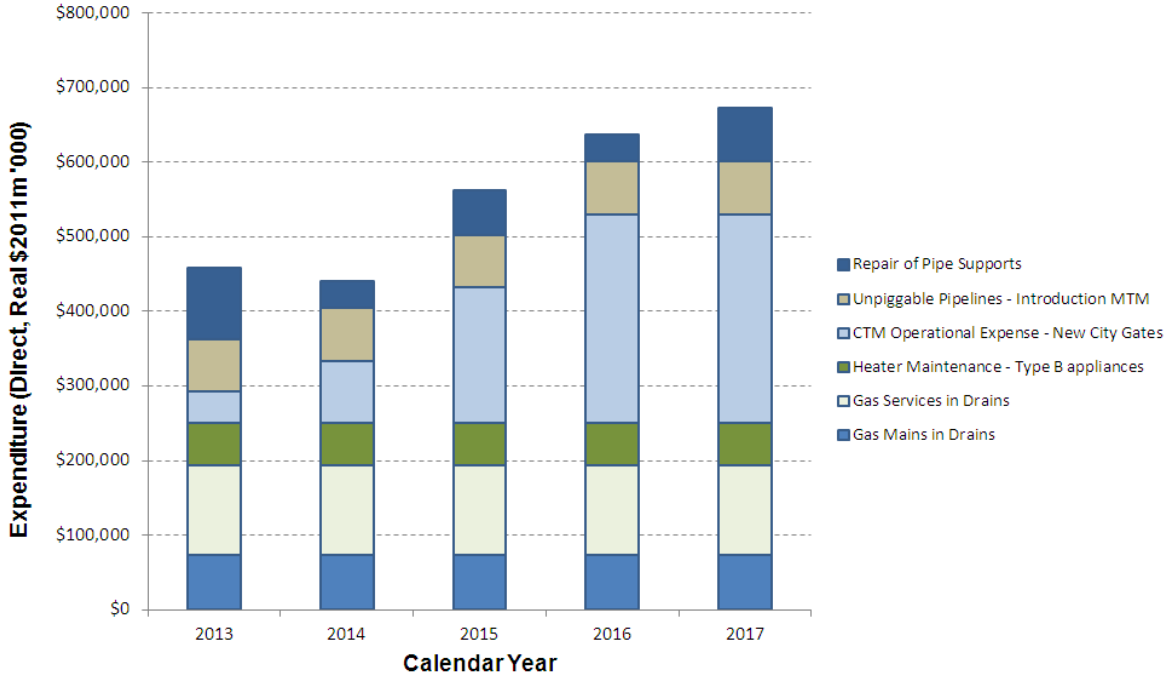
1. Gas mains and services in drains survey (Section 4, page 7)
2. Heater Maintenance schedule changes (Section 5, page 9)
3. Custody Transfer Meter (CTM) operational expense (Section 6, page 11)
4. Unpiggable Pipelines – Introduction of Magnetic Tomography (Section 7, page 13)
5. Pipe saddle repairs / inspection (Section 8, page 15)

The identified network step changes varying in their recurring nature. Table 1 (below) summarises the total expenditure requirements for each program within the forth regulatory period, while Figure 1 (page 6) highlights the expenditure profile.

Table 1: Network Step Change Expenditure Summary (Real, $2011)

Program	Expenditure[1] 2013-17	Recurring
Gas Mains and Services in Drains	$970.5	No
Heater Maintenance - Type B appliances	$280.0	Yes
CTM Operational Expense - New City Gates	$868.0	Yes
Unpiggable Pipelines - Introduction MTM	$354.5	Yes
Pipe Saddle Support Repairs	$300.0	No
TOTAL	$2,773.0	

Figure 1: Network Step Change Expenditure 2012-2017 (Real $2011)



[1] Before allowance for input price escalation

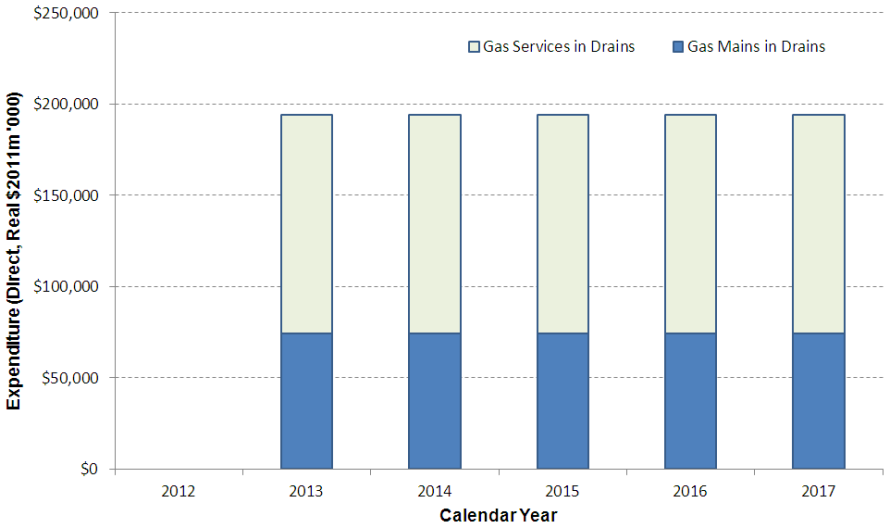
4 Gas Mains and Services in Drains Survey

SP AusNet is introducing an annual sample survey of mains and services to identify assets that may have been laid in stormwater drains and sewers which are at risk of 3rd party damage when clearing blockages.

In April 2010, Worksafe Victoria issued an industry wide alert addressing the above risk, highlighting a systemic issue in the industry. SP AusNet has since been working closely with Energy Safe Victoria (ESV) and other distribution companies to identify additional control measures and programs to reduce this identified risk.

The introduction of target surveys is SP AusNet's second stage of control measures, following increased written communication to contractors and the identification of areas of potential danger on SP AusNet's district plans. These plans are used by both internal staff and provided to external contractors as part of the 'dial-before-you-dig' process.

Figure 2: Step Change Expenditure Profile (Real $2011)



4.1 Background

In April 2010, Worksafe Victoria issued an industry wide alert (reference: ALE0125/01/04.10) highlighting the dangers of clearing stormwater drains and sewers without checking for intruding utility service pipes. The alert stemmed from a number of recent incidents where gas pipes (several within SP AusNet's distribution network[2]) had inadvertently been bored through stormwater drains / sewers and subsequently damaged by a third party when clearing blockages. As a result, natural gas has escaped into the drainage network, and spread, causing a risk of explosion in and around domestic homes. SP AusNet has since been working closely with Energy Safe Victoria (ESV) and other distribution companies to identify additional control measures and programs to reduce this identified risk[3].

Historically, the vast majority of mains laid (commissioned) in the west of the state has been via the 'open cut' method due to the heavy clay and rock conditions in the area; however there are a small number of coastal networks such as Torquay (postcode 3228), Warrnambool (postcode 3280) and Lara (postcode 3212) whereby the mains were predominantly installed via the directional boring method. The new town networks of Woodend

[2] Example: Iona Street, Norlane 3214, 11 August 2010 (IMS Number: 205281)
[3] The ESV considered the existing controls were not adequate to address this risk.

(postcode 3442), Gisborne (postcode 3437) and Port Fairy (postcode 3284) also had mains installed via directional boring. It is in these areas, where frequent directional boring was performed, that the risk of a main penetrating through an existing stormwater or sewerage drain may exist. In such instances, damage of the main/service is unavoidable during clearing works of blocked stormwater or sewerage drains.

Also identified as a potential hazard is the industry practice of the insertion of new polyethylene services into existing 'old' steel services as part of a mains and services renewal program (where services are typically upgraded to high pressure, i.e. >140kPa). A similar risk exists as per above (i.e. mains in drains) if the existing service pipe was already encroaching in a drain or sewer. Again, this would leave the potential hazard for any future drain/sewer cleaning activities.

4.2 Required Expenditure

Two programs have been identified to address the risk of 3rd party damage to SP AusNet's gas assets that may be encroaching in drainage systems.

4.2.1 Mains

The networks detailed above total approximately (C-I-C) of polyethylene mains which may have been installed via directional boring. A sample review of these networks is to be undertaken by walking the main and identifying any possible sections that are entering or crossing a water / sewerage pipe or pit (via the use of an electronic pipe locator). Of the 6 networks detailed, a (C-I-C) km batch of supply mains from each postcode is to be sample surveyed per year (over a 5 year program). This will provide insight as to the likelihood and severity of breaches. The approximate cost of surveying around 60km of polyethylene supply main via the use of a pipe locator, while taking note of any other authorities' underground assets, and inspecting and recording pits along the gas main alignment, is (C-I-C) per km. In total, the program is expected to cost (C-I-C) per annum and be completed over a 5 year period.

In addition to the mains survey, SP AusNet predicts that (C-I-C) dig-ups will be required per annum to confirm and rectify any concerns found during survey works.

Table 2: Mains in drains expenditure summary

Component		2012	2013	2014	2015	2016	2017	Total Program
Mains Survey ($850/km)	Length (km)	-	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Exp ('000)	-	$51	$51	$51	$51	$51	$255
Resulting Dig-ups ($2,310 ea)	Units	-	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Exp ('000)	-	$23.1	$23.1	$23.1	$23.1	$23.1	$115.5
Total Expenditure ('000)		-	$74.1	$74.1	$74.1	$74.1	$74.1	$370.5

4.2.2 Services

To address the concern with new polyethylene services being inserted into 'old' steel services, a sample survey of services renewed via the insertion method as part of a mains renewal program is proposed. This survey is to focus on identified high risk suburbs including East Keilor, Avondale Heights and Pascoe Vale which have been the focus of mains renewal programs over the past 5-10 years. During this period approximately 11,000 services have been renewed, typically via the insertion method.

A review of service locations will identify possible assets that are entering or crossing water / sewerage pipes or pits. For identified high risk services, the live service will need to be exposed within the customer's property and

relocated if required. Excavation of the service (Meter to service tee) will cost (C-I-C) per service. A sample size of (C-I-C) services per year (5 year program) will be included within this program at a cost of $120,000 per annum.

Table 3: Services in drains expenditure summary

Component		2012	2013	2014	2015	2016	2017	Total Program
Random Sample	Services	-	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Exp ('000)	-	$120	$120	$120	$120	$120	$600

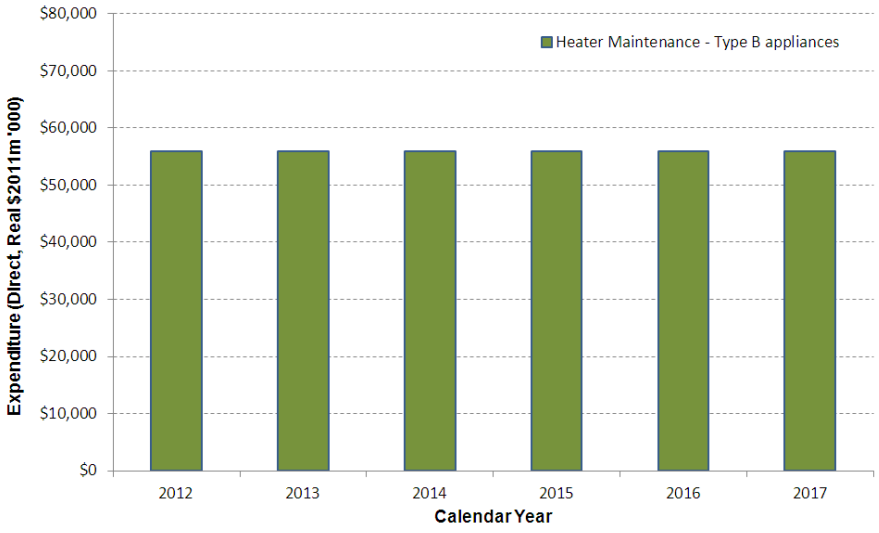
5 Heater Maintenance Schedule Changes

Following expert advice on the operation and maintenance of SP AusNet's fleet of water bath heaters, SP AusNet has extended its annual water bath heater maintenance (effective 1 January 2012) to include periodic testing of flue gases for Carbon Monoxide to help ensure that the heaters are operating efficiently.

The policy change aligns SP AusNet's maintenance practices with the Australian Standard for Combustion Conditions (AS-3814: Combustion conditions) which is considered by SP AusNet as industry best practice.

The additional maintenance, expected to cost (C-I-C) per site will be completed by a 'Type B' Gas Appliance Technician, who is suitably qualified to perform such activities. This capability will be sourced from the market as SP AusNet (or its current service provider) does not have the required qualifications.

Figure 3: Step Change Expenditure Profile (Real $2011)



5.1 Background

In 2011, Gasco Pty Ltd (www.gasco.net.au), experts in gas combustion equipment, were engaged to provide expert assessment of a sample of SP AusNet's 28 water bath heaters[4]. A total of 8 heaters were assessed for operability and condition, all within the metropolitan area.

The resulting reports (Report numbers 536805 & 536998), supported SP AusNet's policies and procedures for the maintenance and operation of its heating assets. However, the report also highlighted areas for improvement, including the inclusion of periodic Carbon Monoxide (CO) Testing of flue gases during operational checks, resulting from significantly high levels of the gas being recorded at two of the sites during the assessment program. Australian Standard (AS-3814) – Combustion Conditions, states that the CO concentration of the combustion product should not exceed 400ppm (Clause 3.6.1 page 58). The (C-I-C) City Gate heater (P4-157) was found to be operating at 6000ppm or 15 times above generally acceptable limits (As depicted within AS-3814). This reading indicates partial combustion of the fuel gas resulting in the inefficient operation of the heater. The large CO concentrations can also pose a risk to the safety of personnel on site.

To measure the CO concentration in the flue gases, a combustion gas analyser is required. With this instrument the air to fuel ratios can be tuned to achieve optimal combustion to create a more efficient heating process and safer working environment for maintenance personnel. Further causes of the large CO concentrations include blockages in the air filtration system or the flue itself.

Upon investigation into current maintenance practices for SP AusNet's heaters, it was found the Maintenance Service Provider does not have the combustion analysing equipment required for such a test, therefore no tuning of the heater air/fuel combustion ratios is carried out.

SP AusNet believes it is prudent that this further maintenance on the burner of heaters be carried out to ensure the safety of the site and the efficiency of the heater. Further to this, by properly maintaining the burner the efficiency and reliability of the heater will be improved.

5.2 Required Expenditure

Given the above policy change in heater maintenance, the following additional maintenance task will be required.

A 'Type B' Gas Appliance Technician will visit each heater annually to check the burner unit condition of each of SP AusNet's (C-I-C) water bath heaters and carry out required tuning, cleaning of the air filter and flue stack as required. This specific burner maintenance will be conducted in addition to the existing periodic maintenance carried out by the primary service provider that maintains the gas train, heater water composition and gas process coil.

Additional maintenance is expected to cost (C-I-C) per annum, above the current heater maintenance regime.

Table 4: Heater maintenance schedule change

Component		2012	2013	2014	2015	2016	2017	Program 2012-17
Heater Maintenance	Units	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Exp ('000)	$56	$56	$56	$56	$56	$56	$336

* (C-I-C) per annum recurring.

[4] Heaters, most of which are of the water bath type, are used to preheat the gas upstream of City Gate regulating stations (i.e. before the pressure drop) to counter the temperature drop resulting from a significant decrease in pressure. (Known as. the Joules Thompson effect), Pre-heating the gas ensures its temperature remains above a critical temperature at the outlet of the regulating facility, preventing icing of pipework and potential failure of the regulating station.

6 Custody Transfer Meter Operational Expense

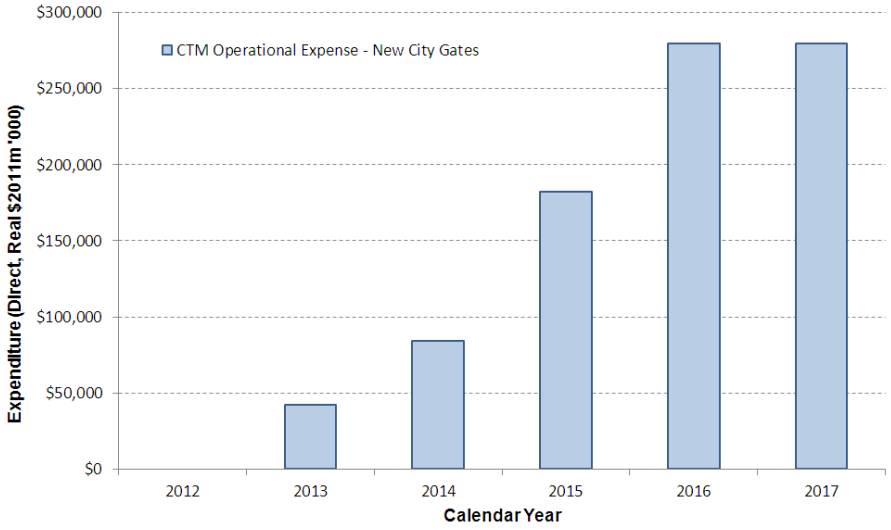
SP AusNet's network augmentation program, which is required to ensure SP AusNet remains compliant with the Gas Distribution System Codes minimum gas supply pressures, includes the installation of three new City Gate regulating facilities.

City Gates are demarcation points between the Declared Transmission System (DTS) and SP AusNet's distribution network. The flow of gas passing though these installations is metered, as the responsibility for the carriage of gas (and any resultant gas losses) passes to SP AusNet from the DTS owner at these points. The metering installations at City Gates are known as Custody Transfer Meters (CTMs).

SP AusNet and the APA GasNet (the PTS owner) are parties to a gas system connection agreement entered into during September 1998 as amended whereby APA GasNet provides connection services to SP AusNet. Under the agreement, APA installs and maintains CTMs at all City Gate installations while SP AusNet pays an annual operation fee covering these activities.

The installation of three new City Gates will result in a substantial incremental increase in operation fees to the GasNet for CTM services.

Figure 4: Step Change Expenditure Profile (Real $2011)



6.1 Background

SP AusNet has an obligation to maintain and manage the supply of natural gas to its customers in accordance with its Gas Safety Case (in accordance with the Gas Safety Act and Gas Safety Regulations) and the Gas Distribution System Code. In particular, SP AusNet is required to maintain network pressures above the following minimum levels.

Table 5: Minimum network pressure obligations, Gas Distribution System Code

Network Pressure	Minimum Obligated Pressure
High	140 kPa
Medium	7 kPa
Low	1.4 kPa

Source: Gas Distribution System Code, version 9, Schedule 1, Part A

SP AusNet's augmentation program to 2017 includes the installation of three (3) City Gate regulating facilities required to maintain security of supply and compliance with the distribution code.

All City Gates (existing and proposed) are required by the Gas Distribution System Code to have a Custody Transfer Meter (CTM) to record the volume of gas passing from the Declared Transmission System (DTS) to the SP AusNet distribution network. The CTM is used to identify the transfer of responsibility (not ownership which is maintained by retailers) of the gas from one distributor to the next. The high accuracy of the CTMs (which contributes significantly to capital costs) is required for accurate Unaccounted for Gas (UAFG) calculations.

CTM's are owned, operated and maintained by the DTS owner with SP AusNet paying an annual operating fee for this service. Commissioning of any new City Gate Regulating facility will result in a subsequent (and necessary) increase in SP AusNet's operational expenditure.

6.2 Required Expenditure

Increased operational expenditure is borne by SP AusNet following the commissioning of any new regulating facility, not just City Gates. This increase in expense (i.e. maintenance and operational checks) is normally absorbed by SP AusNet within its OPEX forecasts.

The increase is operational expense resulting from a new CTM is considered significant (i.e. of material value) and as such recognised as a step change in operational expenditure.

The estimated capital cost of a CTM for a 10,000 Sm3/hr City Gate regulating facility (i.e. the size being installed) is approximately (C-I-C). Based on this expenditure, SP AusNet expects to pay an annual operating fee (in perpetuity) estimated at approximately (C-I-C) for the new facility (based on past experience). For simplification, SP AusNet has assumed 50% of this expense would be incurred in the year the station was commissioned, with the full amount for each subsequent year.

Table 3: Custody Transfer Meter operation expenses

Component	Capacity	2012	2013	2014	2015	2016	2017	Total Program
(C-I-C)	(C-I-C)	-	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
(C-I-C)	(C-I-C)	-	-	-	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
(C-I-C)	(C-I-C)	-	-	-	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
Total Expenditure ('000)		-	$42	$84	$182	$280	$280	$868

Please note: The identified expenditure above is subject to annual price increases, which may or may not align with CPI. CTM expenditure is recurring from the date of its commissioning.

7 Unpiggable Gas Pipelines – Introduction of Magnetic Tomography

As mandated by law, SP AusNet's transmission pipelines are maintained and operated to the latest version of AS 2885.3 (2008), under which the integrity of each pipeline must be maintained and periodically demonstrated. The standard is non-prescriptive of the methods needed be adopted in order to prove pipeline integrity. Instead the onus to prove pipeline integrity is placed on the asset owner.

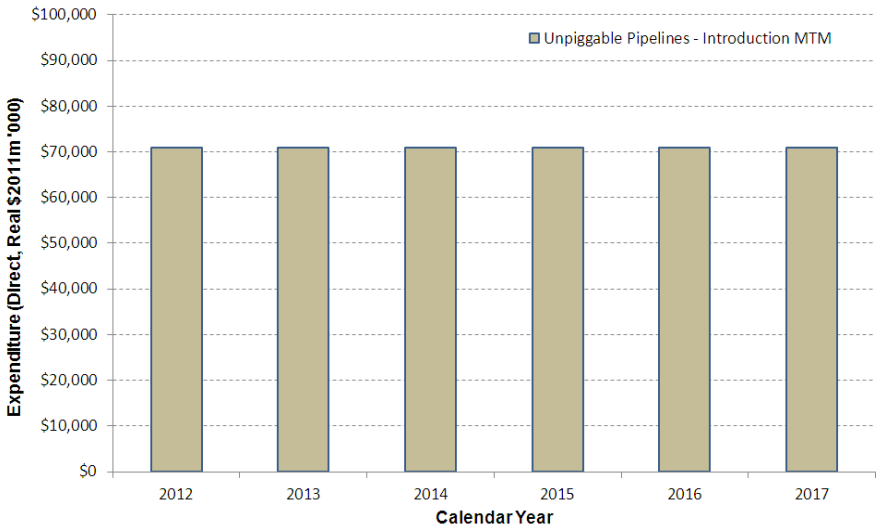
SP AusNet has developed, and maintains, an Integrity Management Plan (30-2507-1) which covers each of SP AusNet's licensed pipelines and demonstrates compliance with AS 2885.3 and individual licence conditions.

Demonstration of pipeline integrity can be achieved in a number of ways; with inline inspection (i.e. pigging) considered the most effective as it results in direct measurement of pipeline wall thickness and hence integrity. Unfortunately the design of the majority of SP AusNet's pipelines does not lend itself to inline inspection, namely they are considered Unpiggable pipelines.

Magnetic Tomography Method (MTM) is a non-intrusive pipeline inspection technology which assists in validating the structural integrity of underground ferrous pipelines. The technology is able to calculate pipeline wall thickness and provide early detection of corrosion or other pipeline defects. It is considered a leading technology in validating the integrity of Unpiggable pipelines.

Following an investigation of MTM technology in 2011, SP AusNet plans to introduce MTM as a complementary method of demonstrating the integrity of its transmission pipelines.

Figure 5: Step Change Expenditure Profile (Real $2011)



7.1 Background

SP AusNet currently has 20 individually licensed transmission pipelines totalling 183km, operating at pressures up to 2,800kPa. Permits to operate licensed pipelines are issued by the Department of Primary Industries (DPI) with written consent from the Minister of DPI required for their operation.

Transmission pipelines are designed and constructed to Australian Standard (AS) 2885.1 using high-grade steel and maintained and operated to the latest version of AS 2885.3 (2008).

SP AusNet has developed, and maintains, an Integrity Management Plan (30-2507-1) which covers each of SP AusNet's licensed pipelines. Each pipeline is reviewed every 5 years and assessed in terms of:

- Historical data (Coating defects, pigging data, damage data, repair data, etc)

- Asset data (i.e. maximum operating pressure (MAOP), wall thickness, design factors, etc.), and
- Assessment data (Hot spots, over-pressure protection review, MAOP review, etc)

Utilising a risk based approach, strategies for further maintenance and/or inspections may be recommended following the assessment of individual pipelines.

Magnetic Tomography Method (MTM) is a non-intrusive pipeline inspection technology which assists in validating the structural integrity of underground ferrous pipelines. MTM is performed above ground by traversing over the pipeline route and does not require specific pipework features, or modifications, like most inline inspection technologies. In 2011, SP AusNet carried out a research project "Alternative Techniques for Inspection of Unpiggable Gas Pipelines" which recommended MTM as an alternative technology to inspect transmission pipeline. During this project, assessments were made on several technologies highlighting their feasibility and advantages for the inspection of pipelines that are considered difficult to inspect for wall loss damage by pigging. The technologies explored were:

- Long-range Guided Wave Ultrasonic Technology (LRGWT)
- "NoPig" Inspection Technology (NoPig)
- Non-Contact Magnetic Tomography (MTM)
- Explore II

During the project it was discovered that PETRONAS, Chevron and Shell have used MTM technology for their pipeline inspections in Indonesia, Malaysia and Europe. SP AusNet contacted representatives of these companies who confirmed the use and advantages of MTM in inspecting wall thickness related defects on buried pipelines.

MTM has the following benefits:

- Ability to inspect transmission pipelines that are not currently inspected for wall thickness defects due to their unpiggable nature
- Ability to compare results of coating defect surveys
- Adds to the suite of available technologies for pipeline integrity management
- Increased SP AusNet and the wider industry's knowledge base of unpiggable pipeline inspection

MTM is of significant importance as it will enable SP AusNet to carry out wall thickness and corrosion defect surveys of the majority of its pipelines which are deemed unpiggable due to their geometry (sharp bends, changing diameter) and lack of pig launching and receiving facilities. By employing this innovative technology to assist in the integrity management of its licensed pipeline, SP AusNet will fulfil its obligations to AS2885.3 in a far more decisive manner than is currently possible.

7.2 Required Expenditure

SP AusNet has developed an inspection program for its 20 transmission pipelines with each being surveyed by the MTM method every ten years. This aligns with common industry practice for pigging (internal inspection), meaning SP AusNet will need to undertake MTM inspections of at least two pipelines every year.

When surveying (C-I-C) pipelines a year, cost efficiencies (in reduced travel expenses) are gained as the MTM technology is not available in Australia[5]. In total, MTM pipeline inspections cost (C-I-C) per pipeline when completed (C-I-C). This includes MTM testing ((C-I-C) based on costs from (C-I-C)) and pipeline dig-ups ((C-I-C) each) to validate the results.

[5] The MTM technology is only offered by companies in the United Kingdom, USA, Russia and Malaysia.

Table 3: Introduction of Magnetic Tomography[6]

Component		2012	2013	2014	2015	2016	2017	Total Program
MTM Testing	Pipelines	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Exp ('000)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
Resulting Dig-ups	Units	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Exp ('000)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
	Total Expenditure ('000)	$70.9	$70.9	$70.9	$70.9	$70.9	$70.9	$425.4

8 Pipe Saddle Support Repairs

Knowledge sharing between SP AusNet and other industry participants (namely APA GasNet) has prompted SP AusNet to initiate a program of works to inspect and carry out repairs as required to (C-I-C) pipe saddle supports identified at six City Gate regulating facilities.

The identified program is an evolution of what was industry accepted practice for the inspection of pipe supports which failed to adequately inspect the carrier pipe for signs of corrosion with 'saddle' type pipe supports which was the standard support design during the early 1970's.

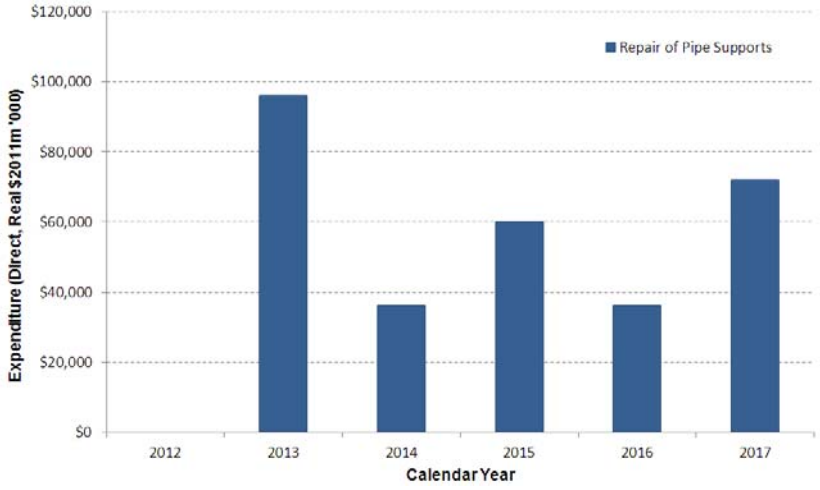
The inspection / rectification program involves the physical removal of the saddle support, made possible with the use of a crane. Detailed inspection will include sandblasting, ultrasonic measurement of wall thickness and reinstatement. Each support will cost (C-I-C).

To eliminate the likelihood of any corrosion and to ensure both the safety and integrity of the city gate installations which supply gas to many thousands of downstream gas consumers, it is recommended to carry out a repair / rectification program to approximately (C-I-C) pipe work saddle supports.

This new program is the result of SP AusNet acting as a prudent distributor of natural gas as it will keep the company's pipe support inspections inline with the latest industry best practice.

[6] Modified program to only include those pipelines being inspected by the MTM method to 2017

Figure 6: Step Change Expenditure Profile (Real $2011)



8.1 Background

A number of SP AusNet's older city gate installations, dating back to before the Gas and Fuel Corporation, were not housed in concrete kiosks or concrete pits, but were constructed as exposed mounted installations supported by concrete blocks saddled by a steel support wrapped around the pipe.

These saddled pipe supports provide the required pipe bearing load to minimize any vertical movement that the pipe may experience under the weight of regulating equipment (2x) and isolating valves (2x) each weighing in excess of 200kg per item. However, by design the saddle makes direct contact with the underside of the gas carrier pipe from the 9 o'clock to 3 o'clock positions, and has the tendency to collect and trap moisture, creating a 'hot spot' for corrosion.

Accepted industry practice (dating back to the Gas and Fuel) for this type of pipe support was for twice annual visual inspection for signs of corrosion and pipe wall deterioration. However, due to its design a comprehensive inspection of the pipe could not be achieved without the physical removal of the support to visually check the underside of the supported pipe.

Knowledge sharing between SP AusNet and other industry participants (namely APA GasNet) has highlighted the possibility of significant pipe deterioration on the contact surface between the saddle and the carrier pipe hidden from normal visual inspections.

In response, SP AusNet has initiated a program of works to inspect and carry out repairs as required to (C-I-C) identified pipe saddle supports identified at six City Gate regulating facilities.

Table 3: Identified City Gates with 'Saddle' type pipe supports.

City Gate	Number of Saddle Supports	Commissioned
(C-I-C)	(C-I-C)	1970
(C-I-C)	(C-I-C)	1972
(C-I-C)	(C-I-C)	1972
(C-I-C)	(C-I-C)	1972
(C-I-C)	(C-I-C)	1972
(C-I-C)	(C-I-C)	1973

8.2 Required Expenditure

In order to appropriately inspect the pipe, removal of the saddle is required. And the pipe will need to be adequately supported via a crane. With the crane in position and providing the adequate support to the pipe, the pipe can be sandblasted and visually inspected followed by an inspection via an ultrasonic wall thickness detection unit to ensure the pipe walls' integrity is sufficient.

Each saddle support is expected to cost (C-I-C) to perform the required inspection and rectification works.

Table 3: Cost breakdown per saddle support

Component	Cost
Saddle removal including crane hire	(C-I-C)
Sandblasting	(C-I-C)
Saddle inspection via ultrasonic device	(C-I-C)
Application of clock spring (barrier between pipe and saddle)	(C-I-C)
Pipework and saddle painting	(C-I-C)
Total cost	(C-I-C)

Figure 7: Step Change Expenditure Profile (Real $2011).

Program		2012	2013	2014	2015	2016	2017	Total Program
Pipe Saddle Support Repairs	Units	-	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)	(C-I-C)
Total Expenditure ('000)		-	$96	$36	$60	$36	$72	$300