GOLDFIELDS GAS TRANSMISSION JOINT VENTURE

GOLDFIELDS GAS PIPELINE

ESTIMATED REPLACEMENT COST

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Prepared by

Venton & Associates Pty. Ltd.
ABN: 86 081 612 053
PO Box 472
Bundanoon NSW 2578

TEL: *+61 2 4884 4470*

FAX: *+61 2 4884 4474*

In association with:

Aust-Wide Estimating Pty Ltd
Brookfield, Qld, 4069

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1. SUMMARY

Commercial regulation of gas transmission pipelines requires that the capital base of the pipeline be periodically re-established to provide a base against which the transportation tariff is calculated.

This involves a reassessment of the pipeline, and its existing and projected future load to develop a design that is optimised for the actual capacity of the pipeline, rather than the capacity expected at the time it was originally developed. The Goldfields Gas Transmission pipeline is considered by its Owners as representing a technically optimal design for the actual and forecast loads in the pipeline.

To establish a replacement cost for the pipeline, Goldfields Gas Transmission Joint Venture (GGTJV) requested Venton and Associates use a combination of historic design and cost information, and current knowledge of pipeline costs to establish a current (3rd quarter, 2004) cost to replace the pipeline that currently exists (3rd quarter, 2004). The work also uses a similar procedure to estimate the capital cost at December 1999. This work was undertaken in association with Aust-Wide Estimating, who were responsible for the development of the budget control estimate for the original project.

This pipeline is 1378 km long, comprising 520 km of DN 400 pipe and the 858 km of DN 350 pipe. The pipeline is equipped with four (4) compressor stations, two of which have 2 compressor units (duty and standby) and two which have a single unit. The pipeline incorporates the DN 200 Newman lateral pipeline.

The replacement cost estimate was developed by adjusting the budget control estimate (4th quarter 1995) to reflect the actual capital cost of the pipeline, taking into account the variance between the actual and estimated cost. This was used to adjust the quantities (labour, materials and equipment) used in the budget control estimate. In developing an appreciation of the reasons for cost variances, project records and personnel closely involved during the design and construction phase of the project were consulted.

The costs associated with the adjusted budget control estimate quantities were then escalated to reflect the current cost for labour, materials and equipment to develop the estimated replacement cost.

The estimated cost to replace the Goldfields Gas Pipeline and the Newman Lateral Pipeline (Pipeline Licence 24) in 3rd quarter 2004 is $A 678,167,000 excluding interest during construction. This represents the total development cost, including studies, land acquisition, design, and construction and commissioning and Owners cost. Interest during construction (applied at 9% of the project cost, based on the actual interest, adjusted for the change in company tax rate in 2000) is estimated to be $M 61,035,000. This increases the total project cost at time of project completion to $739,202,000.

The cost at December 1999 is:

- Capital $535,513,000
- Interest $ 50,767,000 (applied at a rate of 9.48% - see text)
- Total $586,280,000

In developing this estimate Venton and Aust-Wide have relied on original project records held by them and those consulted, actual cost records provided by Goldfields Gas Transmission Joint Venture, and their knowledge of current costs for major pipeline construction in remote areas of Australia.

This report recognises that there are risks inherent in using an historic cost and escalating it to present day conditions, and that the potential error increases as the period between the historic cost and the estimate date increases.

The estimates in this report minimise this risk by:

- Calibrating the quantities in the original detailed estimate to reflect the actual costs, and escalating the cost of the quantities using indices derived from current detailed estimates for pipeline construction, rather than from more generalised index data.
- Using a professional estimator who has been involved in pipeline estimation for more than 15 years, and whose client base includes construction contractors as well as project developers.
- Drawing on the knowledge of people involved in the original project to develop some understanding of the factors that contributed to the differences between the project budget estimate and the as constructed cost.

The report compares the estimated unit cost (2004 basis) with the unit project cost of a recently completed pipeline and with unit project costs for similar pipelines, and found that the estimate (2004) was in general agreement with those from current actual projects.

It is possible that the estimated costs will be considered high when viewed against "experience" comparators. It must be emphasised that the base cost represents the actual spend on the project, including all development and Owners costs. "Experience" numbers derived from consultants and contractors typically ignore or make inadequate allowance for Owners costs.

Venton and Aust Wide consider that the actual cost of the project would lie within the bounds of 105% and 90% of the cost estimated in this report, if the project was constructed at the date of the re-estimates. This confidence reflects the effect of errors in the assessed escalation rates applied, and the possible benefit in new machinery and different project delivery methodology – but it should be appreciated that this confidence bound was established by judgement, not by a rigorous analysis of the components of the estimate.

The allowance for interest during construction represents information provided by GGTJV based on the cost of capital as re-assessed at the completion of construction. It was beyond the scope of this report to reassess this cost, and it has been applied as a flat percentage of the estimated capital cost, based on history, except that a small reduction was applied to the percentage used for 2004, to reflect the reduction in corporate tax rate that has applied since 2001.

Because the estimate is based on actual costs, neither the 1999 nor the 2004 estimated cost include any contingency.

2. INTRODUCTION

2.1 BACKGROUND

The Goldfields Gas Transmission (GGT) pipeline and four key laterals were constructed in 1995/6 and commenced operation in 1996. The pipeline was designed and constructed to AS 2885, Pipelines, gas and liquid petroleum, 1987 Revision.

The objective of this report is to provide an estimate of the capital cost of the pipeline if it was constructed in the 4th quarter of 1999 and in the 3rd quarter 2004 by applying escalation factors to the as constructed capital cost.

2.2 THE PIPELINES

The existing GGT pipeline (Licence PL 24) consists of a trunk pipeline, 1378 km long. The pipeline commences at a pressure regulating facility constructed at the termination of a supply pipeline from Apache, adjacent to the Dampier – Bunbury pipeline compressor station 1.

There is a short DN 400 pipeline connecting this facility to the GGT Yarraloola compressor station. This delivers gas into a 520.3 km, DN 400 pipeline that runs south and east to a scraper station (Newman) from which a DN 200 lateral delivers gas to a power station approximately 46 km to the north.

The pipeline diameter is reduced at the Newman Scraper station to DN 350, and this pipeline runs south over a distance of 857.3 km to the terminal facility at Kalgoorlie south.

The GGT pipeline has compressor stations installed at:

- Yarraloola (kP 0)
- Paraburdoo (kP 304)
- Ilgarari (kP 602.8)
- Wiluna (kP 863.4)

The pipeline has provision for the future installation of compressors at a number of installed scraper stations to provide additional capacity if this should be required by the market.

The GGT pipeline incorporates the DN 200 lateral pipeline from the Newman scraper station to Newman (47.4 km) (Licence PL 24).

Four other pipelines were constructed concurrently with the GGT pipeline:

- From Mt Keith mainline valve to Mt Keith (8.6 km) (Licence PL 25)
- From Leinster scraper station to Leinster (5.2 km) (Licence PL 26)
- From Kalgoorlie North mainline valve to Parkeston (8.6 km) (Licence PL 27)
- From Kalgoorlie South terminal station to Kambalda (44.8 km) (Licence PL 28)

The Mt Keith, Leinster and Kambalda lateral pipelines were owned and constructed by Western Mining, while the Parkeston lateral pipeline was owned and constructed by Normandy Poseidon. Ownership of these pipelines has since been transferred from the original owners to Southern Cross Pipelines Pty Ltd (SCP).

The SCP lateral pipelines are excluded from this cost estimate.

The pipeline network has a design and maximum allowable operating pressure of 10.2 MPa.

The pipeline commenced operation in 1996.

Since that time lateral pipelines have been constructed:

- From Three Rivers MLV to Plutonic Mine
- From Wiluna Scraper Station to Jundee Mine
- From Wiluna Scraper Station to Wiluna Gold Mine
- From kP 1317.4 to Cawse Mine
- From kP 1142.8 to Murrin Murrin Mine
- From kP 1142.8 to Leonora
- From Kambalda MLV 2 to Esperance

These lateral pipelines are not owned by GGT or SCP, and are excluded from this cost estimate.

The key parameters of the GGT Pipeline and the Newman Lateral Pipeline (PL 24) are summarised in **Table 2-1**.

Table 2-1

Parameter	Unit	Yarraloola to Newman Scraper Station	Newman Scraper Station to Kalgoorlie South Terminal	Newman
Licence		24	24	24
Length	km	520.3	857.3	47.4
MAOP	MPa	10.2	10.2	10.2
Outside Diameter	mm	406.4	355.6	219.1
Steel Grade	API 5L	X70	X70	X52
Standard Wall	mm	6.0	5.3	4.4
“Heavy” Wall	mm	8.6	7.6	5.8
Critical Defect Length (Standard Wall)	mm	78	70	59
Critical Defect Length (Heavy Wall)	mm	157	139	98

In each case the “heavy” wall thickness pipe results in the hoop stress at MAOP being 50% of the specified minimum yield strength of the steel used, while the “standard” wall thickness results in the hoop stress at MAOP being 72% of SMYS.

The GGT pipeline is designed with “heavy” wall thickness installed at:

- Each significant road crossing
- Each significant watercourse crossing
- Locations approximately 10 km apart to provide locations for heavy vehicles to safely cross the pipe
- Locations identified as Location Class T1 at the time of the pipeline design
- For a distance of approximately 15 km downstream of each scraper station identified as a future compressor station, to reduce the effect of stress on the initiation likelihood of stress corrosion cracking

- At the lead in and lead out of each MLV and scraper station
- At other locations identified during construction as requiring either increased thickness or reduced operating stress

The DN 200 laterals are designed using the same criteria, except that "heavy" wall thickness pipe is installed from the mining lease boundary to the pipeline terminal

All pipelines are designed with a minimum cover of 750 mm in accordance with the requirements of AS 2885. Increased cover is provided at:

- Watercourse crossings (1500 mm – major streams and 1200 mm at other streams)
- Road and track crossings (1200 mm below the table drain invert or below the pavement, whichever is more stringent)
- Rail crossings (2000 mm below the table drain or 2000 mm below the top of rail, whichever is the more stringent)
- Locations identified as having erosion potential, or the potential to be inundated for extended periods (typically 1200 mm)
- Special crossings such as heavy duty haul road crossings (subject to special design)
- "Heavy" wall thickness pipe and 1200 mm cover where the pipeline is installed within the mining lease it serves.

The Kambalda lateral pipeline was constructed with increased cover (900 mm) over most of its length. It is not known whether this was deliberate (because the pipeline design was prepared by a different consultant from the main pipeline), or whether it was a result of a conservative construction practice.

The key parameters of the SCP Lateral Pipelines are summarised in **Table 2-2**.

Table 2-2

Parameter	**Unit**	**SCP**			
		Mt Keith	**Leinster**	**Kambalda**	**Parkeston**
Licence		25	26	27	28
Length	km	5.2	8.6	44.8	8.6
MAOP	MPa	10.2	10.2	10.2	10.2
Outside Diameter	mm	219.1	219.1	219.1	219.1
Steel Grade	API 5L	X56	X56	X56	X52
Standard Wall	mm	4.4	4.4	4.4	4.4
"Heavy" Wall	mm	5.8	5.8	5.8	5.8
Critical Defect Length (Standard Wall)	mm	59	59	59	59
Critical Defect Length (Heavy Wall)	mm	98	98	98	98

2.3 PIPELINE STATIONS

This report considers the risks associated with pipeline stations. **Table 2-3** shows the location and key equipment at each Station on the GGT Pipeline and the Newman Lateral.

Table 2-3 Pipeline Stations

Name	Facility Type	Diameter	kP	Section Length (km)	Actuated	Manual MLV	Offtake Valve
Yarraloola	Inlet SLV				➨		
Yarraloola	Launcher/ CS	406.4	1.1		➨		
Red Hill	MLV	406.4	57.3	56.2		➨	
Wyloo West	SS	406.4	140.2	82.9	➨		
Wyloo East	MLV	406.4	225.9	85.7		➨	
Paraburdoo	CS/SS	406.4	304	78.1	➨		
Boonanchi Well	MLV	406.4	405.7	101.7		➨	
Turee Creek	SS	406.4	465.3	59.6	➨		
Newman	SS/ Launcher		520.3	55	➨		
Ilgarari	CS/SS	406.4	602.8	82.5	➨		
Three Rivers	MLV	355.6	702.7	99.9		➨	
Neds Creek	SS	355.6	739	36.3	➨		
Cunyu	MLV	355.6	795.2	56.2		➨	
Wiluna	CS/SS	355.6	863.4	68.2	➨		
Mt. Keith	MLV/ Launcher	355.6	945.6	82.2	➨		
Leinster	SS/ Launcher	355.6	1010.7	65.1	➨		
Sturt Meadows	MLV	355.6	1081.3	70.6		➨	
Leonora	MLV	355.6	1153.1	71.8	➨		
Leonora Site	Offtake Valve		1142.8				
Jeedamya	SS	355.6	1204.3	51.2	➨		
Mt Vetters	MLV	355.6	1298.6	94.3		➨	
Cawse Lateral	Offtake Valve		1317.4				
Broad Arrow	Offtake Valve		1321.8				

Table 2-3 Pipeline Stations

Name	Facility Type	Diameter	kP	Section Length (km)	Actuated	Manual MLV	Offtake Valve
Kalgoorlie North	MLV	355.6	1355.8	57.2		➨	
Kalgoorlie West	MLV	355.6	1366.9	11.1	➨		
Kalgoorlie South	Receiver	355.6	1379	12.1	➨		
Newman Lateral							
Newman	Launcher		0		➨		➨
MLV 6	MLV	219.1	40.8	40.8		➨	
Newman Terminal	Receiver	219.1	47.6	6.8	➨		

Like the pipeline, each of the Pipeline Stations are located at sites that are remote from population, and with one or two exceptions are located remote from existing public roads.

2.4 LAND USE

The GGT pipelines cross land that is sparsely populated for their entire length. Most of the land is used for pastoral purposes through a leasehold arrangement, and much of the land is encumbered by mining tenements.

The pipeline route was selected to minimise constraints imposed by the pipeline on known and potential mining activity.

The pipeline does pass through the Wanjarri Nature Reserve.

At the southern end, the GGT pipeline passes through land recognised as having the future potential to be developed for residential use, although at the present time there are few permanently occupied buildings within the zone of potential consequence from a gas release from the pipeline, with ignition.

2.5 LANDFORM

The land traversed by all pipelines is generally flat or of modest slope. The land is stable, and the pipeline route avoids areas identified as having higher levels of seismic activity. Furthermore the original route selection for the GGT pipeline and the laterals was undertaken in conjunction with mining companies to identify and avoid locations where there were identified mineral deposits.

The DN 400 pipeline between Yarraloola and Newman crosses drainage lines from the Hamersley Ranges to the Ashburton River. This area is prone to seasonal cyclone driven high intensity – short duration rainfall, with a high runoff percentage. Watercourses are generally shallow and not well formed, and in high runoff events water floods over adjacent land forming large areas of inundation. The primary watercourses are prone to meander, and experience has indicated that severe rainfall events can result in the watercourse moving from the location where the pipeline was designed for the crossing to a location where the pipeline was designed for either inundation, or in some cases, for general open country construction. Some additional design conservatism may be adopted through this area if the pipeline was to be rebuilt with today's knowledge.

South of the Newman scraper station the landform is similar, but while there are a large number of watercourses crossing the pipeline, few have sufficient power in flood situations to cause significant erosion or stream meander.

In the Leonora area the pipeline passes through a region of low lying salt pans. The pipeline route was selected to avoid construction through salt pans.

3. BASIS OF ESTIMATE

3.1 GENERAL

This estimate addresses the cost to replace the existing Goldfields Gas Transmission pipeline (Pipeline Licence 24) in its existing (4th quarter 1999 and 3rd quarter 2004) configurations. The estimate is based on the approved capital cost estimate adjusted to reflect changes in the pipeline design and actual construction conditions using a combination of as-constructed costs and the recollections and records of persons involved through the design and construction phases of the project.

The adjusted capital cost estimate was escalated to reflect current costs for major materials, labour and construction equipment using the adjusted quantities in the original estimate.

3.2 HISTORIC ESTIMATED COST

Aust-Wide Estimating Pty Ltd developed the capital cost estimate that formed the basis of the project control budget approved by GGT.

This estimate incorporated the estimated costs together with tendered prices and allowances for pipe, coating and pipeline construction. This estimate has been rearranged into the capital cost line items provided by GGTJV, and is shown in Attachment 1, Table A1.

The estimate was a detailed estimate, developed on a materials, construction labour and construction equipment and supplies basis. It incorporated allowances provided by GGT for Owners costs, including the cost of the pipeline operator who was involved in the project from its initial design through construction and commissioning.

3.3 AS-CONSTRUCTED COST

GGTJV provided a record of the as-constructed cost of the GGT pipeline, together with capital costs expended from the time of pipeline commissioning and the present date.

The post commissioning costs included completion costs (completing work incomplete at the time of commissioning), rectification costs (rectifying items incorporated in the design but for whatever reason required additional work to be accepted as fit for purpose and the capital cost of the Wiluna and the Paraburdoo compressor stations (2001 and 2004 respectively).

The actual capital cost of the pipeline is shown in Attachment 1, Table A1.

3.4 INTEREST DURING CONSTRUCTION

GGTJV provided details of the interest during the construction period for the original pipeline calculated by the pipeline developers prior to construction and corrected for actuals after construction.

This cost was based on the calculated weighted average cost of capital (WACC) for the capital makeup (debt/equity) of the project and the conditions prevailing at the time, and on the cumulative expenditure (by month) for the project.

The interest paid was $43.23 million, which is approximately 9.48% of the recorded capital cost. The corporate tax rate changed from 36% to 30% in 2000. Because of this it was decided to apply an interest cost equal to 9.48% of the capital cost estimate for the 4th quarter 1999 estimate and 9.0% of the estimated capital cost for the 3rd quarter 2004 estimate.

3.5 ADJUSTED HISTORIC COST ESTIMATE

The historic cost estimate was adjusted to as closely as practicable make it reflect the actual cost of the pipeline. This involved:

- Reviewing the historic cost estimate and allocating the provision for contingency against line cost items
- Reviewing the contingency allocated historic cost estimate against the as-constructed cost to identify items where there was significant variance between the estimate and the actual figures.
- Attempting to develop an appreciation for the reason for each variance through discussion with the engineering manager for the project (who reviewed some personal copies of project records to aid his recollection), together with a review of, and some personal copies of records held by others associated with the project.
- This understanding was used to adjust the historic cost estimate to provide for the variances identified (for example, there was a significant difference between the estimated quantity of rock, based on geotechnical investigation and the actual quantity of rock required to be excavated at the time of construction).

  The cost variation was used to adjust the quantity on which the historic cost estimate was based.

The variance between the estimated cost and the actual capital cost is shown in Attachment 1, Table A1.

Attachment 1, Table A2 summarises the analysis used to reconcile the estimated capital cost with the recorded actual capital cost.

Significant variances identified include:

- A substantial additional construction cost that resulted from the discovery of significantly more rock that required excavation than estimated from site investigations.
- A reduction in the actual length of the pipeline, compared with the estimated length (which was recognised as an adjustment to the actual construction cost, rather than to a reduction in cost).
- Increased cost in the compressor stations originally installed compared with the estimated cost, partly as a result of changes in the design scope to accommodate the selected compressors, and partly a result of the estimate failing to make adequate allowance for the design complexity and the remote location.
- A significant change in Government charges.
- Cost over-runs in EPCM.
- Reductions in Maintenance Base costs, Perth operations centre, line pipe and scraper stations.

Two significant items in the actual costs were not adopted fully in the adjusted cost:

- The GGT Project Team was substantially expanded when it decided to take over the construction management activity from the EPCM Consultant toward the end of the project. The reason for this is not fully appreciated. The variance in GGT Project Team cost was reduced from $A 7.968 M to $A 2.0 M in the adjusted estimate.
- Substantial costs were incurred in analysing and rectifying pipe work and components associated with the reciprocating compressor stations installed with the project. These costs resulted from the decision to install reciprocating compressors, rather than centrifugal compressors. It is generally considered that if the pipeline was replaced, gas turbine machines like those installed recently at the Wiluna and Paraburdoo compressor stations would be used. Consequently the costs associated with the rectification work are not applicable to a replacement pipeline.

3.6 ESTIMATED CAPITAL COST

The adjusted historic capital cost estimate was escalated to develop the present day capital cost estimate.

There are no cost indices that directly apply to the labour, materials and construction costs that apply to the pipeline construction industry. The “assessed” cost increase identified in the following sections, represent an assessment made by a professional estimator (Aust-Wide Estimating) engaged continuously in developing capital and construction cost estimates for both construction contractors and project developers.

In making the “assessment” of the cost increases, Aust-Wide consulted estimates prepared through the period for a range of major construction projects, distilling the information from those estimates into an assessment of the change between the reference GGT capital cost estimate and date of the revised estimate. Thus the estimated escalation has a sound basis, even though it is derived from the records of only one estimating firm.

3.6.1 Line Pipe

The 1995 cost for line pipe was $A1100/tonne FOB Port Hedland. Current (2004) estimated line pipe cost for a major project in northern Australia is $A1320/tonne (20% increase).

The 1999 cost for pipe is considered to be $1265/t, based on records of estimates prepared for a slightly smaller diameter pipeline prepared in the 3rd quarter of 1999. This represents an increase of 15%. The increase applied at 1999 was assessed at 16% including allowance for the location and other factors that differ between the GGT location and the pipe cost recorded in the 1999 pipeline estimate.

NOTE: Venton and Aust-Wide undertook a detailed ORC analysis for the Moomba-Wilton Pipeline in 1998. Line pipe cost used in that estimate was $1193/tonne. Subsequent assessments of line pipe cost prepared for the ACCC indicated considerable price variability, probably reflecting the order books of the mills and the commercial conditions at the time. The pipe incorporates approximately 73,000 tonnes of steel (including the Newman lateral). The effect of the line pipe cost being estimated at $70/t higher than that established in 1998 for the Moomba-Wilton pipeline is to over estimate the cost of this component of the pipeline by approximately $5 million in an estimated cost of $535M.

3.6.2 Labour

The average construction crew labour rate in 1995 was $316 / man day including wages, on costs and profit. The 2004 labour rate for the same average crew is $A488/man day. (54% increase).

The labour rate used in pipeline cost estimate prepared in the 3rd quarter of 1999 was $387, representing an increase of 22%.

3.6.3 Construction Plant

There is no specific index applicable to construction plant. Factors influencing the construction plant cost include:

- Fuel – cost increase approximately 67% from 1995 to 2004, and 23% from 1995 to 1999.
- Foreign exchange changes between 1995 and 2004 have caused depreciation cost and replacement costs (paid in Australian dollars) to rise more rapidly than the consumer price index change.

The assessed escalation in construction plant between 1995 and 2004, including depreciation, insurance, finance, parts, expendable parts, fuel, health and safety, major and minor repairs and servicing is assessed at 53%.

In the period between 1995 and 1999, the increase is considered to be 19%, based on records taken from estimates in that period.

3.6.4 Equipment and Materials

Recent (2004) quotations for pipeline coating and other pipeline materials including valves, and fittings suggest that a reasonable allowance for escalation in these items since 1995 is 38%.

The assessed increase between 1995 and 1999 is 15%.

3.6.5 Indirect Costs

The escalation in indirect costs between 1995 and 2004, including salaried personnel and services is assessed at 45%.

The escalation in indirect costs between 1995 and 1999, including salaried personnel and services is assessed at 20%.

3.6.6 Compressor Equipment

The existing GGT Pipeline has two Compressor Stations installed with the original pipeline (Yarraloola and Ilgarari) each equipped with two reciprocating engine driven, reciprocating compressors, and two compressor stations installed more recently (2001 and 2004) (Wiluna and Paraburdoo) each equipped with a single Solar Saturn S20 gas turbine compressor.

The original installation was budgeted on the basis of gas turbine compressors, but during the execution of the project a decision was made to install reciprocating compressors driven by reciprocating engines. It is understood that reciprocating engines were favoured because their delivered power is relatively insensitive to the ambient temperature, whereas the delivered power from gas turbine engines varies with the ambient temperature.

It is understood that the equipment installed originally was approximately the same cost as the gas turbine machines. However additional costs were incurred with supporting facilities on the site.

Given that the single unit Paraburdoo compressor station represents the actual cost of a 2004 completed compressor station, it is used as the basis for compressor stations constructed for the replacement pipeline.

The 3rd quarter 2004 unit cost for a Solar Saturn S20 compressor set delivered to site, with an enclosure is $A 2.35 million. This cost, with additional supporting equipment (coolers, unit valves, building and foundations, power and controls) was used in factoring up the cost of the Paraburdoo compressor station for two units to establish the current capital cost of the Yarraloola and Ilgarari compressor stations.

The 1999 pipeline configuration did not include the Wiluna and Paraburdoo compressor stations, and these stations are not included in the cost estimate. However the same principles and gas turbine equipment have been assumed as original equipment, not the reciprocating machines.

NOTE: The original pipeline compressor stations provided a duty and standby machine at each station to ensure 100% capacity availability. The recently installed Wiluna and Paraburdoo compressor stations each have a single duty unit, with provision for future installation of a standby unit.

This decision was facilitated by the current load and by the diversity offered by the additional stations, which enables either the Wiluna or the Paraburdoo compressor station to be removed from service for maintenance without materially affecting the pipeline throughput (although the operating cost may be increased in this period by increased fuel burn at the other stations).

Duty and standby units are required at Yarraloola under any operating scenario to provide reliability, since the pipeline capacity under any configuration cannot be realised without compression at this location.

4. ESTIMATED COST

4.1 CAPITAL COST - 2004

The estimated capital cost to replace the Goldfields Gas Pipeline (PL 24) in 2004, excluding interest charges is $A 678,167,000. The total including interest is $A739,202,000**.**

Table 4-1 presents the component costs that add to this total.

Table 4-1
Estimated Capital Cost for GGT Pipeline (PL 24) 3rd Quarter, 2004 Basis

Items	**Estimated Replacement Cost ($A)**
CP	2,508,259
Completion Of Construction	1,684,607
Comp Stns – Yarraloola & Ilgarari	38,960,491
Comp Stns - Wiluna & Paraburdoo	27,000,000
E & I	8,192,308
EPCM	43,956,360
Feasibility Studies	3,660,289
Geotech Contract	397,916
GGT Project Team	12,905,000
Govt Charges	9,409,679
Landowner's Compensation	428,484
Linepipe Supply & Coating	141,901,300
MLV's	3,725,403
Maintenance Bases (4 No)	9,173,858
Offtake Stns	60,308
Other Consultants	807,712
Perth Operations Centre	1,023,595
Pipeline Construction	334,372,014
Pipeline Operator	7,236,034
Project Insurance	4,031,532
Route Survey Contract	2,380,311
SCADA / Comms	10,574,718
Scraper Stns	8,574,442
Delivery Stns	2,096,515
'Other' Assets	3,105,949
TOTAL	**678,167,084**
Interest Charge at 9.0% of capital	**61,035,037**
TOTAL INCLUDING INTEREST	**739,202,121**

The estimated cost represents the cost to replace the pipeline with a new pipeline having the same configuration and capacity as the pipeline that exists in the 3rd quarter 2004. The time base for the estimated replacement cost is 3rd quarter 2004.

4.2 CAPITAL COST - 1999

The estimated capital cost to replace the Goldfields Gas Pipeline (PL 24) in 1999, excluding interest charges is $A 535,512,744. The total including interest is $A 586,279,352**.**

Table 4-2 presents the component costs that add to this total.

Table 4-2
Estimated Capital Cost for GGT Pipeline (PL 24) 4rd Quarter, 1999 Basis

Items	Estimated Replacement Cost ($A)
CP	2,050,980
Completion Of Construction	1,394,158
Comp Stns – Yarraloola & Ilgarari	32,097,597
Comp Stns - Wiluna & Paraburdoo	-
E & I	6,623,492
EPCM	36,377,677
Feasibility Studies	3,029,204
Geotech Contract	329,310
GGT Project Team	10,680,000
Govt Charges	7,787,321
Landowner's Compensation	354,607
Linepipe Supply & Coating	129,547,548
MLV's	3,024,421
Maintenance Bases (4 No)	7,575,453
Offtake Stns	49,212
Other Consultants	668,452
Perth Operations Centre	830,063
Pipeline Construction	263,804,430
Pipeline Operator	5,988,442
Project Insurance	3,336,440
Route Survey Contract	1,969,913
SCADA / Comms	8,778,944
Scraper Stns	6,989,447
Delivery Stns	1,702,432
'Other' Assets	523,200
TOTAL	**535,512,744**
Interest Charge at 9.48% of capital	**50,766,608**
TOTAL INCLUDING INTEREST	**586,279,352**

The estimated cost represents the cost to replace the pipeline with a new pipeline having the same configuration and capacity as the pipeline that exists in the 4th quarter 1999. The time base for the estimated replacement cost is 4th quarter 1999.

5. ESTIMATE QUALITY

5.1 GENERAL

An estimate represents the estimated cost based on a design, on prevailing conditions, and on a range of assumptions. The quality of the estimate, (that is the extent to which the estimate represents the money actually spent, is largely a function of the knowledge that the estimator has of all the conditions that influence cost.

This estimate was prepared on the basis of an actual cost, and the calibration of the detailed pre-construction estimate against that actual cost so that the invariant factors (labour, equipment and materials) in the estimate were corrected to reasonably reflect the actuals, and so provide a base against which the actual cost could be escalated.

Clearly there is uncertainty associated with this approach including:

- Incorrect estimates of escalation rates.
- Changes in base costs that result from market conditions, from new technology and competition.
- Changes in productivity through all phases of the project, including construction equipment.
- Base cost distortion resulting from the conditions at the time of the original development (industrial conditions, contractor competition, weather, land and environment requirements etc), which is not recognised and allowance made when the actual costs are passed through to “calibrate” the original estimate.
- Inadequate allowance for changed conditions at the date of the new estimate (because the “old” ways may no longer be permitted).

The following factors explain how the uncertainties are addressed in developing the estimates provided in this report.

5.2 ESTIMATE ACCURACY AND CONTINGENCY

The estimates presented in this report are based on the known cost of an as-constructed project. Because of this, there is no requirement for a contingency for omissions, and none is provided.

The estimate accuracy is directly related to the assessed escalation for each component considered and applied to the base “calibrated” estimate.

Because the estimate is an escalated one, it is difficult to review components of it to assess the reliability of each item, and apply an assessment of confidence in each component, and so arrive at an overall assessment of the estimate confidence.

Section 5.9 of the report provides an overall assessment of the quality of the estimate by comparing the unit rates from this project with unit rates for projects that are somewhat comparable.

Were the project to be constructed at the dates nominated, it is considered that the actual cost would lie in the band bounded by the 105% and 90% of the estimated cost in **Table 4-1** and **Table 4-2**. (It should be noted that this confidence is an experience based judgement – not one arising from an analysis of the estimate).

Venton and Aust-Wide consider that the estimate total is a reasonable representation of the total project cost for the nominated years, The confidence levels reflect an assessment of the escalation rates established for this report, and the potential impact of both changes in construction equipment (rock excavation in particular) and project delivery methods.

The confidence level could only be improved by undertaking a detailed re-estimate of the whole project using current budget estimates for the materials and estimates for labour, equipment and materials based on current conditions. This approach is outside the scope of this analysis.

5.3 STEEL AND COATING

The steel mills supplying the Australian market are in 2004 are essentially the same as those that supplied steel and pipe to the GGT pipeline in 1995. To the best of the author's knowledge there has been no significant change in steel manufacturing, and in most cases the ERW pipe mills that convert the coil into pipe use the same mill, with modernisation to control systems, but no significant change to productivity.

Recent major pipelines in Australia (Eastern Gas Pipeline, Tasmanian Gas Pipeline and the SEA Gas Pipeline have each been supplied with pipe sourced from Australia and Japan, while the SEA Gas Pipeline also purchased some pipe from Japan.

The pipeline coating that would be used on a GGT pipeline constructed now would comply with essentially the same specification as used on the original pipeline. There are now two manufacturers in Australia, and each use new, more flexible side extrusion machines for the HDPE component which are more flexible, but the production rates are essentially the same as achieved on the GGT pipeline. The only difference is that the three layer coating system is now a mature system in Australia, and some of the concerns that existed with the coating system at the time are no longer of concern – the extent to which this influences the cost is not known.

It is probable that pipe joints would now be coated using a spray applied coating, rather than the epoxy heat shrink sleeves that were applied to the original pipeline. This would offer a lower cost of this item of possibly $0.5M

5.4 CONSTRUCTION TECHNOLOGY

There have been no significant changes in construction technology since 1995 that would make a step change in construction cost.

Recent pipelines have been manually welded, using essentially the same consumables and welding specification as used on the GGT pipeline.

Since construction of the GGT heavy, high powered "Rocksaw" machines have become readily available and would be applied to rock trench areas on the GGT. There was extensive rock along the pipeline route, and while there was considered to be a reasonable allowance in the project budget, there was still a significant claim for additional costs associated with rock (approximately $13M). It is probable that this cost could be reduced using rock saws, rather than excavators, rock hammers and blasting.

However "Rocksaws" have limitations, and are not cost effective when processing "hard" rock. In the absence of any direct knowledge of the extent to which a "Rocksaw" could provide a cost effective alternative to the machinery used in the construction, any change to this technology would simply be a guess.

As mentioned in the previous subsection, the joint coating system would probably be a spray applied system – this only changes the application of the coating – the preparation work prior to coating still relies on manual grit blasting, unchanged from that used on the original pipeline. The contribution from this technology will be small – however the technical performance of the coating will be improved.

5.5 COMPRESSION TECHNOLOGY

It is most unlikely that a new pipeline would adopt the reciprocating engine-reciprocating compressor equipment installed in the pipeline. It is possible that it could use reciprocating engine-centrifugal compressor packages to take advantage of a lower power derating during summer offered by the reciprocating engines.

However it is understood that the current pipeline performance would be adequate with Solar Saturn S20 gas turbine engines (the power rating of these units has been boosted since 1995), and since the mechanical simplicity of turbine engines offer considerable maintenance advantage compared with the more complex reciprocating machines, it is most probable that a new pipeline would use the turbine sets.

The estimates in this report are based on these units.

5.6 REGULATORY PROCESSES

Since 1995 the regulatory processes associated with a project of this type have strengthened, and the compliance cost is generally considered to have increased, adding to the project cost. These costs include:

- Environmental compliance (State and Federal)
- Cultural heritage
- Construction safety and training
- Additional technical compliance costs in Western Australia compared with other states

There has not been a definitive study on these matters that can be referenced for this report – however the pipeline industry considers that compliance cost is an increasing component of a pipeline construction project.

Recent pipelines constructed in Western Australia have reported considerable cost impact in complying with technical and safety requirements of the technical regulator. These costs have been direct (through increased work), and indirect (through schedule delays).

5.7 ENGINEERING DESIGN

Engineering design of pipelines has not changed significantly since 1995. Technological improvements (GIS, Databases, Drawing Aids etc) have delivered some productivity gains – but their existence has resulted in an increase in the effort applied to each problem, and the net change in technical input to producing the design documents has not changed much.

Since 1995 the Australian Standard (AS 2885) has required a detailed risk assessment of the pipeline and all facilities. This involves considerable additional effort to document the design, its risk assessment and risk treatment, which is undertaken on a metre by metre basis for the whole of the pipeline. Risk assessment processes are mandated for facility, station and control system design, things that did not exist in 1995.

5.8 PROJECT DELIVERY

Recent projects have moved away from the Engineering, Procurement and Construction Management (EPCM) approach that was used on the GGT pipeline. Three approaches have been used:

- An Owner's integrated team that delivers the EPCM component of the project using a combination of project hired staff and external consultants, but using traditionally engaged construction contractors (Duke Eastern Gas Pipeline and Tasmanian Gas Pipeline).
- A turn-key design, supply, construct, commission, handover approach through a contract entered into between the Owner and a construction contractor. This approach was adopted on the SEA Gas Pipeline, the Kambalda-Esperance Pipeline and the Telfer Pipeline. The purpose of this approach is to attempt to limit the project cost by requiring the construction contractor to accept the design, supply and construction risk. It has achieved varying degrees of success, but in each case has resulted in claims (and disputes) at project completion that after settlement has resulted in an increase in the original contract.
- A partnering approach, such as that used on the Enertrade pipeline to Townsville. This approach requires a commitment from the Owner to prequalify and select partners for all components of the project during the development phase, and for those partners to cooperate fully to integrate each aspect of the design, supply and construction with the objective of minimising risk. It includes risk sharing and management. This has been shown to increase the project cost through the effort to bring parties together and maintain the involvement and commitment throughout the project, but by managing risk and by enabling the team to quickly respond to a changing situation without fear of commercial penalty is considered to deliver lower completed project cost.

The potential for any of these approaches to deliver significant cost savings to a 2004 (or 1999) project has not been evaluated. It is probable that the construction management component of the EPCM project delivery method would be reduced by the turn-key and the partnering approaches, but the extent of any reduction requires detailed analysis, and analysis of the specific requirements of the Owner. It is also probable that the cost of associated with implementation by way of a partnering approach would be increased, because of the additional effort required through the integrated team, but through the partnering approach the cost of claims and claim settlement would be reduced.

While further analysis may show an advantage of one project delivery method over the others, this report considers that there is no material advantage offered by any of the approaches, to the extent that it would make a meaningful difference to the capital cost estimated in this study.

5.9 UNIT PROJECT COST

The pipeline industry traditionally uses a unit cost approach for quick comparison between projects. The unit cost is:

$$UnitCost = \frac{Capital\_Cost}{Outside\_Diameter * Length}$$

The capital cost may be the project cost or the construction cost. The unit cost is quickly distorted by inclusions or exclusions from the cost number, and by the number of facilities, diameter changes and the like. However it does provide a reasonable basis for a sense check of an estimated cost.

The unit cost of the 2004 estimate, excluding the capital charge and the compressor stations, and assuming a total length of 1424 km (1378+46), and assuming an "effective" diameter of 370 mm (length weighted diameter) is approximately $1162/mm diameter/km, or $1287/mm diameter/km including the compressor stations.

To put this in perspective:

- The recently constructed SEA Gas project has a reported project cost of $500M (SEA Gas web site). This pipeline has a higher pipe cost (higher pressure rating and thickness) than the GGT, and about 50% of its length consists of two DN 350 pipes in parallel. It has one (1) compressor station, two (2) inlet stations and four (4) delivery stations complete with metering, heating and pressure regulation equipment. Assuming that the effective diameter is 457mm and that the overall length is 680 km, the calculated unit cost is $1609/mm diameter/km. The "effective" diameter of the pipeline is calculated to be 584.1 mm, which gives a unit cost or $1259/mm km. (the "effective" diameter is the length weighted diameter of 680 km of DN350 pipe plus 340 km of DN450 pipe, applied to the total pipeline length of 680 km). It is presumed that the reported SEA Gas cost includes the financing cost through the project development and construction period.
- Discussion with a pipeline contractor suggests that the project cost for a DN 450 pipeline is around $1200/mm diameter/km, based on their internal data from a pipeline estimated recently. The appurtenances on this pipeline was not provided, but the cost basis did not include Owners cost.

5.10 CONSUMER PRICE INDEX

The consumer price index is sometimes used as a basis for escalating capital cost estimates. Because the bundle of indices that are used to makeup the CPI is more directed toward the consumer than to major industrial projects, it is not a good indicator of project price escalation. **Table 5-1** shows the published CPI at June 30 for the years in question.

Table 5-1 Consumer Price Index (source ABS)

Year (June 30)	Index	Change
1996	119.8	
1997	120.2	Base
1998	121.0	
1999 1999 (31/12)	122.3 124.1	 1.0324
2000	126.2	
2001	133.8	
2002	137.6	
2003	141.3	

2004	144.8	1.2047

Table 5-2 shows the effect of the change of the CPI on the actual cost, compared against the estimated cost.

Given that the change in actual costs of labour, construction equipment and materials for major remote area projects has significantly outstripped the change in the consumer index, it is not surprising that the CPI does not provide a reasonable estimate in the cost change.

Table 5-2 Consumer Price Index (source ABS)

Year (June 30)	Capital Cost	CPI Escalated Cost	Estimated Cost	Ratio
1997	452.3			
1999		467	535.5	1.147
2004	452.3+25.7	575.9	678.2	1.391

NOTE: While this estimate does not directly apply any CPI based escalation, it equally does not apply any correction to costs to account for any effect of the “GST spike” effect on the CPI that resulted from the introduction of GST

ATTACHMENT 1

COST ESTIMATE WORKSHEETS - 2004

TABLE A1 – COST CORRELATION – BUDGET CONTROL ESTIMATE COMPARED WITH ACTUAL CAPITAL COST

Modified Construction Cost Ex GGTJV	Post Commissioning Costs GGTJV	Total Costs Ex GGTJV	Items (GGTJV)	Orig 1995 Capex Estimate (No Contingencies)	Orig 1995 Contingency	Total Orig 1995 Capex	Variation (Orig Compared To As Builts)
322,587		322,587	Capital Project Work By AGL	0	0	0	-322,587
1,721,630	15,789	1,737,419	CP	1,603,366	144,848	1,748,214	10,795
1,161,798		1,161,798	Completion Of Construction	0	0	0	-1,161,798
30,527,011		30,527,011	Comp Stns - Yarraloola & Ilgarari	22,809,945	2,060,650	24,870,595	-5,656,416
	25,703,073	25,703,073	Comp Stns - Wiluna & Paraburdoo	0	0	0	-25,703,073
52,106		52,106	Design Review Worley	0	0	0	-52,106
6,621,894		6,621,894	E & I	5,110,933	461,722	5,572,655	-1,049,239
30,314,731		30,314,731	EPCM	23,680,528	2,139,299	25,819,827	-4,494,904
2,524,337		2,524,337	Feasibility Studies	2,644,561	238,910	2,883,471	359,134
251,688		251,688	Geotech Contract	251,688	22,737	274,425	22,737
14,878,971		14,878,971	GGT Project Team	6,338,200	572,593	6,910,793	-7,968,178
-680,892		-680,892	Govt Charges	5,952,120	537,715	6,489,434	7,170,326
295,506		295,506	Landowner's Compensation	852,000	76,970	928,970	633,464
111,678,921		111,678,921	Linepipe Supply & Coating	108,523,000	5,426,150	113,949,150	2,270,229
2,564,025		2,564,025	MLV's	2,656,200	239,961	2,896,161	332,136
6,526,365		6,526,365	Maintenance Bases (4 No)	8,011,000	723,714	8,734,714	2,208,349
42,049		42,049	Offtake Stns	111,300	10,055	121,355	79,306
557,043		557,043	Other Consultants	200,000	18,068	218,068	-338,975
699,753		699,753	Perth Operations Centre	962,300	86,934	1,049,234	349,481
219,938,288		219,938,288	Pipeline Construction	200,412,000	18,107,421	218,519,421	-1,418,867
4,990,368		4,990,368	Pipeline Operator	4,345,500	392,572	4,738,072	-252,296
2,798,054		2,798,054	Project Insurance	2,550,000	230,367	2,780,367	-17,687
1,641,594		1,641,594	Route Survey Contract	1,642,000	148,338	1,790,338	148,744
9,495,518	236,065	9,731,583	SCADA / Comms	6,912,000	624,473	7,536,473	-2,195,110
5,973,105		5,973,105	Scraper Stns	6,024,050	544,213	6,568,263	595,158
	100,077	100,077	Receipt Stns	0	0	0	-100,077
	1,769,380	1,769,380	Delivery Stns	0	0	0	-1,769,380
	2,142,034	2,142,034	Other Assets	0	0	0	-2,142,034
454,896,450	**29,966,418**	**484,862,868**		**411,592,691**	**32,807,710**	**444,400,000**	**-40,462,868**

TABLE A2 – ADJUSTED CAPITAL COST ESTIMATE (TO REFLECT AS-CONSTRUCTED COST AND QUANTITY)			
ITEMS	**Total Orig 1995 Capex (Incl. Contingency)**	**Revised 1995 Capex Estimate**	**ADJUSTMENTS & COMMENTS**
CP	1,748,214	1,748,214	Adopt 'As Built' Cost
Completion Of Construction	0	1,161,798	Adopt 'As Built' Cost
Comp Stns - Yarraloola & Ilgarari	24,870,595	27,657,595	Add For Extra Accom (0.37m), Larger Workshops ($0.62m), Smaller Foundations (-$0.12m); Extra Pipe Supports ($0.39m), Extra E & I ($0.81m); Increased Cost Of Concrete In Situ / M^3 ($0.287m); Larger Building Enclosures ($0.43m). Delete costs for pipe vibration.
Comp Stns - Wiluna & Paraburdoo			Stns Were Built Post 1995 - See Sheet 3
E & I (MLV's, Scraper & Offtake Stns)	5,572,655	5,572,655	Retain estimates – Construction inefficiencies identified
EPCM	25,819,827	30,314,731	Adopt 'As Built' Cost (As Evidence Of Many Extra Design Studies Undertaken)
Feasibility Studies	2,883,471	2,524,337	Adopt 'As Built' Cost
Geotech Contract	274,425	274,425	Retain estimate
GGT Project Team	6,910,793	8,900,000	Imported Management Team Unusual, Allow Extra $2m Only
Govt Charges	6,489,434	6,489,434	Cannot Reconcile GGTJV Cost - Leave As Original Cost
Landowner's Compensation	928,970	295,506	Adopt 'As Built' Cost
Linepipe Supply & Coating	113,949,150	111,678,921	Adopt 'As Built' Cost
MLV's	2,896,161	2,564,025	Adopt 'As Built' Cost
Maintenance Bases (4 No)	8,734,714	6,526,365	Adopt 'As Built' Cost
Offtake Stns	121,355	42,049	Unable To Reconcile Cost Differential - Hence Adopt 'As Built' Cost
Other Consultants	218,068	557,043	Adopt 'As Built' Cost As No Details Of Appointed Consultants Available
Perth Operations Centre	1,049,234	699,753	Adopt 'As Built' Cost
Pipeline Construction	218,519,421	220,432,360	Original Estimate Allowed $2.6m For Rock. Actual Was $15m So Add $12.4m. Add $1.2m For Unforseen R.O.W. Flooding. Apply Only 3% Contingency
Pipeline Operator	4,738,072	4,990,368	Adopt 'As Built' Cost
Project Insurance	2,780,367	2,780,367	Retain estimate
Route Survey Contract	1,790,338	1,641,594	Adopt 'As Built' Cost
SCADA / Comms	7,536,473	7,603,200	Unnecessary Design & Installation Problems Arose . Adopt Original Estimate but Allow 10% Contingency
Scraper Stns	6,568,263	5,973,105	Adopt 'As Built' Cost
Delivery Stns	0	1,450,000	Adopt 'As Built' Costs For Period 1997 - 1999 Only
Other' Assets	0	2,142,034	Adopt 'As Built' Cost (Details Unknown But Assume This Is A Real Cost)
TOTALS	444,400,000	454,019,879	

TABLE A3 – ESTIMATED CURRENT (Q3, 2004) CAPITAL (REPLACEMENT) COST OF GGT AND NEWMAN LATERAL PIPELINE (LICENCE PL 24)

Items	Revised 1995 Capex Estimate	Revised 1995 Capex Estimate (Breakdown Based On Orig GGT Estimates)				Escalated Capex as at 3rd Qtr 2004				Total Escalated Capex as at 3rd Qtr 2004
		Labour	Equipment & Materials	Const Plant	Indirects	Labour	Equipment & Materials	Const Plant	Indirects	
CP	1,748,214	549,070	1,146,664	52,480		845,568	1,582,396	80,294		2,508,259
Completion Of Construction	1,161,798				1,161,798				1,684,607	1,684,607
Comp Stns - Yarraloola & Ilgarari	27,657,595	2,922,943	22,565,724	2,168,928		4,501,332	31,140,699	3,318,460		38,960,491
Comp Stns - Wiluna & Paraburdoo						3,500,000	21,300,000	2,200,000		27,000,000
E & I	5,572,655	2,965,641	2,423,405	183,609		4,567,087	3,344,299	280,922		8,192,308
EPCM	30,314,731				30,314,731				43,956,360	43,956,360
Feasibility Studies	2,524,337				2,524,337				3,660,289	3,660,289
Geotech Contract	274,425				274,425				397,916	397,916
GGT Project Team	8,900,000				8,900,000				12,905,000	12,905,000
Govt Charges	6,489,434				6,489,434				9,409,679	9,409,679
Landowner's Compensation	295,506				295,506				428,484	428,484
Linepipe Supply & Coating	111,678,921		111,678,921				141,901,300			141,901,300
MLV's	2,564,025	948,026	1,380,236	235,763		1,459,960	1,904,726	360,717		3,725,403
Maintenance Bases (4 No)	6,526,365	931,950	5,472,000	122,415		1,435,203	7,551,360	187,295		9,173,858
Offtake Stns	42,049	9,068	27,454	5,527		13,965	37,887	8,456		60,308
Other Consultants	557,043				557,043				807,712	807,712
Perth Operations Centre	699,753	362,100	337,653			557,634	465,961			1,023,595
Pipeline Construction	220,432,360	82,699,544	24,776,616	112,956,200		127,357,298	34,191,730	172,822,986		334,372,014
Pipeline Operator	4,990,368				4,990,368				7,236,034	7,236,034
Project Insurance	2,780,367				2,780,367				4,031,532	4,031,532
Route Survey Contract	1,641,594				1,641,594				2,380,311	2,380,311
SCADA / Comms	7,603,200	487,214	7,087,000	28,986		750,310	9,780,060	44,349		10,574,718
Scraper Stns	5,973,105	1,169,300	3,840,681	963,124		1,800,722	5,300,140	1,473,580		8,574,442
Delivery Stns	1,450,000	346,134	836,306	267,560		533,046	1,154,102	409,367		2,096,515
'Other' Assets	2,142,034				2,142,034				3,105,949	3,105,949
TOTALS	**454,019,879**					**147,322,125**	**259,654,660**	**181,186,426**	**90,003,874**	**678,167,084**

ATTACHMENT 2

COST ESTIMATE WORKSHEETS – 1999

TABLE A4 – ADJUSTED CAPITAL COST ESTIMATE (TO REFLECT AS-CONSTRUCTED COST AND QUANTITY)			
ITEMS	**Total Orig 1995 Capex (Incl. Contingency)**	**Revised 1995 Capex Estimate**	**ADJUSTMENTS & COMMENTS**
CP	1,748,214	1,748,214	Adopt 'As Built' Cost
Completion Of Construction	0	1,161,798	Adopt 'As Built' Cost
Comp Stns - Yarraloola & Ilgarari	24,870,595	27,657,595	Add For Extra Accom (0.37m), Larger Workshops ($0.62m), Smaller Foundations (-$0.12m); Extra Pipe Supports ($0.39m), Extra E & I ($0.81m); Increased Cost Of Concrete In Situ / M^3 ($0.287m); Larger Building Enclosures ($0.43m). Delete costs for pipe vibration.
Comp Stns - Wiluna & Paraburdoo			Stns Were Built Post 1995 - See Sheet 3
E & I (MLV's, Scraper & Offtake Stns)	5,572,655	5,572,655	Retain estimates – Construction inefficiencies identified
EPCM	25,819,827	30,314,731	Adopt 'As Built' Cost (As Evidence Of Many Extra Design Studies Undertaken)
Feasibility Studies	2,883,471	2,524,337	Adopt 'As Built' Cost
Geotech Contract	274,425	274,425	Retain estimate
GGT Project Team	6,910,793	8,900,000	Imported Management Team Unusual, Allow Extra $2m Only
Govt Charges	6,489,434	6,489,434	Cannot Reconcile GGTJV Cost - Leave As Original Cost
Landowner's Compensation	928,970	295,506	Adopt 'As Built' Cost
Linepipe Supply & Coating	113,949,150	111,678,921	Adopt 'As Built' Cost
MLV's	2,896,161	2,564,025	Adopt 'As Built' Cost
Maintenance Bases (4 No)	8,734,714	6,526,365	Adopt 'As Built' Cost
Offtake Stns	121,355	42,049	Unable To Reconcile Cost Differential - Hence Adopt 'As Built' Cost
Other Consultants	218,068	557,043	Adopt 'As Built' Cost As No Details Of Appointed Consultants Available
Perth Operations Centre	1,049,234	699,753	Adopt 'As Built' Cost
Pipeline Construction	218,519,421	220,432,360	Original Estimate Allowed $2.6m For Rock. Actual Was $15m So Add $12.4m. Add $1.2m For Unforseen R.O.W. Flooding. Apply Only 3% Contingency
Pipeline Operator	4,738,072	4,990,368	Adopt 'As Built' Cost
Project Insurance	2,780,367	2,780,367	Retain estimate
Route Survey Contract	1,790,338	1,641,594	Adopt 'As Built' Cost
SCADA / Comms	7,536,473	7,603,200	Unnecessary Design & Installation Problems Arose . Adopt Original Estimate but Allow 10% Contingency
Scraper Stns	6,568,263	5,973,105	Adopt 'As Built' Cost
Delivery Stns	0	1,450,000	Adopt 'As Built' Costs For Period 1997 - 1999 Only
Other' Assets	0	436,000	Adopt 'As Built' Cost for the period 1997-1999 Only
TOTALS	444,400,000	452,313,845	

TABLE A5 – ESTIMATED AT DECEMBER 1999 CAPITAL (REPLACEMENT) COST OF GGT AND NEWMAN LATERAL PIPELINE (LICENCE PL 24)

Items	Revised 1995 Capex Estimate	Revised 1995 Capex Estimate (Breakdown Based On Orig GGT Estimates)				Escalated Capex As At Dec 1999				Total Escalated Capex As At Dec 1999
		Labour	Equipment & Materials	Const Plant	Indirects	Labour	Equipment & Materials	Const Plant	Indirects	
CP	1,748,214	549,070	1,146,664	52,480		669,865	1,318,664	62,451		2,050,980
Completion Of Construction	1,161,798				1,161,798				1,394,158	1,394,158
Comp Stns - Yarraloola & Ilgarari	27,657,595	2,922,943	22,565,724	2,168,928		3,565,990	25,950,583	2,581,024		32,097,597
E & I	5,572,655	2,965,641	2,423,405	183,609		3,618,082	2,786,916	218,495		6,623,492
Epcm	30,314,731				30,314,731				36,377,677	36,377,677
Feasibility Studies	2,524,337				2,524,337				3,029,204	3,029,204
Geotech Contract	274,425				274,425				329,310	329,310
GGT Project Team	8,900,000				8,900,000				10,680,000	10,680,000
Govt Charges	6,489,434				6,489,434				7,787,321	7,787,321
Landowner's Compensation	295,506				295,506				354,607	354,607
Linepipe Supply & Coating	111,678,921		111,678,921				129,547,548			129,547,548
MLV's	2,564,025	948,026	1,380,236	235,763		1,156,592	1,587,271	280,558		3,024,421
Maintenance Bases (4 No)	6,526,365	931,950	5,472,000	122,415		1,136,979	6,292,800	145,674		7,575,453
Offtake Stns	42,049	9,068	27,454	5,527		11,063	31,572	6,577		49,212
Other Consultants	557,043				557,043				668,452	668,452
Perth Operations Centre	699,753	362,100	337,653			441,762	388,301			830,063
Pipeline Construction	220,432,360	82,699,544	24,776,616	112,956,200		100,893,444	28,493,108	134,417,878		263,804,430
Pipeline Operator	4,990,368				4,990,368				5,988,442	5,988,442
Project Insurance	2,780,367				2,780,367				3,336,440	3,336,440
Route Survey Contract	1,641,594				1,641,594				1,969,913	1,969,913
SCADA / Comms	7,603,200	487,214	7,087,000	28,986		594,401	8,150,050	34,493		8,778,944
Scraper Stns	5,973,105	1,169,300	3,840,681	963,124		1,426,546	4,416,783	1,146,118		6,989,447
Delivery Stns	1,450,000	346,134	836,306	267,560		422,283	961,752	318,396		1,702,432
'Other' Assets	436,000				436,000				523,200	523,200
Totals	452,313,845					113,937,008	209,925,348	139,211,664	72,438,724	**535,512,744**