CMS ENERGY
Gas Transmission Australia

PARMELIA PIPELINE

ACCESS ARRANGEMENT INFORMATION

Submitted to the

Independent Gas Pipelines Access Regulator
Western Australia

20 November 2000

CMS GAS TRANSMISSION of AUSTRALIA PARMELIA PIPELINE CONTACT DETAILS

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1 INTRODUCTION

1.1 Purpose of Document

This Access Arrangement Information document, prepared by CMS Gas Transmission of Australia ARBN 078 902 397 a Cayman Islands Corporation with limited liability of 8 Marchesi Street, Kewdale, Western Australia (**CMS**) for the Parmelia Pipeline, has been written to satisfy the requirements of the Gas Pipelines Access (Western Australia) Act 1998 (**Act**) which incorporates the National Third Party Access Code for Natural Gas Pipeline Systems (**Code**) which requires the provision of information pertinent to the Access Arrangement for the Parmelia Pipeline. This document has been amended to comply with the mandatory amendments required by the Regulator in his Final Decision published on the 20 October 2000.

1.2 Confidential Information

This Access Arrangement presents some information in aggregated form. This has been done out of necessity to observe contractual confidences, and protect the legitimate business interests of existing Users, prospective new Users, and CMS. Such aggregated presentation is identified and permitted under section 2.8 of the Code.

1.3 Document Control

The Parmelia Pipeline Access Arrangement and Access Arrangement Information documents are covered by CMS' document control system. One controlled copy in hard (i.e. paper) copy form has been submitted to the Western Australian Independent Gas Pipelines Access Regulator.

In addition, uncontrolled copies of the Parmelia Pipeline Access Arrangement and Access Arrangement Information documents have been provided to the Office of Gas Access Regulation in hard copy and electronic form to facilitate their dissemination to the public.

Copies of the Parmelia Pipeline Access Arrangement and Access Arrangement Information documents issued to the public by the Office of Gas Access Regulation in either hard copy or electronic form are not controlled documents.

1.4 Nomenclature

This Access Arrangement Information document makes use of terminology used in the Code. In particular, meanings from a number of definitions from section 10.8 of the Code are assumed.

2 COMPLIANCE WITH CODE AND QUICK REFERENCE GUIDE

2.1 Introduction

This section seeks to identify the parts of the Parmelia Pipeline Access Arrangement which accomplish specific compliance with the requirements of the Code. It is also intended to provide a quick reference guide for the reader to permit easy identification of areas of interest.

2.2 Compliance with Code

Section 2.5 of the Code states that an Access Arrangement

> ... must include at least the elements described in sections 3.1 to 3.20 ...

of the Code.

Section 2.6 of the Code requires that the Access Arrangement Information must provide information to Users and Prospective Users of the Parmelia Pipeline so that they can

> ... understand the derivation of the elements in the proposed Access Arrangement ...

and are able to

> ... form an opinion as to the compliance of the Access Arrangement with the provisions of the Code.

The intent of this Access Arrangement is to provide information which permits understanding of the Access Arrangement for the Parmelia Pipeline.

The table below addresses the issue of compliance of the Access Arrangement with the requirements of section 3 of the Code. It provides a cross reference between the requirements of sections 3.1 to 3.20 inclusive, and the Parmelia Pipeline Access Arrangement.

Further, this Access Arrangement Information addresses section 2.7 of the Code, which requires that Access Arrangement Information documents include the categories of information listed in Attachment A of the Code. A cross reference linking the contents of this document and the information listed in Attachment A appears in Appendix A.

CODE COMPLIANCE and QUICK REFERENCE GUIDE: PARMELIA PIPELINE ACCESS ARRANGEMENT

Code Section 3 Reference	*Comment*	*Access Arrangement Reference* *
3.1 Services	The Parmelia Pipeline embraces Open Access principles, offers a suite of Reference Services, and provides for other services which can be specifically tailored to meet individual Users' needs.	**AA section 4**
3.2 sought after Services	The Parmelia Pipeline offers a suite of Reference Services which may be utilised individually or collectively.	**AA 4.2**
3.3 Tariffs	Separate Reference Tariffs are provided for Extended Reference Services; Spot Reference Services tariffs are established by competitive bidding.	**GT&C Schedule 1; GT&C 6.9**
3.4 compliance with section 8 of the Code	An exposition of tariff determination principles and methodology is provided in this Access Arrangement Information document.	**AAI section 7; AA section 5**
3.5 principles used	Reference Services tariffs are determined in accordance with the Reference Tariff Policy for the Parmelia Pipeline, and section 8 of the Code.	**AA section 5**
3.6 Terms and Conditions	The General Terms and Conditions address the suite of Reference Services offered and provide for flexibility and negotiation to satisfy individual Users' requirements	**entire GT&C; AA section 7**
3.7 Capacity Management	The Parmelia Pipeline is a Contract Carriage pipeline as defined in the Code.	**AA section 8**
3.8 market carriage	The Parmelia Pipeline is not a Market Carriage pipeline.	**not applicable**
3.9 Trading	Users may readily trade capacity.	**AA section 9; GT&C section 20**
3.10 assignment, change of Receipt & Delivery points	Bare Transfers and Consent Transfers as stipulated under the Code are provided for; Users may negotiate changes to Receipt and Delivery Points.	**AA section 9, GT&C section 20; GT&C 5.11**
3.11 examples	Changes in Receipt Points and Delivery Points may be negotiated.	**AA section 9 GT&C section 20, GT&C 5.10, 5.11**

* Note: AA designates the Access Arrangement document
GT&C designates the General Terms and Conditions of the Access Arrangement
AAI designates this Access Arrangement Information document.

CODE COMPLIANCE and QUICK REFERENCE GUIDE (continued): PARMELIA PIPELINE ACCESS ARRANGEMENT

Code Section 3 Reference	*Comment*	*Access Arrangement Reference* *
3.12 Queuing	Queuing for capacity is on the basis of fair and equitable treatment among Prospective Users.	**AA section 10**
3.13 policy content	Queuing is generally on a first come first served basis but allows for special cases such as open seasons.	**AA section 10**
3.14 other matters	The Queuing Policy is designed to accommodate a wide variety of circumstances and allows for queues for each Service.	**AA section 10**
3.15 compliance	CMS has every intention of complying with its Queuing Policy and all other aspects of its Access Arrangement.	**AA section 10**
3.16 Extensions / Expansions	Extensions and Expansions covered by the Code with the Regulator's consent will be subject to the Access Arrangement; Users who have not made capital contributions to Extensions / Expansions may be subject for surcharges as provided for in section 8 of the Code.	**AA section 11, GT&C section 11**
3.17 Review and Expiry	The Revisions Submissions Date is four and a half years following the date upon which the Access Arrangement comes into effect; the Revisions Commencement Date is five years following the date upon which the Access Arrangement comes into effect.	**AA section 12**
3.18 duration more than 5 years	Access Arrangement is for five years.	**AA section 12**
3.19 duration more than 5 years	Access Arrangement is for five years.	**AA section 12**
3.20 Pipelines not Covered	The Parmelia Pipeline is a Covered Pipeline.	**not applicable**

* Note: AA designates the Access Arrangement document
GT&C designates the General Terms and Conditions of the Access Arrangement
AAI designates this Access Arrangement Information document.

3 OVERVIEW: PARMELIA PIPELINE

3.1 Historical Overview

The Parmelia Pipeline was constructed and commissioned in 1971. This makes it, along with the Longford to Dandenong pipeline in Victoria, the Roma to Brisbane pipeline in Queensland and the Moomba to Adelaide pipeline in South Australia, one of the first natural gas pipelines in Australia.

The Parmelia Pipeline has played a key role in the development of Western Australia, and today occupies a position which is unique amongst natural gas transmission pipelines in the country. It is therefore informative to present a brief history of the pipeline to place its current position in context.

Natural gas was first discovered in the Perth Basin in 1964 at Yardarino, near the coastal fishing town of Dongara, located approximately 350 kilometres north of Perth. In the same year, drilling near the town of Gingin, located approximately 80 kilometres north of Perth, discovered a field which was given the town's name. Subsequent drilling in 1966 discovered the Dongara and Mondarra fields, located near Dongara. In 1971, the Walyering field, located midway between Perth and Dongara, was discovered.

The Yardarino, Gingin, and Mondarra fields proved to be comparatively small, but the Dongara field provided a sufficient reserves base to underpin a new development. Consequently, the Parmelia Pipeline was constructed to deliver natural gas to industrial, commercial, and residential consumers in the Perth area.

Commissioned in 1971, the Parmelia Pipeline comprises approximately 416km of DN 350 mm (NPS 14 inch) main line and approximately 21 km of sales laterals. The environmental management programme put in place first during construction and then during subsequent operation was one of the first of its kind in Australia. The work of Harry Butler and others set the standard for many oil and gas projects which followed.

Initial customers included the Midland Brick Company, Swan Cement, Western Mining, Alcoa, the Fremantle Gas and Coke Company, and the (then) State Electricity Commission (SEC). Supply to industrial customers facilitated the substitution of alternate fuels with more 'environmentally friendly' natural gas. Supply to the SEC and the Fremantle Gas and Coke Company facilitated the replacement of manufactured gas with natural gas for the domestic (commercial and household) market in the Perth metropolitan area. This domestic supply was provided continuously from 1971 to 1984.

To increase the capacity of the pipeline as gas demand in the Perth area grew, five compressor stations were constructed along its length progressively over time. Each station was equipped with one or two gas turbine driven centrifugal compressors. Provision for an additional compressor station (near Muchea) was made, but this facility was never constructed.

As flow through the pipeline declined as the Dongara field depleted, selected compressor stations were decommissioned.

The progressive depletion of the Dongara gas field through the 1970s and lack of exploration success in the Perth Basin prompted the State government to seek new gas supplies. During the early 1980s it negotiated with the North West Shelf joint venture for the purchase of gas by the State Energy Commission of Western Australia (SECWA, later AlintaGas) from the North Rankin, and later Goodwyn, offshore fields.

The Dampier to Bunbury Natural Gas Pipeline (DBNGP) was constructed by SECWA in 1983 / 84 to transport North West Shelf gas from the Carnarvon Basin to markets in and around Perth. The DBNGP runs close to the Parmelia Pipeline for much of the latter's length.

In the early 1980s the Woodada gas field, located approximately 10 kilometres west of the Parmelia Pipeline's Compressor Station 1, was discovered by a joint venture lead by Hughes and Hughes. Starting in 1982, gas from Woodada was transported by the Parmelia pipeline on behalf of SECWA to permit a ramp up of the Perth gas market in anticipation of the availability of North West Shelf gas.

In 1984, North West Shelf gas replaced Dongara gas as the source of supply to the Perth household and commercial market segments. The Parmelia Pipeline continued to supply industrial customers, providing the majority of these with a dual supply in conjunction with gas from the DBNGP.

In 1990, the Beharra Springs gas field, located adjacent to the Parmelia Pipeline approximately half way between Dongara and Compressor Station 1, was discovered. After the field was declared commercially viable, all gas produced was (and currently is) transported to market via the Parmelia Pipeline.

In 1994, a connection was established at Mondarra (near Dongara) to connect the DBNGP and Parmelia Pipeline to facilitate the transport of associated gas from oil production operations on Thevenard Island to consumers in the Perth area. That midstream component of the gas chain, involving four separately owned pipelines and a third party gas processing facility, is currently the most complex in Australia. In recent times, the Mondarra interconnection has been used to permit the transport of third party gas through the DBNGP and the Parmelia Pipeline from producers in the Carnarvon Basin to markets in the Perth area.

In July 1997 CMS purchased the Dongara, Yardarino, and Mondarra fields and the Parmelia Pipeline. It subsequently sold the Dongara and Yardarino field reserves to

Arc Energy, but retained the gas gathering system for these fields and the associated gas processing plant. The depleted Mondarra field is being developed by CMS as a gas storage field.

3.2 What Makes the Parmelia Pipeline Unique

The Parmelia Pipeline is unique among natural gas transmission pipelines in Australia. The reasons for this are presented below.

3.2.1 Industry Structure

The Parmelia Pipeline is not a natural monopoly. This makes the Parmelia Pipeline different from other natural gas transmission pipelines in Australia.

The industry structure within which the Parmelia Pipeline operates is characterised by four major components. These are:

1) The Dampier to Bunbury Natural Gas Pipeline is a direct and formidable competitor to the Parmelia Pipeline in the gas transmission market.

2) The AlintaGas distribution system is a direct and formidable competitor to the Parmelia Pipeline in the Perth area gas delivery market.

3) The Parmelia Pipeline holds a small fraction of the total market share in both the gas transmission and delivery markets.

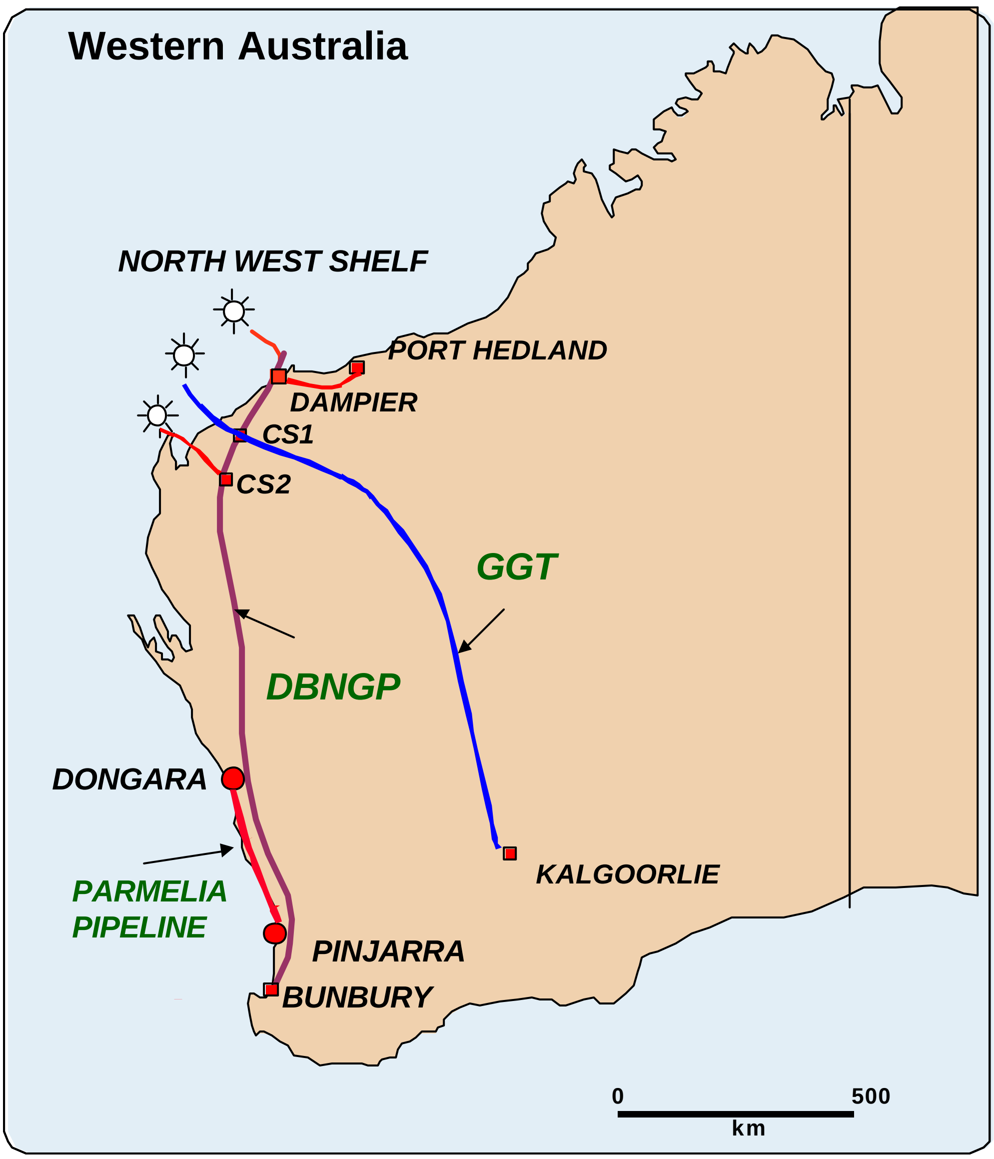
4) The Parmelia Pipeline is physically incapable of gaining or holding a majority share in either of the gas transport markets in which it operates, because of its small ultimate capacity compared to that of the DBNGP and its restricted geographic extent compared to that of the AlintaGas distribution network.

The fact that the Parmelia Pipeline does not and can not hold a share of the relevant market which is in any way comparable to the share held by the DBNGP or AlintaGas means that neither industry structure is a duopoly.

Rather, the Parmelia Pipeline finds itself in a position of facing competitors who can exert monopoly power through their holding well in excess of 90 percent of the (distinct) gas transport markets in which they operate.

The only chance the Parmelia Pipeline has of becoming a monopoly transmission pipeline is for the DBNGP to cease operation. Similarly, the Parmelia Pipeline could dominate the market for delivery of gas only if the AlintaGas distribution network no longer existed in operational form. Given the critical strategic position held by these direct competitors in the State's energy infrastructure (see map below), cessation of their operations is extremely unlikely.

WESTERN AUSTRALIAN GAS TRANSMISSION PIPELINES



3.2.2 Position in the Gas Chain

CMS' Western Australian operations provide gas transportation and associated services only. CMS is neither a producer nor an end user of natural gas in this state.

3.2.3 Commercial History and Future Outlook

The Parmelia Pipeline pioneered third party gas transport in Western Australia. It did this as a pipeline which has been privately owned for its entire operating life.

No potential user has ever been denied access to the Parmelia Pipeline.

Further, all gas producers who have the choice of pipeline utilise the Parmelia Pipeline.

The Parmelia Pipeline strives to become known as 'the friendly pipeline' because of its customer focus and willingness to provide gas transport and associated services on terms and conditions which are quite different to those currently offered by its direct competitors. CMS views superior service as one of the few available counters to the strong market positions held by the DBNGP and the AlintaGas distribution system.

Further, CMS view an increase in throughput as a prerequisite for the continued future operation of the Parmelia Pipeline. Thus, access by third parties constitutes a critical success factor for CMS and the Parmelia Pipeline. Such access is available for parties seeking both inputs to the Parmelia Pipeline from gas production operations and other pipelines, and outlets from the Parmelia Pipeline into end user premises and third party gas transport and delivery systems.

3.2.4 Unique Overall Position

The Parmelia Pipeline currently operates under conditions of strong competition, and is likely to continue to do so for the balance of its operating life.

Therefore, the Parmelia Pipeline is not a natural monopoly.

Further, the Parmelia Pipeline is not part of a duopolistic or oligopolistic industry structure because of its inability to gain or hold a significant share in either of the two gas transport markets in which it operates.

The core business of the Parmelia Pipeline's owner is the transportation of natural gas, and not gas production or gas consumption. Therefore, the Parmelia Pipeline is not part of a vertically integrated industry structure.

These facts mean that the primary drivers for Open Access legislation simply do not apply to the Parmelia Pipeline, because it operates in an environment of actual and potentially onerous competition.

Thus, the regulatory creation of conditions of 'synthetic competition' is unnecessary.

However, the presence of large and potentially overpowering competitors means that the Parmelia Pipeline could feasibly be disadvantaged by the abuse of monopoly power by these competitors.

4 CAPITAL COSTS

CMS is the operator of both the Parmelia Pipeline, and related but unregulated assets. These unregulated assets include the Dongara gas gathering system, the Dongara gas processing plant, and the Mondarra gas storage field. Expenditures and revenues related to the unregulated assets have not been included in costs and income assigned to the Parmelia Pipeline.

4.1 Asset Base

4.1.1 Introduction

The Code intends (section 8 Introduction) that Reference Tariffs should be designed to:

> ... replicate the outcome of a competitive market, and to be efficient in level and structure …

at the same time providing the Service Provider with:

> … the opportunity to earn a stream of revenue that recovers the costs of delivering the Reference Service over the expected life of the assets used in delivering that Service.

The Code states (section 8.4) that capital costs should be included in the determination of Total Revenue. Section 8.10 of the Code provides a list of methodologies and factors to be considered when establishing the Initial Capital Base for existing pipelines. These include:

- depreciated actual cost,
- depreciated optimised replacement cost,
- other well recognised asset valuation methodologies,
- the economically efficient utilisation of gas resources,
- comparison with cost structures of competing pipelines,
- asset purchase prices.

Section 8.11 of the Code states that the Initial Capital Base:

> ... normally should not fall outside the range of values determined under [a depreciated actual cost] and [a depreciated optimised replacement cost].

Many observers have pointed out that no single asset valuation methodology produces an unambiguously 'correct' Initial Capital Base. Therefore, in order to achieve a reasonable value for the Initial Capital Base, it is necessary to exercise judgement in the selection and utilisation of the valuation method used.

4.1.2 Asset Valuation

The Regulator has determined a valuation for the Parmelia Pipeline based on what has been termed an Optimised Deprival Value (ODV). This methodology takes the lower value determined by DORC or the capital value required to give a specified rate of return for a given pre-determined tariff and an assumed forecast of throughput.

The components of the DORC methodology are discussed in detail below.

4.1.3 Parmelia Pipeline Replacement Cost

4.1.3.1 Optimum Pipeline Size

The Parmelia Pipeline was originally constructed in order to facilitate the commercialisation of the Dongara, Mondarra, Yardarino and Gingin natural gas fields. The State and Federal governments of the time were satisfied that the development of these fields and the construction of the associated pipeline were in the public interest, and did not cover the project under any kind of State Agreement legislation.

Today, the Gingin and Walyering fields have long been abandoned and the Dongara and adjacent fields are substantially depleted. The other producing gas fields in the region, Beharra Springs and Woodada, are also in decline. Further, the Dampier to Bunbury Natural Gas Pipeline (DBNGP) runs within 100 metres of the Parmelia Pipeline for much of the latter pipeline's length (see map in previous section). Therefore, consideration of the asset value of the Parmelia Pipeline is not as straightforward as, for example, that for the recently constructed Ballera to Wallumbilla or Marsden to Dubbo transmission pipelines.

If the Parmelia Pipeline were to magically vanish, it is unlikely that any commercially oriented pipeline operator would reconstruct it in any form to provide solely the transport services utilised by current users. The justification for this statement is simple. The total remaining volumes of gas (and associated flow rates) from currently producing Perth Basin fields are insufficient to justify the construction of a new pipeline. On the basis of current production, users such as Arc Energy, Boral Energy Resources, and Phoenix Energy would be forced to utilise the DBNGP for their gas transport needs if the Parmelia Pipeline did not exist.

However, the Parmelia Pipeline is strategically located. Part of CMS' strategic intent is to construct a natural gas pipeline from the Carnarvon Basin in the North West of the State to the South West of the State. This intent recognises the value of the existing Parmelia Pipeline. Such value derives from both the transport capacity it offers, and its physical location through the Perth metropolitan area.

Any new pipeline linking the Carnarvon Basin and the South West would, in all reasonable probability, fall in the size range DN 450 mm (NPS 18 inch) to DN 750 mm (NPS 30 inch). The existing DBNGP falls inside this range, at DN 650 mm (NPS 26 inch). A size in this range is required to accommodate the flow rates required to achieve the economies of scale necessary to make viable a project of this type and magnitude.

Therefore, if the Parmelia Pipeline were to be reconstructed today by CMS, it would, in all probability, be sized in accordance with the requirements of transporting substantial quantities of gas from the Carnarvon Basin to the South West. Hydraulic studies by CMS have indicated that that a pipeline in the size range DN 500 (NPS 20 inch) to DN 700 (28 inch) between Mondarra (i.e. the Dongara area) and delivery points in the South West is necessary.

However, the Parmelia Pipeline does actually exist in its current form. As a consequence, the existing Parmelia Pipeline would be used as a loop to any new pipeline constructed by CMS linking the Carnarvon Basin and the South West. Such a loop would permit a reduction in size of the section of the new line between Mondarra and Pinjarra. While such reduction could provide significant cost savings and hence benefits to potential users of a new pipeline, the fact nevertheless remains that the existing Parmelia Pipeline is undersized in the context of CMS' long term objectives.

Thus on balance, the 'optimum' size for the purposes of DORC for the existing Parmelia Pipeline is its present size, DN 350 mm (NPS 14 inch).

4.1.3.2 Optimum Pipeline Replacement Cost

There have been various efforts made over time to quantify Australian pipeline construction costs. Pipeline unit construction costs (i.e. dollars per unit of diameter per unit of length) have been identified in various publications and presentations by Philip Venton (e.g. Venton 1996). Venton's figures have been widely quoted by the industry and in the industry literature, and may be regarded as constituting industry rules of thumb.

The length weighted average pipeline unit construction cost identified by Venton (1996) is $ 25,805 per inch kilometre in 1995 Australian dollars. In 1999 Australian dollars, this value is approximately A$ 27,000 per inch kilometre.

On this rule of thumb basis, the cost of replacing the Parmelia Pipeline main line would be approximately A$ 157 million.

However, use of such a rule of thumb substantially understates the true replacement cost for the Parmelia Pipeline. The reason for this is that the data provided by Venton is heavily weighted towards pipelines which traverse country which is sparsely populated and essentially unoccupied by services and infrastructure.

At the time of construction (i.e. 1970 - 71), the route for the existing Parmelia Pipeline was chosen to skirt the fringes of the Perth metropolitan area. This was done to minimise construction costs and disruption to existing services and infrastructure.

However, over time, Perth has expanded, and 'enveloped' the metropolitan section of the Parmelia Pipeline. This envelopment has presented the operators of the pipeline with substantial challenges related to the maintenance of the integrity of the pipeline in the face of these urban development activities.

On the other hand, the urbanisation of areas adjacent to the Parmelia Pipeline has given it a competitive advantage over the DBNGP and potential future pipelines. This advantage is derived from the proximity of the Parmelia Pipeline to gas consumers.

The urbanisation surrounding the Parmelia Pipeline's route would constitute a huge encumbrance to the constructor of a new pipeline which followed the existing Parmelia Pipeline route. Further, a significant portion of the rural country traversed by the Parmelia Pipeline has changed in use to more intensive forms of agriculture. Therefore, construction and restoration costs for these areas would be significantly higher than for pipelines such as the Goldfields Gas Transmission pipeline and the Ballera to Wallumbilla pipeline, which traverse land which is very sparsely populated and presents few encumbrances to the pipeline constructor.

Therefore, it is clear that the use of industry rules of thumb as identified above is not appropriate to the estimation of the cost of replacing the Parmelia Pipeline.

CMS engaged the services of an external engineering consultant, Egis Consulting (formerly CMPS&F), to provide an estimation tool to permit the development of projected construction costs for a Parmelia Pipeline replacement. Egis were chosen because of their extensive relevant experience. They have had recent involvement in pipeline construction as prime contractor for the Engineering, Procurement, Construction and Management of the Goldfields Gas Transmission Pipeline, the most recent significant pipeline to be constructed in Western Australia. Egis has also had extensive experience in pipeline construction in Australia over the last 15 years.

The format of the resulting estimate comprised a detailed unit cost breakdown made up of 30 categories covering:

- materials, systems and components for pipeline facilities including:
    - the main pipeline
    - compressor stations
    - custody transfer meter stations
    - a pipeline gas control centre
- pipeline construction, including allowances for:
    - rural and urban terrain
    - river crossings
    - road crossings
    - services relocation
- engineering, procurement, and project management, and
- land management.

Application of these to the existing Parmelia Pipeline yields a pipeline main line construction cost of A$ 240 million.

This estimate does not include a number of items, discussed in the sub-section below.

4.1.3.3 Other Capital Assets

Capital assets not included in the optimum pipeline replacement cost obtained from the Egis estimate described above include:

- pipeline laterals,
- initial spares holdings,
- light and heavy vehicles,
- workshop machinery,
- control centre standby power generation,
- capital contributions to interconnected pipelines,
- emergency response equipment,
- security systems,
- test equipment and instrumentation, and special tools,
- computers, telephones, photocopiers and fax machines,

- office fit out and furniture.

The total of these and related items of capital equipment is estimated at A$ 9 million.

4.2 Asset Depreciation

The issue of asset depreciation for the Parmelia Pipeline (or any other pipeline) is a complex one. Therefore, it is appropriate to make simplifying assumptions regarding depreciation as it affects determination of Reference Tariffs. This approach is consistent with that taken by other gas transmission and distribution system operators in Australia in the determination of tariffs for their Reference Services.

The simplifying assumptions made for the purposes of determining the value of the Initial Capital Base are discussed below.

4.2.1 Asset Life

A natural gas transmission pipeline system is comprised of a large number of individual components. Some of these have different economic lives. As an extreme example, the economic life of buried pipe may be 70 years, while the economic life of a personal computer may be less than 5 years.

It is not practical to determine the economic life of every item of plant and equipment on the Parmelia Pipeline. Therefore, it is necessary to aggregate asset types into a manageable number of classifications.

The Regulator has mandated (Amendment 27) that the Depreciation Schedule reflect calculation of depreciation of the Initial Capital Base on a unit-of-production basis, assuming average throughput of 40 TJ/day in 2000, increasing to 60 TJ/day over five years and being maintained at 60 TJ/day thereafter, with a residual life of assets of 42 years. Depreciation of Future Capital Expenditure has been calculated on a straight line basis over assumed technical lives of particular asset classes.

The Access Arrangement Information has been amended to reflect depreciation costs over the Access Arrangement Period as follows (1999 $million):

Asset Group	Economic life	Remaining life	Depreciation 2000	2001	2002	2003	2004
Existing Assets	70	42	1.004	1.130	1.255	1.381	1.506
Capital Expenditure							
Minor Capex	20	20	0.013	0.025	0.038	0.050	0.063
Interconnection	70	70	0.032	0.032	0.032	0.032	0.039
SCADA	10	10	0	0	0.030	0.030	0.030
Building	70	70	0.011	0.011	0.011	0.011	0.011
Total			1.059	1.197	1.365	1.503	1.649

4.3 Future Capital Expenditure

Future capital expenditure on the Parmelia Pipeline is anticipated on the basis that CMS is successful in accessing and securing new gas transport opportunities and succeeds in increasing its share of existing transport markets. Such increased access will incur capital costs above and beyond any potential customer capital contributions towards Parmelia Pipeline extensions and / or expansions.

Minor capital expenditure is also required during the life of any pipeline. This capital expenditure covers replacement of miscellaneous capital equipment and enhancements of peripheral and utility systems and equipment.

For the Parmelia Pipeline, projected future capital expenditure used by the Regulator in the derivation of tariffs, is as follows.

(Amendment 24)

The Access Arrangement Information have been amended to reflect Capital Expenditure of $5.05 million over the Access Arrangement Period, as follows (1999 $million):

	2000	2001	2002	2003	2004
Minor Capital Expenditure	0.25	0.25	0.25	0.25	0.25
AlintaGas Interconnection	2.25	0	0	0	0.5
SCADA Master Station Upgrade	0	0	0.3	0	0
Building Move and Ringfencing	0.75	0	0	0	0
Total	3.25	0.25	0.55	0.25	0.75

4.4 Working Capital

Working capital for a natural gas transmission pipeline has two major components. First, financial reserves are required to fund the day to day operations of the pipeline. Second, an initial pipeline linepack inventory is required to fill the pipeline with natural gas at the commencement of operations.

For the Parmelia Pipeline, the Regulator has mandated (Amendment 22) a total working capital of A$ 0.5 million, comprising financial reserves of A$ 0.3 million and value of linepack of A$ 0.2 million.

4.5 Initial Capital Base

A value for the Initial Capital Base of A$ 62.5 million, including a value of working capital of A$ 0.5 million has been mandated (Amendment 22). Consequently, this is the asset value used for determination of Reference Services tariffs.

4.6 Capital Redundancy Policy

The Regulator has required the inclusion of the following Capital Redundancy Policy.

(Amendment 23)

The Access Arrangement has been amended to include reference to this Redundant Capital Policy which provides for an amount of the Capital Base to be deemed to constitute Redundant Capital within the meaning of section 8.27 of the Code in the event that average daily throughput in the Parmelia Pipeline at the end of the Access Arrangement Period is less than 50 TJ/day. The value of Redundant Capital should be determined as a linear function of throughput as follows.

$$\begin{matrix}\text{Redundant Capital}\\\text{at end of}\\\text{Access Arrangement Period}\\\text{(\$million at 1 July 1999)}\end{matrix} = \begin{cases} 60.8, & \text{for throughput less than 18.5 TJ/day} \\ 96.3 - 1.94 \times \begin{pmatrix}\text{Average Daily Throughput}\\\text{at end of}\\\text{Access Arrangement Period}\\\text{(TJ)}\end{pmatrix}, & \text{for throughput between 19.5 and 49.5 TJ/day, or} \\ \text{zero}, & \text{for throughput greater than 49.5 TJ/day} \end{cases}$$

Under this Redundant Capital Policy, Redundant Capital is to be added back into the Capital Base in proportion to any increased throughput determined at the time of any subsequent review of the Access Arrangement. The value of any Redundant Capital added back into the Capital Base is to be increased annually on a compounded basis by the Rate of Return from the time the Redundant Capital value was removed from the Capital Base, consistent with the treatment of Redundant Capital under Section 8.28 of the Code.

5 OPERATING, MAINTENANCE, MARKETING AND OVERHEAD COSTS

CMS is the operator of both the Parmelia Pipeline, and related but unregulated assets. These unregulated assets include the Dongara gas gathering system, the Dongara gas processing plant, and the Mondarra gas storage field. Expenditures and revenues related to the unregulated assets have not been included in costs and income assigned to the Parmelia Pipeline.

5.1 Operating and Maintenance Costs

Operating and maintenance costs for the Parmelia Pipeline may be divided into two categories: 'field controllable' and 'major expense job'.

Field controllable operating expense comprises the operating expenditure related to routine, day to day operations. It includes (but is not limited to):

- salaries and wages,
- training,
- contract and professional services,
- spares and consumables,
- vehicle operating costs,
- pipeline right of way surveillance,
- equipment hire,
- SCADA and field radio telecommunications leases,
- public utility charges,
- travel and accommodation,
- government charges, property taxes, etc.,
- insurances,
- office and administration costs and building leases.

Major expense job operating expense comprises expenditure related to non routine, intermittent, and / or special one off activities. It includes (but is not limited to):

- gas turbine overhauls,
- gas compressor restaging,
- development and maintenance of the pipeline Safety Case,
- accommodation of urban encroachment on pipeline right of way,
- non routine environmental surveillance and restoration.

The mandated operating and maintenance costs for the Parmelia Pipeline are as follows:

(Amendment 25)

The Access Arrangement Information has been amended to reflect total Operating Expenditure, including marketing and overhead costs, of $17.372 million over the Access Arrangement Period, as follows (1999 $million):

	2000	2001	2002	2003	2004
Field Controllable Expenditure	1.995	1.995	1.995	1.995	1.995
Major Expense Job Expenditure	1.313	0.788	0.525	1.313	1.313
Marketing & Overhead Expenditure	0.429	0.429	0.429	0.429	0.429
Total Operating Expenditure	3.737	3.212	2.949	3.737	3.737

System Usage Gas (the sum of compressor fuel and unaccounted for gas), and linepack adjustments made through trading constitute a further operating expense consideration. This is dealt with separately in the General Terms and Conditions.

Compressor fuel for Reference Services is provided by CMS. However, fuel costs are proportioned across all pipeline users and charged to them periodically as an item which is separate from transport tariff. Therefore, fuel costs are not included in tariff determination.

Unaccounted for gas (UAFG) is also proportioned across all pipeline users. Such proportioning may result in a debit or a credit to pipeline users, depending on the arithmetic sign of the UAFG inventory. UAFG costs are therefore not included in tariff determination.

Linepack adjustments necessitated by pipeline users incurring gas imbalances over time may be achieved by either trading or swaps between users, or by the purchase or sale of gas by the pipeline operator. It is anticipated that the vast majority of linepack adjustments will be accommodated by swaps or trading between users. Therefore, operating expenses associated with linepack adjustments are assumed to be zero.

5.2 Marketing and Overhead Costs

Marketing and overhead costs include (but are not limited to):

- market research,
- project evaluation,
- advertising and promotion,
- travel and accommodation,

- professional association memberships,
- community support.

Projected marketing and overhead costs for the Parmelia Pipeline are included in the table in Section 5.1.

6 PIPELINE SYSTEM

6.1 Pipeline System Description

The Parmelia Pipeline extends from Dongara, in the Mid West of Western Australia, to Pinjarra, in the state's South West. Its function is to transport pipeline quality natural gas safely, reliably, and efficiently.

The pipeline system comprises:

- the main line,
- the Mondarra interconnection line,
- the Midland Brick lateral,
- the Perth Gas lateral,
- the Kwinana lateral,
- the Western Mining lateral,
- compressor stations on the main line,
- custody transfer meter stations at inlets and outlets,
- a city gate meter station,
- a Gas Control centre, maintenance base, and head office in Kewdale,
- a maintenance base and regional office in Dongara,
- a Supervisory Control and Data Acquisition (SCADA) system,
- a field operations radio communications system,
- operations, maintenance, commercial, safety, and environmental management systems.

Inputs to the pipeline are currently made at:

- Dongara, from the Dongara field;
- Mondarra, from the Dampier to Bunbury Natural Gas Pipeline;
- Mondarra, from the Mondarra field;
- Main Line Valve 1, from the Beharra Springs field;
- Compressor Station 1, from the Woodada field.

Gas is currently being delivered to, or in the process of being connected to, end users at outlet points at:

- the Rocla sand drying works in Gnangara;
- the Midland Brick Company brick works;
- the Whitemans brick works;
- the Feroblast galvanising plant;
- the Tip Top bakery;
- the Jandakot Wool Washers' works;

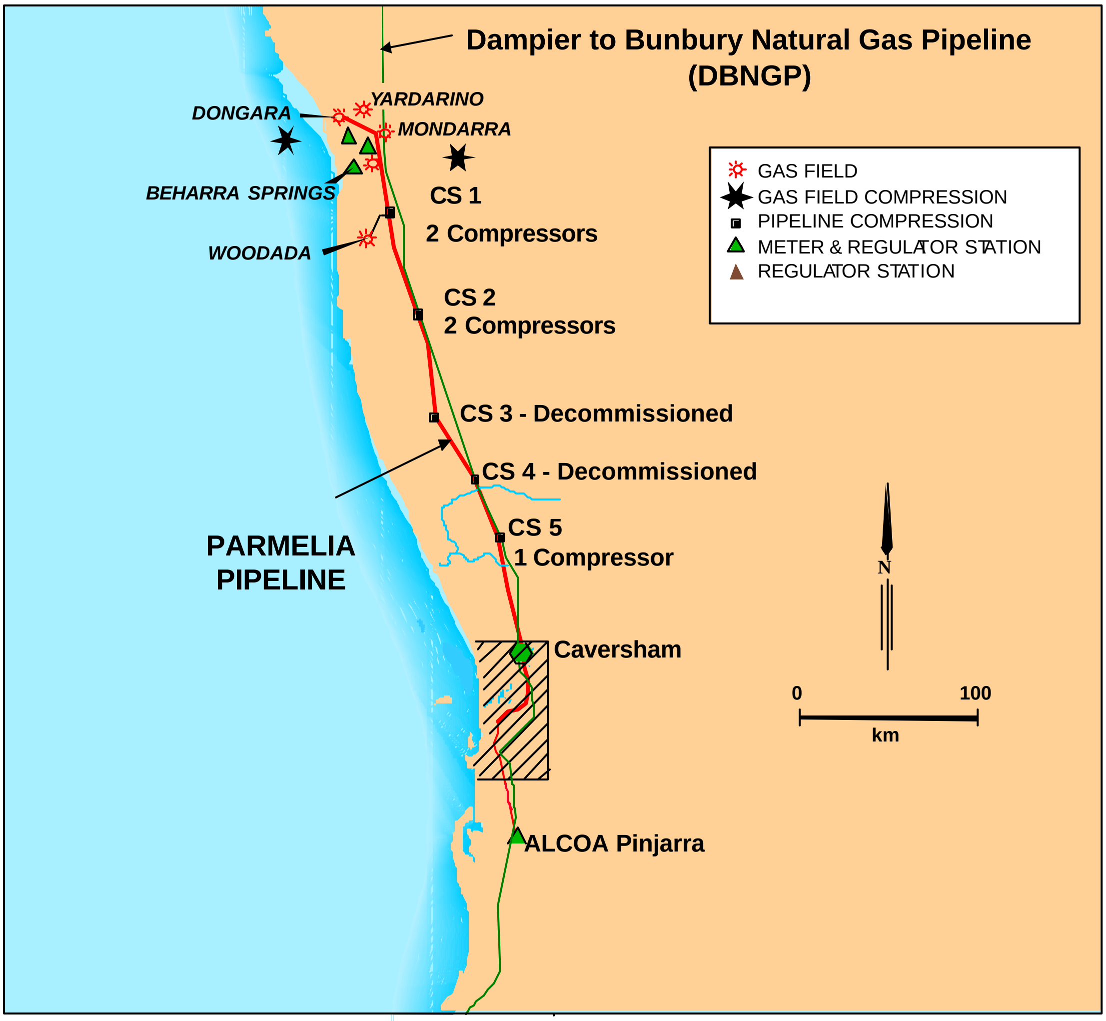
- the Kwinana Power Station;
- the Alcoa alumina refinery at Pinjarra.

Dormant and decommissioned end user delivery points include:

- the AlintaGas distribution system at Caversham, Viveash, Hazelmere, Welshpool, Fremantle, Henderson, Kwinana, and Pinjarra,
- the Perth Gas lateral meter station,
- the Alcoa alumina refinery at Kwinana,
- the Western Mining nickel refinery at Kwinana.

A map showing the Parmelia Pipeline in the context of the state's gas system infrastructure appears overleaf. More detailed maps of the pipeline system appear in Appendix B.

PARMELIA PIPELINE SYSTEM



Key Parmelia Pipeline system characteristics and parameters include:

Commissioning date	October 1971
Pipeline licences WA - PL 1, 2, 3, 5	expire 2012
Pipeline licence WA PL 23	expires 2015
Pipeline length: main line	416 kilometres
Pipeline length: Mondarra DBNGP interconnect	0.5 kilometres
Pipeline length: Midland Brick lateral	2.0 kilometres
Pipeline length: Perth Gas lateral	14.3 kilometres
Pipeline length: Kwinana lateral (primary & loop)	3.5 kilometres
Pipeline length: Western Mining lateral	1.2 kilometres
Pipeline diameter: main line	DN 350 mm (14 inch)
Pipeline diameter: Mondarra DBNGP interconnect	DN 150 mm (6 inch)
Pipeline diameter: Midland Brick lateral	DN 100 mm (4 inch)
Pipeline diameter: Perth Gas lateral	DN 200 mm (8 inch)
Pipeline diameter: Kwinana lateral (primary & loop)	DN 200 mm (8 inch)
Pipeline diameter: Western Mining lateral	DN 100 mm (4 inch)
Maximum Allowed Operating Pressure	7.48 MPa (1085 psi), 7.93 MPa (1150 psi) and 8.50 MPa (1233 psi) in rural areas; 5.61 MPa (813 psi) in urban areas
Pipe grade (main line)	X52
Corrosion mitigation	"Yellowjacket" coating, impressed current cathodic protection
Compressor station sites	5
Active compressor stations	2
Active compressor horsepower	2,700 kW (3,600 hp)
Compressors	Solar "Saturn" gas turbine / centrifugal
Active inlet custody transfer meter stations	5
Active sales outlet custody transfer meter stations	8
City gate meter stations	1
Check meter stations	1
Main Line Valves	20
Scraper (pig) launch and/or receive facilities	4
Maintenance bases	Kewdale and Dongara
Pipeline control	remote via SCADA
Right of Way identification	2700 marker signs

6.2 Capacity and Volume Assumptions

6.2.1 Parmelia Pipeline Capacity

6.2.1.1 Historical Capacity

The capacity of the Parmelia Pipeline has varied over time.

During its early life in the early 1970s, its free flow capacity of around 68 terajoules per day (TJ/d) was sufficient to accommodate customer demand.

As the load in the Perth and surrounding areas grew through the 1970s and into the early 1980s and production from the Dongara field increased correspondingly, compression was progressively added to the pipeline to increase its capacity to above 100 TJ/d.

The development of the Woodada field in 1981 - 82 and the transport of gas from it on behalf of the (then) State Energy Commission of Western Australia via the Parmelia Pipeline necessitated the addition of further pipeline compression to accommodate the required increase in pipeline throughput. This resulted in peak pipeline flows of around 120 TJ/d.

As the Dongara field reached the end of its foundation gas supply contracts in the mid 1980s, production volumes reduced and the requirements for Parmelia Pipeline capacity declined correspondingly. Compressor stations were decommissioned, thereby reducing pipeline capacity.

In 1994, the interconnection between the Parmelia Pipeline and the Dampier to Bunbury Natural Gas Pipeline was established. This connection resulted in a decrease of Parmelia Pipeline firm capacity because of the comparatively low delivery pressure from the DBNGP at various times.

6.2.1.2 Heating Value Considerations

Natural gas from different fields have different heating values. This is because of differences in composition of the different natural gases. Therefore, the heating value (i.e. the energy content per unit volume) of the gas transported in a pipeline must be taken into consideration when assigning an energy transport capacity to a pipeline. Natural gases produced in Western Australia have gross heating values in the range

35 to 42 megajoules per standard cubic metre. This range is significant (i.e. 20 percent). Therefore, to assign an energy transport capacity to a pipeline, it is necessary to determine an average heating value of the gas transported in that pipeline.

When considering pipeline capacity, it is therefore necessary to differentiate between volumetric transport capacity and energy transport capacity. A pipeline with a volumetric transport capacity of, for example, 2.83 million standard cubic metres (100 million standard cubic feet) of gas per day could have an energy transport capacity in the range 99 terajoules per day to 119 terajoules per day if the range of heating values discussed above were to be accommodated.

6.2.1.3 Operational Considerations

Not all of the Parmelia Pipeline's nominal capacity is available to users on the because of practical operational requirements.

Compressor fuel gas must be shipped in the pipeline. This impost, while comparatively small, assumes increasing significance as pipeline throughput increases and additional pipeline compression is required.

A second consideration governing pipeline capacity is load factor. An end user of gas may have a demand which fluctuates during the day, resulting in peaks and troughs in instantaneous flow rate. During trough periods, some pipeline capacity is unutilised. However, this capacity can not be assigned to other pipeline users because that capacity is required at other times during the day to accommodate load peaks. Load factor also applies on a seasonal basis. Some end users of natural gas (such as gas distribution utilities) have loads which are affected by ambient temperature. Others have load peaks and troughs due to fluctuations in demand in the markets into which they sell.

A third consideration governing pipeline capacity is delivery pressure to end users. The higher the required delivery pressure, the lower the pipeline capacity. The actual reduction in pipeline throughput resulting from increases in required delivery pressure is a function of the location of the delivery point and the required delivery pressure.

A fourth factor influencing pipeline capacity is the variation in gas turbine output power with ambient air temperature. Compressors which have turbines as prime movers are less effective in hot weather. Further, pipeline capacity decreases with increasing ambient temperature of the gas being transported.

A fifth reduction in pipeline capacity arises from the nature of the gas transportation services offered on the Parmelia Pipeline. As an experienced and customer focussed pipeline operator, CMS is aware that it is difficult for customers to predict exactly their future gas consumption. Pipeline input fluctuations by gas producers and unforeseen variations in customers' gas consumption may result in customers taking slightly more or less gas than nominated on a given day. To accommodate such variations, CMS provides allowances for these in its Reference Services. The allowances accommodate variations in Maximum Hourly Quantity, Maximum Daily Quantity, and Gas Imbalance. While these allowances accommodate 'real world' operations, they are achieved at the expense of pipeline capacity. Despite the existence of potentially applicable quantity variation charges which are intended to encourage pipeline users to manage their use of pipeline capacity efficiently, prudent pipeline operation requires that some capacity be reserved to accommodate over-deliveries and consequent gas imbalances.

6.2.1.4 Parmelia Pipeline Operational Capacity

When gas heating value and operational factors are taken into consideration, the current firm plus interruptible capacity of the Parmelia Pipeline is approximately 86 TJ/d with a potential swing of 5 TJ/d either side of this value. Current firm capacity of the Parmelia Pipeline is approximately 64 TJ/d with a potential 4 TJ/d variation.

These capacities assume the availability of installed but currently inactive (i.e. 'mothballed') compression.

6.2.2 Parmelia Pipeline Throughput Projections

Gas transported in the Parmelia Pipeline may be divided into two general categories. The first category is gas being transported under contracts which were written prior to the introduction of Reference Services. The second is gas which will be transported under new contracts. Each category of gas requires pipeline capacity to accommodate its transport.

Gas to be transported under existing contracts has and will continue to receive first allocation of capacity in the Parmelia Pipeline. New contracts will be written to utilise capacity which is not required to accommodate existing contractual requirements. New gas transport contracts may be further divided into two categories: Reference Service contracts and Non Reference Service contracts.

Reference Services are intended to constitute those which might be sought by a "significant part of the market" (Code section 3.2), and which may be defined in a clear and unambiguous manner. The Parmelia Pipeline offers a wide range of Reference Services. It is the purpose of this Access Arrangement to provide such definition for services which might be generally sought.

Non Reference Services are those which are tailored to cater for the particular and specific needs of individual pipeline users. As the gas transport market is opened up in Western Australia through the open access regime, it is anticipated that the need for such services will grow markedly. As the nature of these services must, by definition, be tailored to suit the requirements of individual users, it is not possible to define their specific nature in advance. Such definition will be achieved through a process of negotiation at the time the need for such services materialises. CMS, as a customer focussed pipeline operator, will make every attempt to satisfy the individual needs of existing and potential future pipeline users.

New gas transport contracts written in the future under the open access regulatory regime will be won in a competitive environment. The Dampier to Bunbury Natural Gas Pipeline does, and will continue to, constitute a real and potentially overpowering competitor to the Parmelia Pipeline. CMS are currently actively seeking new gas transport business in this competitive environment.

The Regulator has mandated a pipeline throughput forecast from which, given the mandated tariff and rate of return, the Initial Capital Base has been derived. The Parmelia Pipeline future throughput projection is as follows.

(Amendment 28)

Parmelia Pipeline throughput.

	2000	**2001**	**2002**	**2003**	**2004**
Throughput (TJ/day)	40	45	50	55	60

Appendix C shows average daily and peak demand at the Caversham city gate station in terms of energy flow rate and pressure for the 12 month period ending 31 March 1999.

7 ACCESS AND PRICING PRINCIPLES

7.1 Pipeline Access Philosophy

The Parmelia Pipeline is truly an open access pipeline.

In its 27 year history, the Parmelia Pipeline has never refused access to potential new users. Further, all intending users with committed gas transport requirements who have approached the Parmelia Pipeline seeking gas transport services have ended up using the Parmelia Pipeline. The Parmelia Pipeline has transported all gas produced in the Perth Basin, and has transported gas shipped from the Carnarvon Basin via third party pipelines to Mondarra. Therefore, it may be clearly seen that the Parmelia Pipeline's history is one of truly open access.

The principal business of CMS in Western Australia is the safe, reliable and efficient transport of natural gas. The reserves of current producers in the Perth Basin, the Parmelia Pipeline's 'natural' catchment area, have been substantially depleted. Therefore, the company's future survival is critically dependent on the development of new gas transport business. Such development can only be realised through a truly open access philosophy.

Advance recognition of the opportunity and need to provide Non Reference Services in addition to the Reference Services described in this Access Arrangement is further tangible indication that the Parmelia Pipeline actively seeks access by parties wishing to transport natural gas.

7.2 Evaluation of Acceptable Tariff Determination Methods

The Code specifies (sections 8.1, 8.4) that one of three methodologies:

a) Cost of Service (CoS)

b) Net Present Value (NPV)

c) Internal Rate of Return (IRR)

may be used to determine a Total Revenue which:

- in the case of the CoS methodology, "is set to recover costs ... on the basis of a return (Rate of Return)" (section 8 Introduction: Principles for determining the total revenue),

- in the case of the NPV methodology, yields an NPV equal to zero using an "acceptable discount rate" (ibid), and
- in the case of the IRR methodology, provides an "acceptable IRR" (ibid).

The Code also intends (section 8 General Principles) that:

> "other methodologies that can be translated into one of these forms are acceptable".

The NPV and IRR methodologies may be considered to be variants of a common theme, given that the IRR is, by definition, the discount rate which results in the NPV of a given cashflow to be equal to zero.

The Cost of Service methodology considers total revenue and the tariff required to achieve it over a period of one year. Tariffs are then adjusted according to various formulae.

In contrast, the NPV / IRR methodology considers revenues and costs over the full life of the Access Arrangement. This approach yields 'levelised' tariffs. Levelling of tariffs is achieved by considering non routine expenditures (such as major equipment overhauls) within the context of the complete Access Arrangement period. Such costs are thus 'averaged' over several years in a manner which is more closely aligned with actual income and expenditure compared to assumptions of amortisation which are (of necessity) inherent in the Cost of Service approach.

Levelised tariffs offer both simplicity and predictability for pipeline users. Under this methodology, a user of pipeline services is presented with a tariff path over time which is known in real (i.e. CPI adjusted) terms.

7.3 Cost Allocation and Tariff Determination Methodology

7.3.1 Code Intention

Tariffs for Parmelia Pipeline Reference Services are set in accordance with the principles set out in section 8 of the Code.

The Code is prescriptive with regard to the general methodology which is to be employed to determine Reference Tariffs. Therefore, it is appropriate to consider the intent, as well as the specific requirements, of the Code.

Its general tariff setting principles may be summarised through the use of selected excerpts from the Code.

The Code intends (section 8 Introduction: General Principles) that:

> The overarching requirement is that when Reference Tariffs are determined and reviewed, they should be based on the efficient cost (or anticipated efficient cost) of providing the Reference Services.

It continues:

> Reference Tariffs [shall] be designed [to] provide the Service Provider with the ability to earn greater profits (or less profits) than anticipated between reviews if it outperforms (or underperforms against) the benchmarks that were adopted in setting the Reference Tariffs.

The Code further intends (ibid) that Reference Tariff Policy:

> ... should be designed to achieve a number of objectives, including providing the Service Provider with the opportunity to earn a stream of revenue that recovers the cost of delivering the Reference Service over the expected life of the assets used in delivering that Service, to replicate the outcome of a competitive market, and to be efficient in level and structure.

To facilitate these aims (ibid):

> ... the Reference Tariff Principles are designed to provide a high degree of flexibility so that the Reference Tariff Policy can be designed to meet the specific needs of each pipeline system.

7.3.2 Cost Allocation

The Parmelia Pipeline offers gas transport services on a non discriminatory basis. Therefore, the basic cost allocation philosophy adopted for the Parmelia Pipeline is that costs are distributed reasonably over all gas transport services and all users.

CMS also operates facilities which are not covered under the Code. These include the Dongara gas gathering system, the Dongara gas processing plant, and the Mondarra gas storage field. Expenditures and revenues related to the operation of these facilities have been excluded from costs assigned to the Parmelia Pipeline.

The NPV tariff setting approach used yields a 'levelised' tariff. The impacts of significant non routine expenditures, such as gas turbine overhauls, are spread over the duration of the Access Arrangement, thus eliminating price shocks. Further, the adoption of a longer time horizon for tariff setting ensures that future activities are anticipated and planned prudently.

For regulatory purposes, costs will be allocated as if all Users, including Users under existing contracts, are paying Reference Tariffs.

7.3.3 Tariff Determination Methodology

This section provides a high level overview of the methodology and assumptions used to determine tariffs for Reference Services in order to orient the reader. Prior and subsequent sections deal with each of the key aspects of the tariff determination process in more detail.

Tariffs for Reference Services which are to be determined using NPV methodology would use the following steps:

1) Determine the currently applicable Capital Base Value for the Parmelia Pipeline after allowing for depreciation and other capital expenditure not already included.

2) Determine values for required inputs (e.g. pipeline throughput, future capital expenditure, operating expenditure, etc.) for a discounted cash flow (i.e. NPV) model of the Parmelia Pipeline.

3) Determine the Weighted Average Cost of Capital (WACC) applicable to the Parmelia Pipeline.

4) Construct a discounted cash flow model for the Access Arrangement period using throughput projections, existing and proposed tariff structures, and capital and operating costs. This permits calculation of the NPV of that cash flow at a discount rate equal to the WACC.

5) Determine Reference Services revenues which yield an NPV equal to zero at a discount rate equal to the WACC. This revenue is then obtained through the application of tariffs assigned to Reference Services.

7.4 NPV Discount Rate: WACC

7.4.1 Introduction

The NPV methodology employed for tariff determination calculations relies on discounted cash flow analysis with the application of a discount rate which is equal to a Rate of Return which is deemed to be acceptable.

The Code indicates (section 8.31) that Weighted Average Cost of Capital (WACC) is an appropriate value to be used for the Rate of Return when determining tariffs for Reference Services. Therefore, WACC is used as the required rate of return for Reference Tariff determination for the Parmelia Pipeline.

Section 8.31 of the Code states that WACC should be calculated with regard to "standard industry [financial] structures for a going concern and best practice". Thus, a 'standard' approach using relevant data as input parameters will be employed. References to standard university finance texts and widely cited journal articles are included in the following exposition to exemplify this 'standard' approach.

Section 8.31 of the Code also states that the Capital Asset Pricing Model (CAPM) provides a suitable means of calculating WACC. Therefore, the CAPM is employed in the calculation of WACC.

Weighted Average Cost of Capital is most simply defined (Van Horne et al 1985: 268) as a simple weighted average (as its name implies):

WACC = (cost of equity multiplied by proportion of equity)
plus
(cost of debt multiplied by proportion of debt)

This may be expressed algebraically as:

WACC = [Re * (E / V)] + [Rd * (D / V)] ***[equation 1a]***

where:

- Re is the cost of equity
- Rd is the cost of debt
- (E / V) is the proportion of equity
- (D / V) is the proportion of debt

This formulation of WACC is simplistic, because the effects of taxation are not acknowledged.

Officer (1994) incorporates taxation considerations into the determination of WACC. He considers (1994: 4 - 5) the before tax cost of capital where there is dividend imputation (as currently prevails in Australia). He derives (1994: 5, equation (5)) the following relationship for the before tax cost of capital:

$$Ro = [Re * (E / V) / \{1 - (t * (1 - \gamma))\}] + [Rd * (D / V)]$$ ***[equation 1b]***

where:

- Ro is the before tax cost of capital
- Re is the cost of equity
- Rd is the cost of debt
- (E / V) is the proportion of equity
- (D / V) is the proportion of debt
- t is the company tax rate
- gamma (γ) is the proportion of dividend imputation

In order that WACC be determined, it is necessary to first establish the cost of debt, the prevailing capital structure (i.e. proportions of equity and debt), the applicable taxation assumptions, and the cost of equity. These variables are addressed in turn below.

7.4.2 Cost Of Debt

The cost of debt is a function of the perceived risk to the lender and the prevailing level of interest rates in the financial community.

An approach to assigning a value to the cost of debt which is commonly employed in Australia considers the premium above the risk free rate that a borrower will pay to finance a project such as a pipeline.

Financial analysts in Australia have recently estimated the debt premium above the risk free rate for gas transport projects to be in the range 0.75 percent (Macquarie Risk Advisory Services 1998: 28) to 1.50 percent (Texas Utilities Australia / Eastern Energy 1998: 9).

Although a higher debt premium could be argued for the Parmelia Pipeline, the debt premium used in the for this WACC determination is 1.2 percent.

7.4.3 Capital Structure

The Regulator has mandated a debt to equity ratio of 60:40.

7.4.4 Taxation

7.4.4.1 Tax Rate

Changes to Australian corporate taxation rates will occur over the Access Arrangement Period for the Parmelia Pipeline System: a reduction from 36 percent to 34 percent for 2000/01, and to 30 percent thereafter. For the purposes of determining Reference Tariffs, the Regulator has determined that the average taxation rate over the period July 2000 to June 2005, will be 30.8 percent.

7.4.4.2 Dividend Imputation (Gamma) Factor

Franking credits are an allowance under the Australian taxation system that permit dividends paid to shareholders to be exempt from personal income tax in recognition of company tax having already been paid on profits from which the dividends are paid. The value of this dividend imputation is incorporated into the WACC calculation to reflect the benefits that shareholders gain from franking, and the consequent theoretical (and debateable) lower requirement of shareholders for the Rate of Return on investment.

The approach for reflecting the value of imputation credits that has emerged as standard practice is to use a market (equity) risk premium that assumes that Australia has a classical tax system, then to adjust the WACC or cash-flows directly to reflect the non-cash benefits associated with franking credits. The mechanism used to achieve this – the gamma term – can then be interpreted as the value of each franking credit that is created by the firm, as a proportion of its face value.

The Regulator has mandated a gamma value of 0.5 to be used in the determination of WACC for the Parmelia Pipeline.

7.4.5 Cost of Equity

7.4.5.1 Methodology

The Capital Asset Pricing Model may be used (Van Horne et al 1985: 258) to determine the cost of equity.

The CAPM may be expressed algebraically as:

$Re = Rf + \beta e * (Rm - Rf)$ ***[equation 2]***

where:

- Re is the cost of equity
- Rf is the risk free rate of return
- βe is the beta value of the firm's equity
- Rm is the return of the capital market as a whole
- (Rm – Rf) is the market risk premium

Input variables to the CAPM equation are considered in turn below.

7.4.5.2 Risk Free Rate

The risk free rate is represented by a government bond or similar riskless financial instrument with term equal to the pipeline project life. In practice, such financial instruments do not exist, as pipelines may have lives in excess of 50 years and Australian bonds have a term of only 10 years. Thus, a proxy risk free rate is required.

Data presented by Officer (1989: 207) indicates that the geometric average over time of 10 year Australian bond yields for the period 1968 to 1987 is 9.60 percent.

The Regulator has decided to use the yield to maturity on 10 year Commonwealth Government Treasury Bonds as a proxy for the nominal risk free rate and the yield to maturity on the 10 year Commonwealth Government Capital Indexed Treasury Bonds as the proxy for the real risk free rate. The observed yields for the relevant bonds were taken as the average over the 20 trading days to 31 August 2000.

The Regulator has determined that the difference between the two rates (calculated using the Fisher equation) will provide the inflation forecast to be used over the Access Arrangement Period.

As at 31 August 2000, this approach gave a nominal risk free rate of 6.21 percent, a real risk free rate of 3.30 percent, and a forecast rate of inflation of 2.85 percent. These values have been mandated by the Regulator for use in the calculation of the WACC for the Parmelia Pipeline.

7.4.5.3 Beta Value

The beta value of a firm's equity (βe) can not be directly measured. Therefore, it must be calculated from the asset beta (βa), which is a measure of "the average sensitivity of a company's rate of return to that of the market index" (Risk Measurement Service 1998: 6).

Practice amongst regulators has been to determine a proxy asset beta, and then to re-lever this into an equity beta that is consistent with the capital structure of the entity as deemed by the Regulator, using the following (or similar) expression:

$$\beta_e = \beta_a + (\beta_a - \beta_d).\frac{D}{E}$$ ***[equation 3]***

where:

- βe is the equity beta value
- βa is the asset beta value
- βd is the debt beta value
- D is the proportion of debt in the company's capital structure
- E is the proportion of equity in the company's capital structure

The Regulator, in his Final Decision, considers that a range for the asset beta of between 0.45 and 0.60 would generally constitute a reasonable range for the asset beta of an Australian gas transmission business. However, the Regulator considers that the Parmelia Pipeline is likely to bear a higher level of risk than other gas transmission businesses by virtue of it being a small pipeline business with a limited number of potential Users and a market for services that is highly dependent upon production from a limited number of gas fields.

The Regulator has mandated that,in light of the relatively high risk status of the Parmelia Pipeline, an asset beta marginally above the upper end of this acceptable range (0.65) is to be used.

The debt beta is not directly observable. The Regulator calculated the debt beta as the ratio of the debt premium (1.2 percent) to the market risk premium (6.0 percent), giving a value of 0.20.

Assuming a gearing (debt to equity) ratio of 60:40, an asset beta of 0.65 and a debt beta of 0.20 correspond to an equity beta of 1.33.

7.4.5.4 Market Risk Premium

The difference between market return and risk free return (i.e. the (Rm - Rf) term in equation 2) is a dynamic parameter, fluctuating as a result of variations in both market return and interest rates.

Officer (1989), in a study of rates of return to Australian shares and bond yields over the 105 year period 1882 to 1987, shows that the equity premium over bond yields for that period was 7.94 percent. For the 10 year period 1978 to 1987, the premium was 11.87 percent.

These differences between equity rates of return and bond yields provide an indicator for the market risk premium (Rm - Rf). On the basis that a pipeline project has a life of 50 years or more, CMS has submitted that it is appropriate to use longer term averages for the value of equity premium. The Regulator has mandated a value of 6.0 percent on the basis of relative consistency with regulatory precedent elsewhere in Australia.

7.4.5.5 Inflation Rate

The Consumer Price Index has exhibited increases of between 0 percent and 4 percent per year in recent times. As discussed in Section 7.4.5.2, the Regulator has determined that a value of 2.85 percent is to be used.

7.4.5.6 Nominal to Real Transformation

To convert a nominal (i.e. money of the future day) discount rate to a real (i.e. current day money) discount rate, the Fisher equation may be applied (Peirson et al 1985: 37):

1 + r = (1 + n) / (1 + i) ***[equation 4]***

where:

- r is the real discount rate as a decimal fraction
- n is the nominal discount rate as a decimal fraction
- i is the inflation rate as a decimal fraction

This transformation method is used to convert the nominal value of before tax WACC obtained from equation 1b to the corresponding real value.

7.4.5.7 Result: Weighted Average Cost of Capital Calculation

On the basis of the mandated input parameters, the Regulator determined that the real before tax WACC applicable to the Parmelia Pipeline is 8.1 percent.

7.5 Tariff Determination

7.5.1 Introduction

This sub-section on tariff determination is comprised of two parts. The first describes the relativity between tariffs for the four Reference Services offered. The second describes the methodology employed to determine the tariff for the Firm Extended Reference Service.

7.5.2 Firm Extended and Interruptible Extended Service Tariffs

Determination of tariff for Reference Services is benchmarked on the tariff applicable to the Firm Extended service.

The Interruptible Extended service was allocated a tariff which was 90 percent of that for the Firm Extended service. Such discount recognises that an Interruptible Extended service does not provide the level of certainty of continuous full supply provided by a Firm Extended service.

For both Firm Extended and Interruptible Extended Reference Services, the ratio of Reservation Tariff to Commodity Tariff is 80 : 20.

7.5.3 Spot Services Tariffs

The transport tariffs for Firm Spot and Interruptible Spot Reference Services are to be established by users engaging in a competitive bidding process (on a daily basis) for access to those services. Therefore, there is no direct linkage between the tariffs for Spot Reference Services and the benchmark Firm Extended Reference Service tariff.

7.5.4 Tariff Determination Methodology

7.5.4.1 NPV Approach

A Net Present Value (NPV) approach has been adopted for the determination of Reference Tariffs for the Parmelia Pipeline. This approach has been favoured over a Cost of Service approach because an NPV methodology considers revenues and costs over the full life of the Access Arrangement. This approach yields 'levelised' tariffs. Levelling of tariffs is achieved by considering non routine expenditures within the context of the complete Access Arrangement period. Such costs are thus 'averaged' over several years in a manner which is more closely aligned with actual income and expenditure compared to assumptions of amortisation which are (of necessity) inherent in the Cost of Service approach.

Levelised tariffs offer both simplicity and predictability for pipeline users. Under this methodology, a user of pipeline services is presented with a tariff path over time which is known in real (i.e. CPI adjusted) terms.

7.5.4.2 Tariff Calculation Model Structure

The NPV Reference Services tariff calculation model employed conforms closely to the methods of project evaluation described in standard university finance texts. Peirson et al (1985) and Van Horne et al (1985) have been used as references.

The tariff calculation model considers the operation of the Parmelia Pipeline to be a 'project' (in the academic sense) for the life of the Access Arrangement. The project is initially nominally 'purchased' for the Depreciated Optimised Replacement Cost (DORC) value at the beginning of the Access Arrangement period. This 'purchase' constitutes the initial outward cash flow. The 'project' is then operated for the duration of the Access Arrangement, with revenues from the provision of transportation services comprising the annual inward cash flow to the project, and future capital and operating expenses comprising the annual outward cash flows. The project is then nominally 'sold' for the depreciated value of the initial DORC value plus the depreciated capital expenditure during the life of the 'project'.

Net cash flow on a before tax and before interest basis is computed as the difference between revenues and expenditures. This cash flow is then discounted and summed to yield the project Net Present Value (NPV). Reference Tariffs are determined to yield an NPV of zero at a discount rate equal to the Weighted Average Cost of Capital.

This process yields Reference Tariffs which facilitate the recovery of costs associated with the provision of the Reference Services.

7.5.4.3 Taxation Assumptions

The Reference Tariff determination for the Parmelia Pipeline considers earnings before interest and tax.

Such a 'before tax' tariff determination approach is consistent with methods used in other Access Arrangements already submitted in Australia.

This approach has been employed with the objective of avoiding the manifold problems associated with the determination of a representative taxation impost.

7.5.4.4 Pipeline Capacity and Utilisation Assumptions

Pipeline capacity has been discussed in detail in a preceding section. For the purposes of Reference Services tariff determination, the Regulator has mandated the following throughput forecast.

(Amendment 28)

The forecast of pipeline throughput is as follows.

	2000	2001	2002	2003	2004
Throughput (TJ/day)	40	45	50	55	60

7.5.4.5 Tariff Calculation Model: Gas Transport Revenues

Parmelia Pipeline revenues obtained from the provision of Reference Services are the product of the volumes of gas which are estimated to be transported, and the tariffs which apply to that transport. They are uncertain, as they are to be received in the future. Existing contracts also contribute revenue.

For the purposes at hand, all contracts are treated as if they were the subject of a Reference Service.

7.5.4.6 Tariff Calculation Model: Expenditures

Expenditures for the purposes of calculating Reference Services tariffs comprise all the estimated future capital expenditures and operating expenditures for the Parmelia Pipeline during the Access Arrangement period.

Projected expenditures for the Parmelia Pipeline over the life of the Access Arrangement have been discussed in a preceding section. The values are provided in sections 5.1 (operating costs) and 4.3 (anticipated capital expenditure).

7.5.4.7 Tariff Calculation Model: Asset Value and Depreciation

For the purposes of determination of Reference Services tariffs for the first Access Arrangement Period, the asset value at the beginning of the Access Arrangement period is the Initial Capital Base value of the Parmelia Pipeline determined by the Regulator. Application of units of production depreciation to the Capital Base reflective of actual throughput and hence proportional asset utilisation as it is incurred, yields by difference the Capital Base remaining at the end of the Access Arrangement Period.

Future capital expenditure is cumulatively added as it is incurred in the model and, by the application of straight line depreciation, yields the asset residual value for this component of Capital Base at the end of the Access Arrangement period.

7.5.4.8 Tariff Calculation Model: Discount Rate

The real before tax Weighted Average Cost of Capital previously determined is used as the discount factor for the base case NPV calculation to determine Reference Services tariffs.

7.5.4.9 Result: Reference Services Tariff Determination

On the basis of an 80:20 split between reservation and commodity components of tariff, the Regulator has mandated the following Reference Tariff, inclusive of the goods and services tax.

(Amendment 31)

	Tariff Excluding GST	GST Payable	Tariff Including GST
Firm Extended Service Reservation Charge:	$0.440/GJ	$0.044/GJ	$0.484/GJ
Firm Extended Service Capacity Charge:	$0.110/GJ	$0.011/GJ	$0.121/GJ
Interruptible Extended Service Reservation Charge:	$0.396/GJ	$0.040/GJ	$0.436/GJ
Interruptible Extended Service Capacity Charge:	$0.099/GJ	$0.010/GJ	$0.109/GJ

The Regulator has determined that the differential for the provision of an Interruptible Extended Service represents a Prudent Discount as provided for under the Code.

7.6 Incentive Structures

The approach taken in the determination of tariffs for Reference Services is based on a "price path" philosophy (Code section 8.3(a)), whereby tariffs are set in advance for the entire Access Arrangement period on the basis of anticipated revenues and costs.

These revenues and costs constitute a benchmark of performance for the Parmelia Pipeline. If CMS is able to reduce costs, through improvements in operating efficiency, it stands to generate returns above those predicted at the time of determination of tariffs. Conversely, if CMS incurs costs which are greater than those predicted, returns will be lower.

Thus, incentives are inherent in the "price path" approach, particularly given the assumptions made regarding revenues generated from currently unused pipeline capacity.

8 KEY PERFORMANCE INDICATORS

8.1 Australian Benchmarks

The acquisition of meaningful benchmark data which might serve as Key Performance Indicators (KPIs) for the Parmelia Pipeline has proved to be a very difficult task.

CMS searched a number of potential sources of KPI information. Relevant data in a form which is readily useable was not found.

After these endeavours within CMS failed to source meaningful benchmark KPI data, requests for information were sent 16 key industry, government, and regulatory organisations.

None returned data other than that which has been quoted in Access Arrangements already submitted in other Australian states. Comments from representatives of several of these organisations (including both government agencies and industry associations) indicated that comprehensive, current, appropriately organised, public domain benchmark data for the Australian transmission pipeline industry does not exist.

Therefore, it may be concluded that there is no well established and accepted public domain benchmark data appropriate to the current exercise.

8.1.1 Comparison with Benchmark Data From Other Access Arrangements

8.1.1.1 Unit Operating Costs

Benchmark data cited in the Access Arrangement Information (AAI) recently submitted by Transmission Pipelines Australia (TPA) in Victoria relating to unit operating costs is presented below, along with Parmelia Pipeline data. This data should be viewed with caution, as it is not temporally uniform. Further, the comparative pipelines data is (without exception) applicable to former, and not current, owners.

However, it may be seen that the Parmelia Pipeline may compare favourably with other pipelines.

Selected Australian Pipeline Unit Operating Costs

Sources: **TPA AAI**
Parmelia Pipeline AAI

Company	**TPA**	**AlintaGas**	**Pipeline Authority**	**PASA**	**Parmelia**
location (state)	Victoria	Western Australia	New South Wales	South Australia	Western Australia
year	1995 / 96	1995 / 96	1994 / 95	1994 / 95	2000
annual OPEX A$ million	21.4	26.0	19.6	13.1	3.74
unit OPEX A$ million per 1000 km	9.7	13.3	10.1	9.9	9.0

Unit costs relating to operating costs per unit throughput and tariffs per unit throughput are not directly comparable between pipelines of different sizes and hence capacities because of the economies of scale obtained with larger diameter pipelines. Consequently, no such comparisons are made for the purposes of this Access Arrangement.

8.1.1.2 Unit Capital Costs

Any comparison of unit costs relating to pipeline construction in Australia must be viewed with scepticism because of the fact that these pipelines have been constructed across widely different terrains, at different times, and allocated costs according to different base assumptions and accounting standards.

Similarly, unit costs relating to ongoing capital expenditure are really not directly comparable because of the differences in size and scale between the Parmelia Pipeline and other (larger) pipelines for which data is available.

Consequently, no such comparisons are made for the purposes of this Access Arrangement.

8.2 International Benchmarks

International benchmarks have not been considered because of significant differences in market structures and regulatory environments in the United Kingdom, United States and Europe. For benchmarks to be meaningful, they need to compare like with like. Comparison with international data simply because it may be available is neither appropriate nor warranted.

8.3 Key Performance Indicators in a Competitive Environment

The Parmelia Pipeline faces direct, real competition in the gas transmission market from the Dampier to Bunbury Natural Gas Pipeline, and direct, real competition in the gas delivery market from the AlintaGas distribution network. Further, the large difference in capacities and geographic coverage respectively between the Parmelia Pipeline and its two direct competitors means that the Parmelia Pipeline in its current form is unable to dominate either the gas transportation market which delivers natural gas into the Perth metropolitan area and its environs, or the gas delivery market. As the Parmelia Pipeline holds less than 10 percent of the share of the transmission market and a tiny fraction of one percent of the gas delivery market, its actual influence and potential future ability to influence either of these two markets is insignificant.

Such lack of influence in these markets means that considerations of monopoly (or even oligopoly) power simply do not apply to the Parmelia Pipeline. Therefore, the need for the 'manufacture' of conditions of 'synthetic competition' for the Parmelia Pipeline is eliminated because of its unique position in the Australian natural gas transmission pipeline industry. The Parmelia Pipeline faces real and powerful competition.

The Parmelia Pipeline is not part of a vertically integrated supply - demand chain. Its owners are neither producers or consumers of natural gas in Western Australia. Transportation and associated services are CMS' core business. Therefore, considerations related to the potential undesirable consequences of vertical integration do not apply to the Parmelia Pipeline.

The most reliable KPI in a competitive environment is survival. Ultimately, it will be history which will deliver its verdict on the competitiveness of the Parmelia Pipeline.

APPENDIX A

CROSS REFERENCE:
INFORMATION DISCLOSURE TO INTERESTED PARTIES

NATIONAL THIRD PARTY ACCESS CODE FOR NATURAL GAS PIPELINE SYSTEMS REQUIRED INFORMATION per ATTACHMENT A	ACCESS ARRANGEMENT INFORMATION REFERENCE
Category 1 **Access and Pricing**	
tariff determination methodology	7.2, 7.3, 7.4, 7.5
cost allocation approach	7.3
incentive structures	7.6
Category 2 **Capital Costs**	
asset values: zone, service or asset category	4.1, 4.3, 4.5
asset valuation methodologies	4.1
assumptions: economic life for depreciation	4.2
depreciation	4.2
accumulated depreciation	4.2
committed capital works and investment	4.3
description: planned capital investment	4.3
rate of return: equity and debt	7.4
capital structure: debt : equity split	7.4
equity returns assumed: variables used	7.4
debt costs assumed: variables used	7.4
Category 3 **Operations and Maintenance**	
fixed vs. variable costs	5.1
cost allocation: zones, services, asset categories, regulated/unregulated	5, 7.3
wages and salaries	5.1
cost of services by others	5.1
gas used in operations	5.1
materials and supply	5.1
property taxes	5.1
Category 4 **Overheads and Marketing Costs**	
total service provider costs: corporate	5.2
cost allocation: regulated & unregulated	5.2
cost allocation: zones, services, asset categories	5.2
Category 5 **System Capacity and Volume Assumptions**	
description of system capabilities	6.1
map of piping system	6.1, Appendix A
average daily and peak demand	6.2, Appendix C
total annual volume delivered	6.2
annual volume: pricing zone, service, asset category	6.2
system load profile by month	6.2
total number of customers	6.1
Category 6 **Key Performance Indicators**	
industry KPIs	8.1, 8.2, 8.3
service provider's KPIs	8.1

APPENDIX B

MAPS OF THE PARMELIA PIPELINE SYSTEM

INSERT MAP: NATURAL GAS PIPELINES IN AUSTRALIA

INSERT MAP: NATURAL GAS PIPELINES IN WESTERN AUSTRALIA

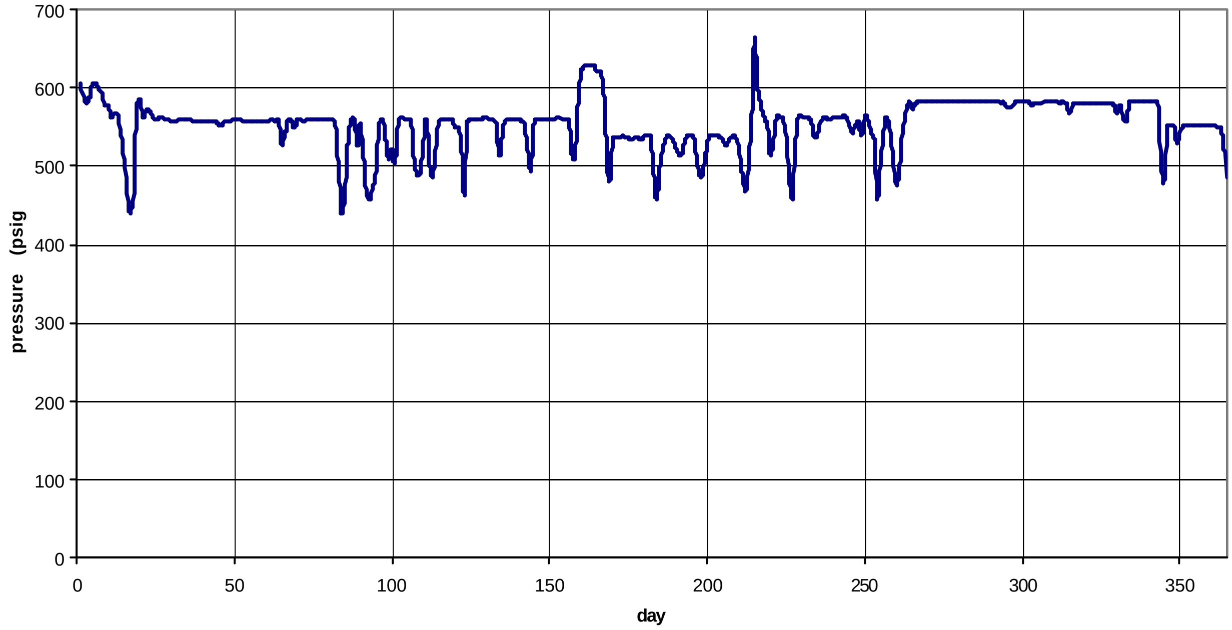
INSERT MAP: PARMELIA PIPELINE SYSTEM: DONGARA TO PINJARRA

INSERT MAP: PARMELIA PIPELINE SYSTEM: PERTH METROPOLITAN AREA

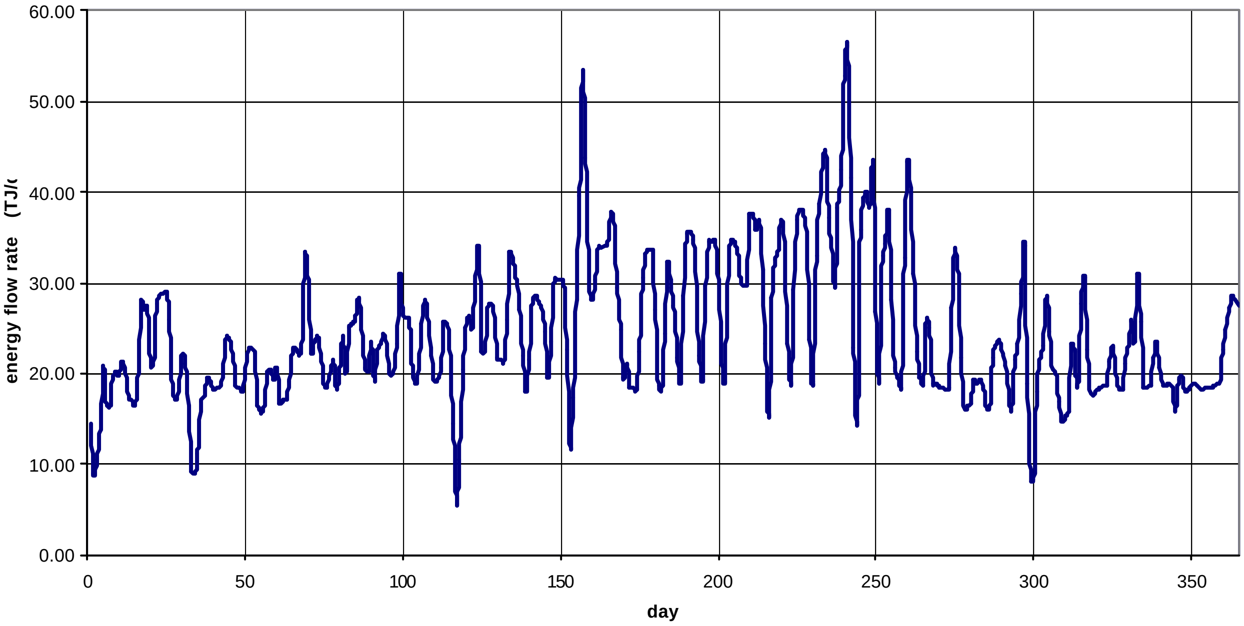
APPENDIX C

PARMELIA PIPELINE FLOW AND PRESSURE
APRIL 1998 TO MARCH 1999

CAVERSHAM CITY GATE STATION
DOWNSTREAM PRESSURE (psig)
1 April 1998 to 31 March 1999



CAVERSHAM CITY GATE STATION
ENERGY FLOW RATE (TJ/d)
1 April 1998 to 31 March 1999



APPENDIX D

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