PARMELIA PIPELINE

ACCESS ARRANGEMENT INFORMATION

Submitted to the
Independent Gas Pipelines Access Regulator
Western Australia

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CMS GAS TRANSMISSION of AUSTRALIA
PARMELIA PIPELINE
CONTACT DETAILS

CMS Gas Transmission of Australia
ARBN 078 902 397

Registered Office: 8 Marchesi Street
Kewdale
Western Australia 6105

Mailing Address: P.O. Box 203
Cloverdale
Western Australia 6985

Telephone: +61 8 9353-7500
Facsimile: +61 8 9353-2452
Email: acmswa@cmsenergy.com

CONTACTS:

David King	Manager of Operations
Rudi Petrig	Business Development Manager
Tom Lyon	Land & Liaison Officer
Steve Peredi	Pipeline Supervisor
Suzy Tasnady	Regulatory Planning Coordinator

TABLE OF CONTENTS

APPENDIX A
CROSS REFERENCE:
INFORMATION DISCLOSURE TO INTERESTED PARTIES

APPENDIX B
MAPS OF THE PARMELIA PIPELINE SYSTEM

APPENDIX C
PARMELIA PIPELINE FLOW AND PRESSURE
APRIL 1998 TO MARCH 1999

APPENDIX D
REFERENCES

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.

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 31 October 2003; the Revisions Commencement Date is 1 May 2004.	**AA section 12**
3.18 duration more than 5 years	Access Arrangement is for 5 years.	**AA section 12**
3.19 duration more than 5 years	Access Arrangement is for 5 years.	**AA section 12**
3.20 Pipelines not Covered	The Parmelia Pipeline is a Covered Pipeline.	**not applicable**

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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.

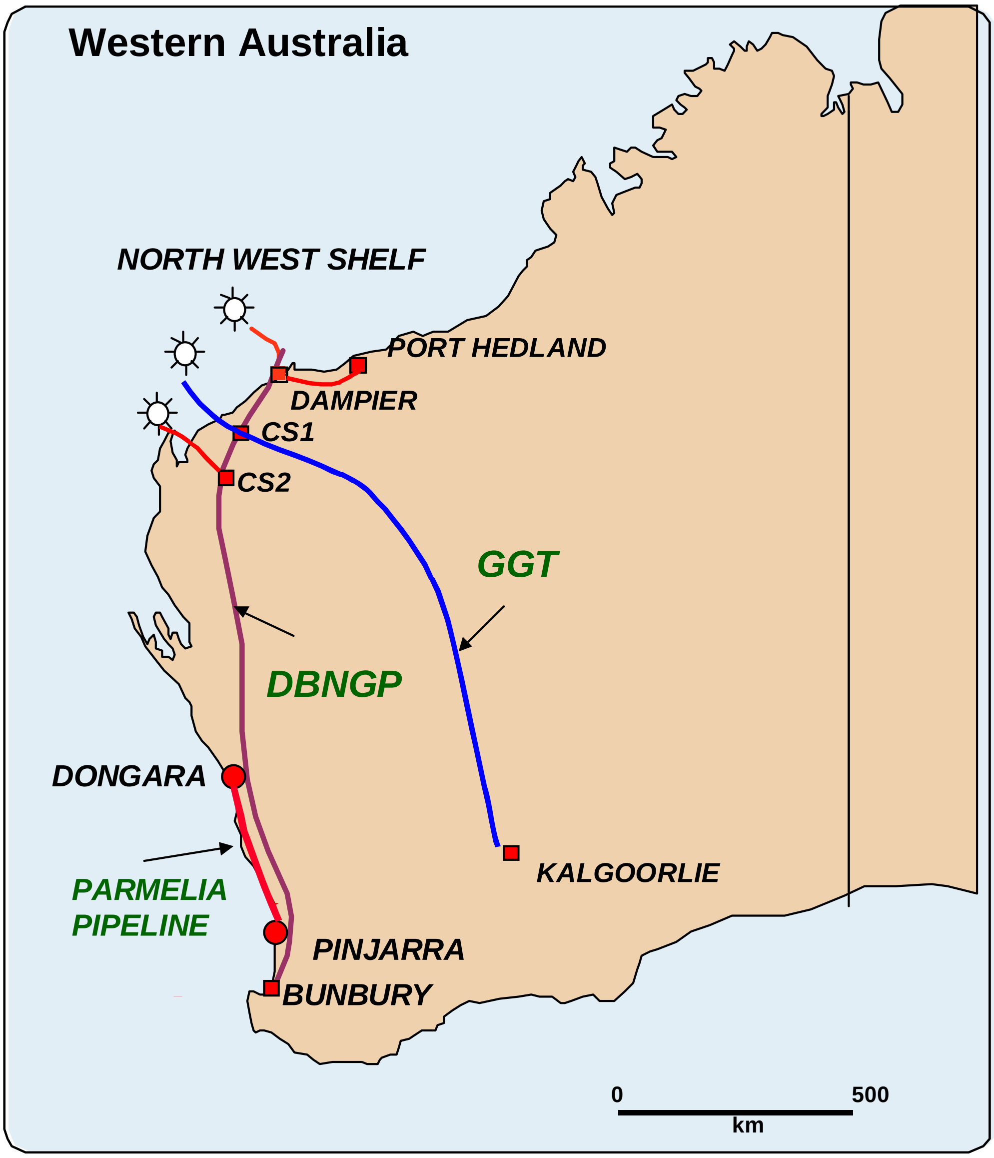
4) The Parmelia Pipeline is physically incapable of gaining or holding a majority share in either of the gas transport markets in which it operates, because of its small ultimate capacity compared to that of the DBNGP and its restricted geographic extent compared to that of the AlintaGas distribution 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. Therefore, considerations of vertical integration do not apply to the Parmelia Pipeline.

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

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 Methodology

Depreciated Optimised Replacement Cost (DORC) valuation is widely perceived as a representative asset valuation method, because it recognises the actual value of assets which otherwise may have a low or zero book value.

DORC has been described and accepted by various observers (including the Australian Competition and Consumer Commission and the Office of the Regulator General, Victoria) as being a reasonable valuation methodology because:

- it provides appropriate economic signals as to the value of the services being provided because it yields prices consistent with those charged by an efficient new entrant into the market,
- it therefore constitutes an attempt to replicate the outcomes of a competitive market,
- it avoids the problems associated with the application of different accounting standards over time,
- the optimisation process yields correctly sized assets, and
- it avoids potential price shocks when assets are replaced.

On these bases, CMS has adopted a Depreciated Optimised Replacement Cost (DORC) methodology as the primary basis for the determination of the Initial Capital Base for the Parmelia Pipeline. This choice is consistent with the approaches taken by other pipeline operators in Australia.

The components of the DORC methodology used are presented 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.

CMS projects that it will expand the Parmelia Pipeline's gas transport business. To this end, Reference Services tariffs have been determined (as described in a subsequent section) on the basis of 'filling' the existing pipeline capacity in the immediate future.

Thus, 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. For the purposes at hand, typical values for these classifications are:

ASSET TYPE	ECONOMIC LIFE (Years)
Buried transmission pipeline and laterals	70
Compressor and meter station pipework	50
Compression and metering equipment	30
Other fixed plant and equipment	30
Vehicles and other mobile plant and equipment	10
SCADA and field communications equipment	10

In order to simplify depreciation calculations, it is appropriate to apply an average economic life to cover all assets. For the purposes at hand, the effective typical average asset economic life has been taken to be 60 years.

However, asset life could be as short as 42 years, terminating at the end of the current pipeline licences.

Alternatively, nominal life could quite feasibly extend to 80 years given continuing technical regulatory consent to operate and continuation of the current high standards of maintenance.

4.2.2 Depreciation Methodology

Depreciation may be calculated using a variety of methods. In Australia, straight line and declining balance approaches are common.

In order to remain consistent with the levelised (i.e. averaging over time) approach taken for tariff determination (discussed below), straight line depreciation has been used for the purposes of tariff determination.

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, comprising the sum of capital costs associated with expanding the business and minor capital expenditure, is as follows:

YEAR	2000	2001	2002	2003	2004
Future capital expenditure A$ thousands	3750	3350	750	1550	850

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, summation of these components yields a working capital of A$ 4.27 million.

4.5 Initial Capital Base

The value for the Optimised Replacement Cost for the Parmelia Pipeline has been determined as the sum of:

- the optimised replacement cost of the main line,
- other capital assets,
- working capital.

On the basis of the discussion above, the value of the Optimised Replacement Cost for the Parmelia Pipeline falls in the range A$ 170 million to A$ 253 million. Assigning a typical value of A$ 210 million therefore constitutes a conservative assumption.

The asset value used for determination of Reference Services tariffs is the depreciated value of this Optimised Replacement Cost.

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.

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

YEAR	2000	2001	2002	2003	2004
Field controllable expenditure A$ thousands	2113	2231	2231	2231	2231
Major expense job expenditure A$ thousands	1313	998	788	1523	1313
Total operating & maintenance A$ thousands	3426	3229	3019	3754	3544

System Usage Gas (the sum of compressor fuel and unaccounted for gas), and linepack adjustments made through trading constitute a further operating expense consideration.

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 as follows:

YEAR	2000	2001	2002	2003	2004
Marketing & overhead expenditure A$ thousands	429	429	429	429	429

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;

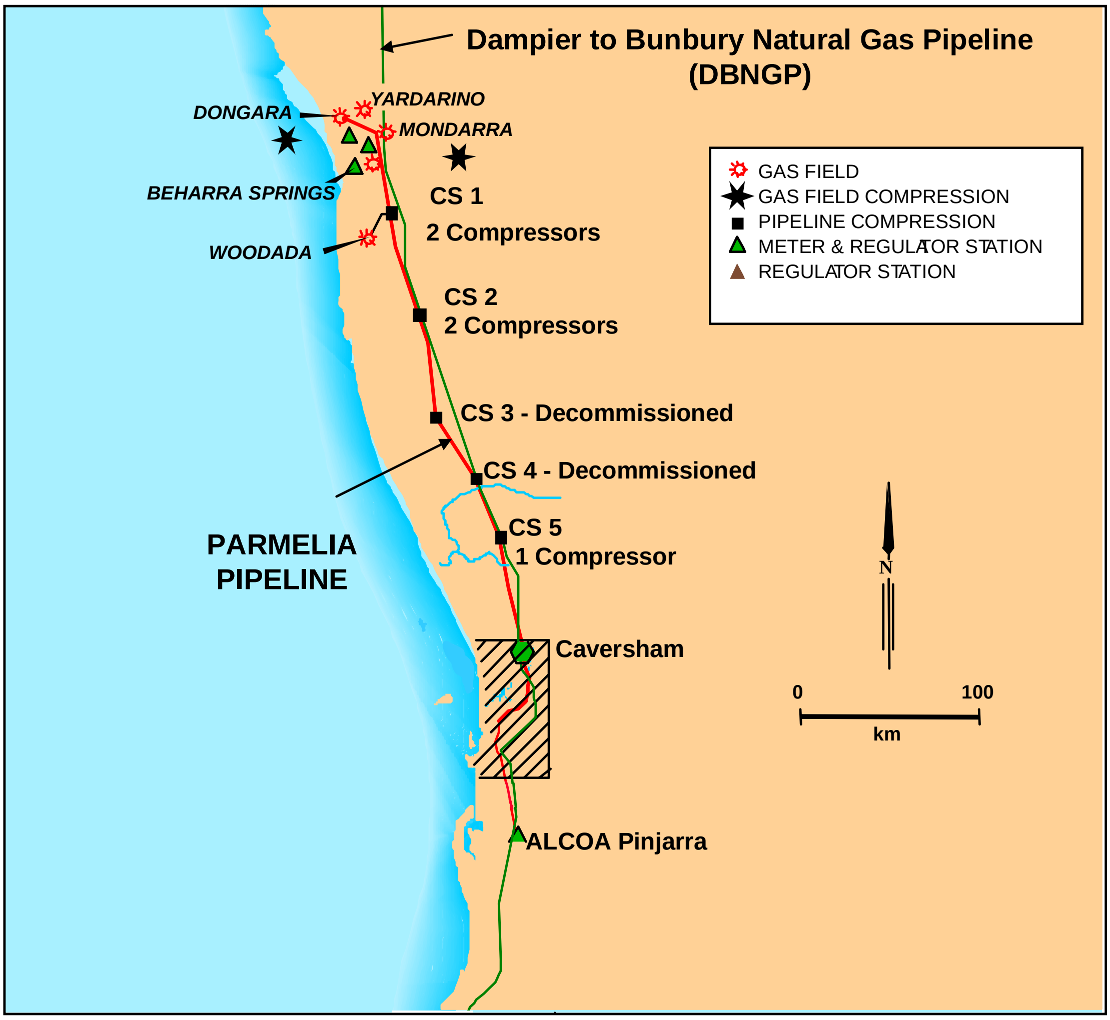
- the Kwinana Power Station;
- the Alcoa alumina refinery at Pinjarra.

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, reducing pipeline capacity substantially.

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 received 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 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. Henry Ford's famous pronouncement of "any colour as long as it is black" (referring to the T model Ford) definitely does not apply to the Parmelia Pipeline and the services it offers.

Existing Parmelia Pipeline gas transport contracts are subject to commercial confidentiality. Therefore, it is mandatory that future throughput projections (and associated revenues) for this category of gas be presented in aggregated form.

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. Therefore, in order to protect future new gas transport business prospects, future throughput projections for open access contracts are presented in aggregated form.

On this aggregated basis, the Parmelia Pipeline future throughput projection is as follows:

YEAR	1999	2000	2001	2002	2003
Existing contracts utilised capacity TJ / d	29.0	29.6	30.2	30.2	30.2
Extended Term Reference Services assumed capacity TJ / d	57.0 typical	56.4 typical	55.8 typical	55.8 typical	55.8 typical
Spot Reference Services available capacity TJ / d	as avail-able	as avail-able	as avail-able	as avail-able	as avail-able
Non reference service available capacity TJ / d	as requested	as requested	as requested	as requested	as requested
Maximum pipeline throughput capacity TJ / d	86 typical	86 typical	86 typical	86 typical	86 typical

The above future throughput projection does not include gas from a potential second pipeline from the Carnarvon Basin to the South West. It is anticipated that if gas from this new pipeline were to be transported by the existing Parmelia Pipeline, such transport would not occur during the life of this Access Arrangement.

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.

Because of the more global view the NPV / IRR approach offers, this method has been adopted for the purposes of determining Reference Tariffs for the Parmelia Pipeline.

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.

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 have been determined by the following steps:

1) Determine the Optimised Replacement Cost (ORC) of the Parmelia Pipeline.

2) Depreciate (on a straight line basis) the ORC to yield the Depreciated Optimised Replacement Cost (DORC).

3) Establish pipeline capacity.

4) Allocate pipeline capacity to existing contracts.

5) Allocate all remaining capacity to Reference Services.

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

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

8) 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.

9) 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 - γ))}] + [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).

CMS concludes that the debt premium above the risk free rate is of the order of 1.2 percent. Therefore, this value is considered as typical for this analysis.

7.4.3 Capital Structure

The capital structure of CMS Gas Transmission Australia's parent company provides a guide to what may constitute an applicable value for the purposes of calculating WACC. As indicated in the CMS Energy Corporation 1998 Annual Report, its prevailing debt to equity ratio is 52 : 48.

However, a substantial proportion of its assets comprise comparatively 'safe' distribution utilities. The Parmelia Pipeline does not fall into this class of lower risk asset. Thus, it represents a comparatively 'riskier' investment to CMS. As gearing levels as accepted by lenders are generally inversely proportional to risk, it is appropriate to assume a gearing level for the Parmelia Pipeline which is lower than that for the entire corporation.

This assumption is supported by data from CSI Data Inc. (cited by Gray (1998: 12)) which shows an average gearing ratio of 49 percent for 19 natural gas utilities in the USA.

Therefore, a debt to equity ratio of 50 : 50 is used as a typical value for the determination of WACC.

However, it could be argued that a comparatively wide range of values for the debt to equity ratio might apply.

The Australian Gas Light Company (AGL), a leading Australian natural gas transmission and distribution company, are cited by Macquarie Risk Advisory Services (1998: 7) as having a gearing ratio of 40 percent (i.e. a debt to equity ratio of 40 : 60).

Conversely, in the recent Final Decision by the Office of the Regulator General, Victoria (ORG) regarding Access Arrangements for the Multinet, Stratus, and Westar gas distribution networks in Melbourne, and the Final Decision by the Australian Competition and Consumer Commission (ACCC) regarding Access Arrangements for Transmission Pipelines Australia (TPA) and the Victorian Energy Networks Corporation (VENCorp), a debt to equity ratio of 60 : 40 was mandated.

7.4.4 Taxation

7.4.4.1 Tax Rate

The Australian company tax rate of 36 percent, prevailing in the second quarter of 1999, is applicable to the determination of WACC.

7.4.4.2 Dividend Imputation (Gamma) Factor

Dividend imputation applies only to Australian investors. As a foreign investor, CMS Energy Corporation, the parent of CMS Gas Transmission Australia, does not benefit from dividend imputation. Therefore, a gamma value of zero is appropriate for the determination of WACC. This assumption is consistent with analysis by Davis (1998: 12) and Gray (1998: 6). Gray indicates that even for wholly owned Australian companies, a maximum value for gamma is 60 percent.

Taking a wider view, an efficient market will factor the effects of dividend imputation into the market risk premium. Kolhatkar (1998: 3) proposes that this is the reason the market risk premium in Australia is lower than that in the United States of America. Given that the effects of dividend imputation are indeed factored into the market risk premium, gamma should be assigned a value of zero for all investors.

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 recent Access Arrangements submitted by EPD on behalf of Multinet, Stratus, Westar, and TPA in Victoria proposed a (nominal) risk free rate of 8.0 percent. This value appears reasonable given Officer's findings and the volatility of bond yields in the 1990s and the high yields obtained in the first half of the decade.

However, the risk free rate varies significantly in the short term. The 10 year bond rate quoted in the Australian Financial Review of Monday 3 May 1999 was 5.51 percent.

On the basis of the above discussion, the fact that 10 year bond rates are currently at a low level, and the fact that some (but not all) financial commentators predict comparative stability of interest rates in the medium term, a risk free rate of 6.5 percent (nominal) is appropriate as a typical value for the determination of WACC.

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).

The Office of the Regulator General, Victoria (1998) proposes that equity beta may be determined as follows:

$\beta e = \beta a * [1 + \{(D / E) * (1 - ((1 - \gamma) * t))\}]$ ***[equation 3]***

where:

- βe is the equity beta value
- βa is the asset 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

- gamma (γ) is the proportion of dividend imputation
- t is the prevailing tax rate as a decimal fraction

Values for asset beta are calculated by the Centre for Research in Finance at the Australian Graduate School of Management at the University of New South Wales. These are published under the name of Risk Measurement Service. Values for all companies with fully paid shares listed on the Australian Stock Exchange are provided. The December 1998 report has been used as source of beta values. Risk Measurement Service is widely accepted as being a reliable source of beta data for Australian listed companies.

CMS Gas Transmission Australia is not a public company. Consequently, its asset beta may not be determined.

Given the company’s stock is not traded on the stock market, a proxy value for the firm’s asset beta must be established.

When considering how to establish a proxy asset beta, several issues become apparent.

First, AGL is the only company currently (2nd quarter 1999) listed on the Australian Stock Exchange whose primary business activities incorporate a substantial gas transmission pipeline component (as distinct from gas distribution, etc.). However, a considerable proportion of AGL's business activities are in gas and electricity distribution. Thus, it is not entirely reasonable to view AGL as a 'representative' gas transmission pipeline (as distinct from distribution) company. AGL had, as at December 1998, an asset beta of 0.80 (Risk Measurement Service 1998). However, it is reasonable to conclude that this beta value is lower than that of a transmission pipeline such as the Parmelia because of the lower risk gas and electricity distribution component of AGL's business.

Second, AGL, and indeed the vast majority of gas transmission and distribution systems in Australia, are natural monopolies. This can not be said of the Parmelia Pipeline, which has a direct and potentially overpowering competitor in the Dampier to Bunbury Natural Gas Pipeline. Exposure to the forces of competition has the effect of increasing business risk, and hence beta.

Third, the Parmelia Pipeline holds a small (less than 10 percent) share of the Western Australian gas transport market sector in which it competes. This further compounds the increase in business risk and hence beta.

Fourth, the Parmelia Pipeline does not currently hold transport contracts which may be expected to endure in the long (e.g. 20 year) term. This is because all currently producing gas fields in the Perth Basin are in decline. This again compounds the increase in business risk, and hence beta.

In order that the Parmelia Pipeline may survive (let alone prosper), it must increase its transport business. To do this, it is dependent on securing gas transport business from existing and new gas producers. Therefore, the business risk faced by the Parmelia Pipeline is to a vital extent coupled to, and hence influenced by, the fortunes of the Parmelia Pipeline's upstream inputs.

Thus, it is reasonable to consider the betas of Perth Basin and other similar upstream producers as proxies for the business risk faced by the Parmelia Pipeline.

Boral, the parent company of Boral Energy Resources, has a quoted (Risk Measurement Service 1998) beta value of 1.14, but the diversified nature of Boral's total business interests precludes it (or its beta) being necessarily representative of a 'typical' Perth Basin gas producer. Phoenix Energy Pty. Ltd. and its parent, the Griffin group, are not listed. Premier Oil also does not have a beta value listed for it. Thus, Arc Energy is the only representative producer operating in the Perth Basin which has a beta value (of 1.91) quoted by Risk Management Service 1998.

Therefore, it is necessary to look further afield and seek 'equivalent' companies which might reasonably represent a typical user of the Parmelia Pipeline. The following table details a selection of companies for whom beta values are available and which might reasonably be used as proxies.

COMPANY	BETA VALUE	CAPITAL (A$ million)
Arc Energy	1.91	16
Energy Equity	1.98	84
Novus Petroleum	1.49	144
Petroz	1.25	118
Oil Search	1.60	773
average (weighted)	**1.58**	

Therefore, the proxy asset beta value for the Parmelia Pipeline could easily be has high as 1.6. This, or an even higher, value recognises the current under utilisation of the Parmelia Pipeline and the substantial competition it faces in both the transmission and gas delivery market sectors in which it operates.

If AGL is considered to define the low end of a possible range for beta, it may be seen that the range for beta is very wide (i.e. 0.8 to 1.6) . This wide spread serves to illustrate the uncertainty which surrounds both the concept of 'business risk' and the uncertainty associated with the calculation of Weighted Average Cost of Capital. Acknowledging this uncertainty, a conservative typical asset beta value of 1.2 is used.

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, it is appropriate to use longer term averages for the value of equity premium. Thus, it is reasonable to argue that a value of (Rm - Rf) of around 8 percent could be used.

However, the ORG and ACCC mandated a market risk premium of 6.0 in their recent Victorian decisions.

A value of 6.5 percent currently has wide acceptance in the Australian finance industry for the market risk premium (Commonwealth Bank of Australia 1998: 2; Davis 1998: 14; Macquarie Risk Advisory Services 1998: 17; Texas Utilities Australia / Eastern Energy 1998: 9). Therefore, this (historically conservative) value is used as a typical value for the determination of WACC.

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. For the purposes of tariff determination, a CPI rate of increase of 2.5 percent is 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):

$$1 + r = (1 + n) / (1 + i) \qquad \textbf{\textit{[equation 4]}}$$

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 Calculation: Weighted Average Cost of Capital

The preceding discussion identifies an appropriate set of equations (1b, 2, 3, and 4) for the calculation of WACC.

However, determination of an appropriate value for WACC involves more than simply solving the equations detailed above. In order that a meaningful value of WACC is obtained, meaningful values must be assigned to each input variable of each equation.

There has been much controversy in the recent past during the submission and decision processes for other Access Arrangements as to what constitute 'appropriate' values for input variables to the WACC calculation, and the extent to which the calculated value of WACC is 'appropriate'.

Such controversy arises from two sources.

The first arises from the uncertainty surrounding the value of each input variable. For example, in the recent Victorian Access Arrangement submissions, the appropriate values for most (if not all) of the input variables to the WACC calculation attracted considerable debate.

The second arises from the perception of the 'GIGO' (garbage in, garbage out) principle applying to the WACC calculation itself. Because there are a comparatively large number of input variables to the WACC calculation, the effect on the output of the calculation resulting from the cumulative variations of each input variable can be large. For example, if the values defining the low ends of the "plausible ranges" for each input variable as proposed by the ORG and the ACCC in the recent Victorian decisions are submitted to the WACC calculation, the resulting WACC is substantially different to that obtained by using the values defining the high ends of the plausible ranges.

One approach for dealing with the problems arising from the uncertainty surrounding input variable values is to assign a single 'best' value to each variable and then solve the relevant equations. This approach leads to the deterministic calculation of a value of WACC which inherits the compound effect of the uncertainty associated with its input variables.

A second approach to the problem is to use a probabilistic, rather than deterministic, methodology to calculate WACC.

From the early 1940s onwards, probabilistic methods have been developed to deal with calculations which have as inputs uncertain variable values. These have been named "Monte Carlo" methods. They:

- assign a plausible range of values and associated probability distribution to each uncertain input variable to the calculation in question,
- randomly select a value from that plausible range for each input variable using the associated probability distribution,
- perform the calculation using the (randomly) selected input variables,
- repeat the process of input data sampling and calculation using the sampled data many times,
- generate the frequency distribution of output values obtained from each calculation, and then
- facilitate the adoption of a final single output value from consideration of the frequency distribution of output values obtained.

In the intervening 55 years, these methods have been applied widely in a variety of situations, including (in particular) the oil and gas industry.

Such a probabilistic Monte Carlo methodology has been applied to the calculation of WACC for this Access Arrangement.

Each uncertain input variable to the WACC calculation is assigned a triangular probability distribution defined by the low, typical, and high values identified in the discussion above and summarised in the table below. These ranges facilitate the iterative calculation process.

A value for each input variable for each iteration is obtained by randomly sampling the plausible range for that variable.

The WACC calculation is then performed.

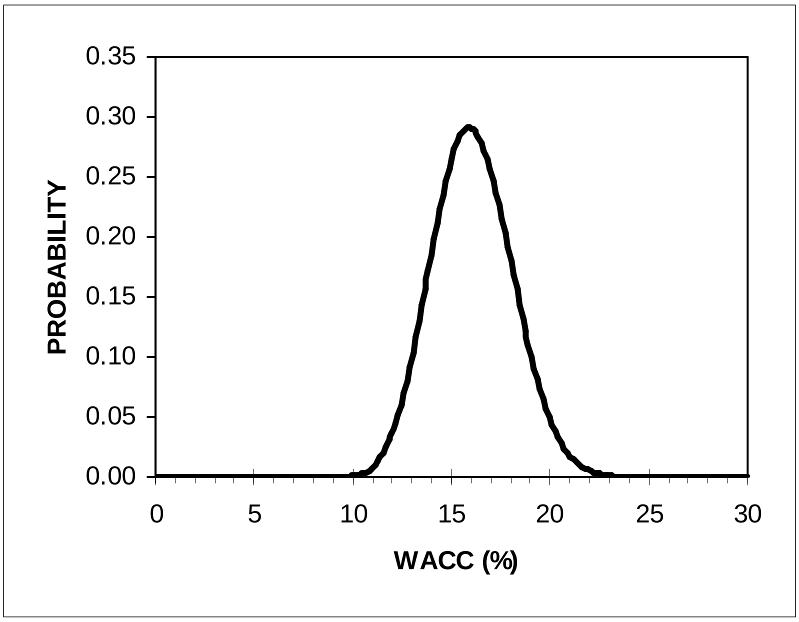
This process is repeated iteratively ten thousand times.

The frequency of occurrence of each WACC value obtained by the succession of the 10,000 calculations (using the sampled data as described above) is finally plotted to yield the distribution shown overleaf.

WACC CALCULATION: PROBABILISTIC INPUT VARIABLE RANGES

WACC Calculation Input Variable	Minimum	Typical	Maximum
debt premium above risk free rate (%)	0.75	1.2	1.5
debt to equity ratio	40 : 60	50 : 50	60 : 40
dividend imputation factor gamma (%)	0	0	60
risk free rate (%)	5.5	6.5	8.0
asset beta value	0.8	1.2	1.6
market risk premium (%)	6.0	6.5	8.0
inflation rate (%)	0	2.5	4.0

RELATIVE FREQUENCY DISTRIBUTION:
WEIGHTED AVERAGE COST OF CAPITAL CALCULATION



7.4.5.8 Result: Weighted Average Cost of Capital Calculation

It may be seen that the applicable value for the real before tax Weighted Average Cost of Capital for the Parmelia Pipeline for the purpose of determining Reference Services tariffs has a (probabilistically calculated) mean value of 16.0 percent.

7.4.5.9 The WACC Calculation in Context

The recent Final Decisions in Victoria by the ORG and ACCC warrant comment at this point because of the volume and intensity of public comment surrounding them, the Draft Decisions which preceded them, and the initial submission of the associated Access Arrangements.

Both Final Decisions give lengthy consideration to the determination of Weighted Average Cost of Capital. It is therefore appropriate to briefly consider salient issues which emerge from this, and other, considerations.

Determination of WACC using the Capital Asset Pricing Model involves the assignment of values to a comparatively large number of input variables, as discussed above.

These input variables may be segregated into two broad classes.

First, there are input variables which are generally applicable to all pipeline operators in the industry. The tax rate, the risk free rate, and the behaviour of the stock market as a whole in terms of its performance with respect to the risk free rate are all applicable to all pipeline operators. They are dictated by prevailing economic and statutory conditions.

Second, there are input variables whose values are specific to each pipeline operator. The capital structure of the firm, the pipeline operator's risk profile with respect to the market as a whole and the associated cost of equity capital, and the ability to benefit from dividend imputation are all variables which are particular to the individual pipeline operator. They are dictated by the particular circumstances applying to the specific company in question.

Both Victorian decisions contain references to the circumstances prevailing in Victoria, and how these were considered in the context of the cases at hand. Thus, caution must be exercised if consideration is to be given to the use of the Victorian decisions as any sort of explicit or implicit benchmarks for other Access Arrangements. It is not appropriate to blindly apply any firm specific variable values from the Victorian Access Arrangements to firms operating in different states in different business environments and industry structures.

Further, the number of conflicting views put forward during the public consultation processes associated with the Victorian decisions indicate that there is no one 'correct' method for the determination of Weighted Average Cost of Capital. This is exemplified by the divergence of views between prominent academics on a number of key issues. It indicates that some of the best minds in the country do not agree on any sort of unique approach to the multi-variate, multi-faceted problem of determining WACC, and that there is no single widely accepted view regarding its solution.

Thus, care must be exercised when considering the Parmelia Pipeline in the context of the Victorian decisions.

Decisions by the ORG and the ACCC regarding appropriate values for variables applicable to all pipeline operators may be taken as a guide for use in other contexts, but should not be utilised solely on the basis of precedent.

Decisions regarding the firm specific variables discussed above should be seen as situation specific. It is not appropriate to blindly apply values for the cost of debt, capital structure, dividend imputation factor, and cost of equity identified as acceptable in the Victorian decisions to the Parmelia Pipeline. To do so implies that the circumstances applicable to the Parmelia Pipeline are the same as those applying to the gas system in Victoria. Even cursory consideration of these indicates that such is not the case.

7.5 Tariff Determination

7.5.1 Introduction

Tariff determination has been one of the most difficult tasks in the preparation of this Access Arrangement. As with the Victorian Access Arrangements, it has been found that variations in the values of some input variables to the tariff calculation can have a significant impact on tariff values obtained. Therefore, a probabilistic (i.e. Monte Carlo) approach identical in form to that utilised for the calculation of Weighted Average Cost of Capital has been employed for the determination of Parmelia Pipeline Reference Service tariffs.

CMS believes that the statistical approach used accommodates in a meaningful way the uncertainty of values of both inputs to, and outputs from, the tariff computation process. This uncertainty is inherent in both tariff determination methodologies (i.e.

Cost of Service or NPV / IRR) approved by the Code and has in the past been the source of considerable disagreement.

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 is allocated a tariff which is 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, pipeline firm plus interruptible capacity is assumed to lie in the range 80 TJ/d to 91 TJ/d with a typical value of 86 TJ/d. Similarly, firm capacity is assumed to lie in the range 60 TJ/d to 68 TJ/d with a typical value of 64 TJ/d.

For the purposes of determining tariffs for Reference Services, it has been conservatively assumed that all unused pipeline capacity is assigned to Reference Services, and that revenues are derived from all of this capacity for the entire life of the Access Arrangement. This assumption has been made on the basis of CMS successfully expanding its business in the near and medium term.

A load factor of 0.90 (where load factor is defined as average throughput divided by maximum throughput) has been assumed for the purposes of Reference Services tariff determination.

Spot services have been assumed to operate to take advantage of reserved but unused capacity.

Thus, it may be seen that the process for tariff determination for Reference Services has made very conservative assumptions. Tariffs are calculated on the basis of a 'full' pipeline, notwithstanding the fact that the Parmelia Pipeline is currently operating significantly under capacity.

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, existing contracts throughputs and consequent revenues are assigned deterministic values. This is because their values are more predictable than those applying to potential future Reference Services contracts.

Existing contracts are subject to normal commercial confidentiality. Therefore, the aggregate revenue from all existing contracts, rather than individual revenue streams, is used in for the Reference Services tariff determination process.

Revenues from existing contracts for the Parmelia Pipeline used for the purposes of determining Reference Services tariffs are as follows:

YEAR	2000	2000	2001	2002	2003
Revenue: existing contracts A$ thousands	6167	6263	6366	6354	6342

Revenues from Reference Services are calculated on the basis of the statistical sampling process applied to the inputs to the cash flow calculation. Therefore, it is not appropriate to list deterministic values for them.

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. These are reproduced in summary form below.

YEAR	2000	2001	2002	2003	2004
Expenditure: operating costs A$ thousands	3426	3229	3019	3754	3544
Expenditure: future capital A$ thousands	3750	3350	750	1550	850

For the purposes of determining Reference Services tariffs these expenditures have been taken as typical values. Being projections into the future, they are uncertain. To facilitate probabilistic tariff determination, low and high range values of plus and minus 25 percent respectively are assigned to these expenditures.

7.5.4.7 Tariff Calculation Model: Asset Value and Depreciation

For the purposes of determination of Reference Services tariffs, the asset value at the beginning of the Access Arrangement period is the depreciated value of the Optimised Replacement Cost (ORC) of the Parmelia Pipeline. Application of straight line depreciation to the Optimised Replacement Cost value from the time of construction to the present day yields the Depreciated Optimised Replacement Cost (DORC). This value is probabilistic rather than deterministic in nature as a consequence of the Monte Carlo methodology employed because ORC and asset life are both defined probabilistically.

Based on the discussion on asset value in a preceding section, a typical ORC value of A$ 210 million is used. To facilitate probabilistic tariff determination, low and high range values of A$ 170 million and A$ 253 million respectively are assigned.

Similarly, typical asset life is set at 60 years, with 42 years and 80 years defining the low and high values of the range respectively.

Addition of future capital expenditure to the DORC and application of straight line depreciation yields the asset residual value at the end of the Access Arrangement period. Analogous to the value for DORC applicable at the beginning of the Access Arrangement period, the residual value is probabilistic rather than deterministic in nature.

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. The range for WACC consists of a typical value of 16.0 percent, and minimum and maximum range values of 13.5 percent and 18.6 percent respectively.

7.5.4.9 Consumer Price Index

To facilitate probabilistic determination of Reference Services tariffs, the assumptions for inflation made for the determination of Weighted Average Cost of Capital (i.e. 2.5 percent typical, 0 percent minimum, 4 percent maximum) are employed.

7.5.4.10 Calculation of Reference Services Tariffs

The methodology employed to calculate Reference Services tariffs is identical in principle to that used for the determination of Weighted Average Cost of Capital.

Plausible ranges are assigned to the above mentioned input variables to the tariff calculation. These ranges are established on the basis of the material presented above.

Each uncertain input variable to the Reference Services tariff calculation is assigned a triangular probability distribution defined by the low, typical, and high values identified in the discussion above and summarised in the table below. These ranges facilitate the iterative calculation process.

A value for each input variable for each iteration is obtained by randomly sampling the plausible range for that variable.

The Reference Services tariff calculation is then performed.

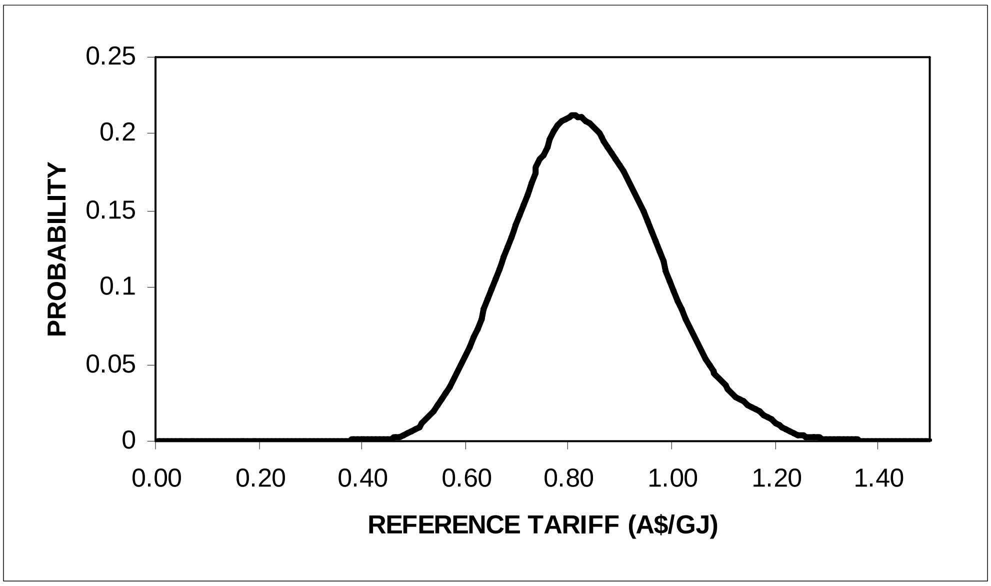
This process is repeated iteratively ten thousand times.

The frequency of occurrence of each Firm Extended Reference Service tariff value obtained by the succession of the 10,000 calculations (using the sampled data as described above) is finally plotted to yield the distribution shown overleaf.

REFERENCE SERVICES TARIFF CALCULATION: PROBABILISTIC INPUT VARIABLE RANGES

Reference Services Calculation Input Variable	Minimum	Typical	Maximum
pipeline capacity firm+interruptible (TJ/d)	80	86	91
pipeline capacity firm (TJ/d)	60	64	68
Spot services capacity if available (TJ/d)	0	5	15
Spot tariff (competitively bid) (A$/GJ)	0.15	0.25	0.50
capital expenditure: percent of projected	75	100	125
operating costs: percent of projected	75	100	125
pipeline Optimised Replacement Cost (A$M)	170	210	253
pipeline life (years)	42	60	80
Weighted Average Cost of Capital (%)	13.5	16.0	18.6
inflation rate (%)	0	2.5	4

RELATIVE FREQUENCY DISTRIBUTION: FIRM EXTENDED REFERENCE SERVICES TARIFF



7.5.4.11 Result: Reference Services Tariff Determination

It may be seen from the preceding that the Firm Extended Reference Service Tariff for the Parmelia Pipeline has a (probabilistically calculated) mean value of A$ 0.83 per gigajoule.

This mean value is adopted as the Firm Extended Reference Service total tariff.

On the basis of the 80 : 20 split described above, this translates to a Reservation Tariff for the Firm Extended Reference Service of A$ 0.664 per gigajoule, and a Commodity Tariff for the Firm Extended Reference Service of A$ 0.166 per gigajoule.

On the basis of the relativity between Firm and Interruptible tariffs described above, the Reservation Tariff for the Interruptible Extended Reference Service is A$ 0.5976 per gigajoule, and a Commodity Tariff for the Interruptible Extended Reference Service is A$ 0.1494 per gigajoule.

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	3.86
unit OPEX A$ million per 1000 km	9.7	13.3	10.1	9.9	9.3

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

It is not appropriate to make comparisons of unit costs relating to pipeline construction in Australia 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.

Unit costs relating to ongoing capital expenditure are also not 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

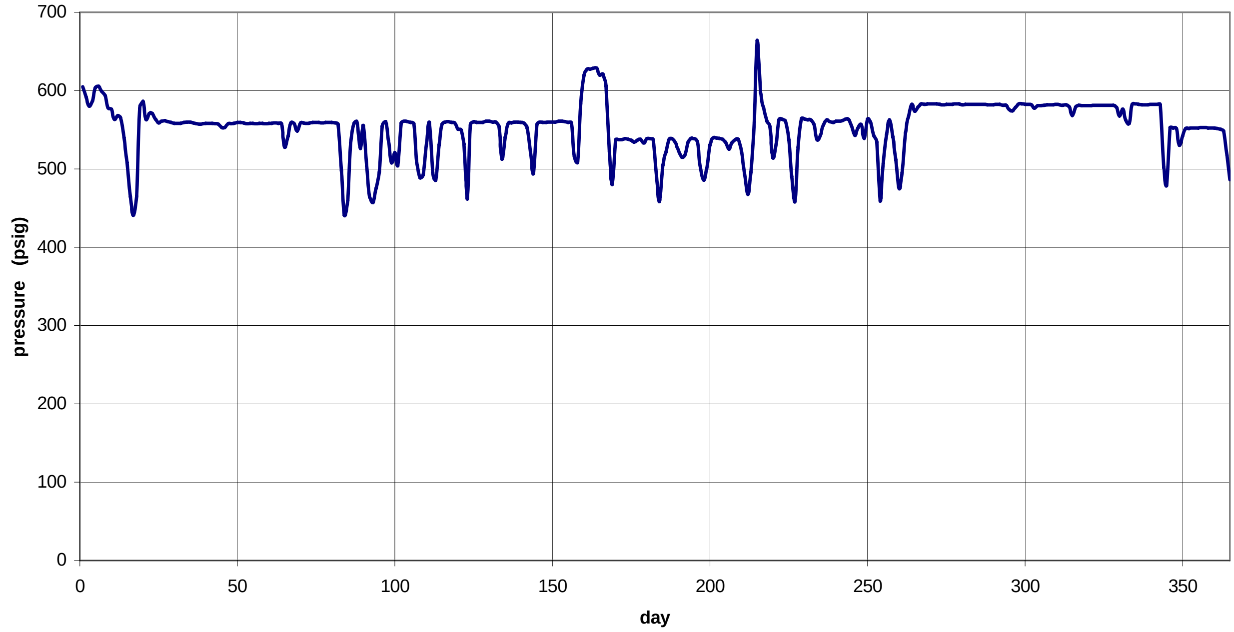
INSERT MAP: PARMELIA PIPELINE SYSTEM: DONGARA TO PINJARRA

INSERT MAP: PARMELIA PIPELINE SYSTEM: PERTH METROPOLITAN AREA

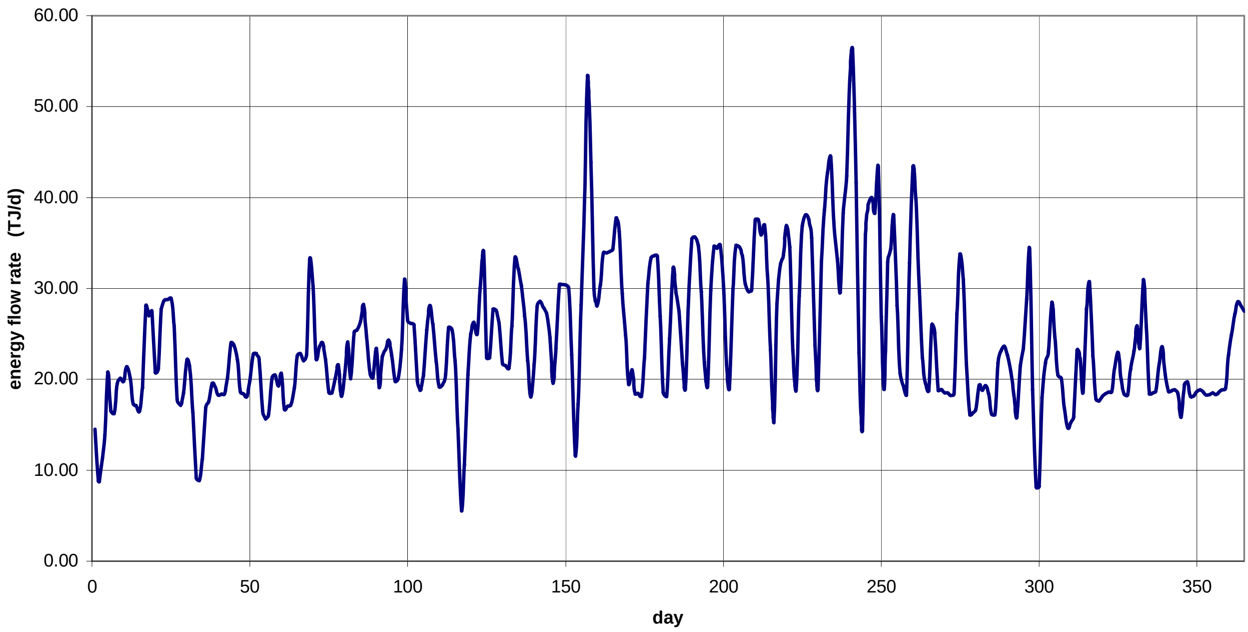
APPENDIX C

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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