
BR-NGTL-001

Issue:

Introduction and Executive Summary

Section:

Section 1.2, p. 2 of 3, Lines 16 and 17

Reference:

Rate Design

Preamble:

NGTL understands that most of its customers do not desire change to the rate design at this time.

Request:

Have any customers requested changes to the rate design? If so, please identify and explain the recommended changes.

Response:

ATCO Gas, ATCO Pipelines, and the North Core Group have expressed concerns relative to the current rate design both in the discussions leading to the 2003 Tariff Settlement and through their submissions in the 2003 Tariff Application proceeding.

The North Core Group has made specific requests of NGTL to make changes to its methodology for allocating fuel between receipt and delivery contracts. No other customer has requested any specific changes.

NGTL continues to have regular discussions with the Parties to the 2003 Tariff Settlement. Discussions are also ongoing with stakeholders that participated in the settlement process and did not execute the Settlement Agreement but also did not object to the settlement. NGTL has not received any requests or indications from any of these parties of their desire to terminate or modify the terms of the settlement.

BR-NGTL-002

Issue:

FT-P Service

Section:

Section 2.2, p. 6 of 55, lines 15-16

Reference:

Rate Design

Preamble:

FT-P provides an intra-Alberta transportation service for customers with a rate that reflects the costs required to provide the service and the attributes associated with it.

Request:

How does NGTL measure the costs associated with FT-P service?

Response:

NGTL does not directly measure the costs associated with FT-P or any other service. The FT-P rate is designed to reflect the system average costs associated with providing the FT-P service. Specifically, each FT-P contract includes a transmission cost component that varies based on the distance contracted and a metering cost component for both the receipt and delivery station required for measurement.

BR-NGTL-003(a)

Issue:

FT-A Rate Accountability

Section:

Section 2.2, p. 7 of 55, lines 4-11

Reference:

Rate Design

Preamble:

FT-A does not have a transmission component associated with its rate because less than two percent of the total transmission costs are associated only with intra-Alberta deliveries. Transmission costs for shared facilities are included in the FT-R rate. The FT-R rate is one of the costs that parties incur in providing gas and is recovered indirectly through the price of gas when the gas is sold.

The change in the Minimum Annual Volume (MAV) and the introduction of the Extension Annual Volume (EAV) increased customer cost accountability for intra-Alberta deliveries.

Request:

How does NGTL define shared and dedicated facilities?

Response:

For rate design purposes, shared facilities are defined as those facilities that were designed to transport gas from all receipt stations to the major border stations. These are the facilities that NGTL includes in its pricing algorithm to develop the station paths. They are designated shared facilities because they are required in order to provide the combined receipt and delivery service required to transport the majority of the gas moved on the Alberta System. Dedicated facilities are the remaining facilities. These facilities are not specifically accounted for in NGTL's pricing algorithm, as they are not used to

BR-NGTL-003(a)

provide service from the receipt points to the major delivery points. These facilities are used for:

- transporting gas into and out of storage and extraction facilities;
- transporting gas to intra-Alberta and minor export delivery stations.

In order to transport gas to intra-Alberta markets the gas must also be metered onto the system, transported through the system and metered from the system. By design the costs for transmission are included in the receipt rate (as well as the receipt metering cost) and the costs associated with the delivery metering are included in FT-A rate. Thus in this reference “shared facilities” refers to the transmission facilities that have been designed to transport gas from the receipt stations to the export delivery stations that are also used to transport gas from the receipt stations to the intra-Alberta delivery stations.

Utilization of an integrated system will change over time. Facilities which may be dedicated to only one service type at one point may be utilized as a shared facility by the aggregate system at another time, and vice versa.

BR-NGTL-003(b)

Issue:

FT-A Rate Accountability

Section:

Section 2.2, p. 7 of 55, lines 4-11

Reference:

Rate Design

Preamble:

FT-A does not have a transmission component associated with its rate because less than two percent of the total transmission costs are associated only with intra-Alberta deliveries. Transmission costs for shared facilities are included in the FT-R rate. The FT-R rate is one of the costs that parties incur in providing gas and is recovered indirectly through the price of gas when the gas is sold.

The change in the Minimum Annual Volume (MAV) and the introduction of the Extension Annual Volume (EAV) increased customer cost accountability for intra-Alberta deliveries.

Request:

Please explain how the MAV or EAV ensures that any incremental revenue is contributed towards NGTL's total system revenue requirement.

Response:

The MAV and EAV each establish a threshold volume of gas to be delivered at the delivery point. If the threshold volume is not delivered, the customer will be required to pay a direct charge. The volume of gas that is delivered generates direct incremental delivery revenue, e.g., FT-A or FT-P revenue, which is applied against the total system revenue requirement as illustrated in the Application, Section 5.0, page 2 of 32, Figure

BR-NGTL-003(b)

5.1-1 “2004 Rate Calculation,” fifth box from the top labeled “Other Transportation Revenue.”

If either of MAV or EAV is not met on an annual basis, e.g., the direct and indirect revenue associated with the facilities is insufficient, NGTL will levy a direct charge, e.g., the FCS Charge, to the FCS customer. FCS Charges, which result from the MAV and EAV requirements, are applied against the total system revenue requirement, prior to the calculation of FT-R and FT-D rates, as illustrated in the Application, Section 5.0, page 2 of 32, Figure 5.1-1 “2004 Rate Calculation,” second box from the top.

NGTL provided in Figure 5.1-1 estimates for the 2004 intra-Alberta delivery transportation service revenue which is directly associated with intra-Alberta service. NGTL provided in sections 2.6 and 2.7 the results of its analysis with respect to intra-Alberta delivery pipes costs and intra-Alberta metering costs, broken out to direct and indirect costs, based on the 2002 Cost of Service Study. The following table summarizes and reconciles such revenues to such costs. The direct revenue from FCS Charges, FT-A service and the delivery metering component of the FT-P service provide a total of \$13.6 million which accounts for the direct metering costs of \$11.9 million. Total direct revenue of \$33.1 million exceeds total costs of \$23.1 million, which contributes incremental revenue of \$10.0 million towards NGTL’s total system revenue requirement. In addition to the direct revenue, \$64.6 million of receipt revenue is associated with these deliveries.

(\$ millions; numbers may not add due to rounding)

Intra-Alberta Service	Direct	Indirect	Total
Cost of Service Analysis:			
Pipe	1.7	1.0	2.6
Metering	11.9	8.5	20.5
TOTAL COSTS:	13.6	9.5	\$23.1
2004 Forecast Revenue:			
FCS Charges ¹	5.0	-	5.0
FT-A	6.4	-	6.4
FT-P ²	21.7	-	21.7
TOTAL REVENUE: ³	33.1	-	\$33.1

1. Total FCS Charges are estimated to be \$5.4 million, of which \$5.0 million is associated with intra-Alberta delivery points.
2. FT-P service direct revenue is based on 100% of the FT-P rate which includes a component for the receipt metering costs and the delivery metering costs, each of which are \$2.2 million.
3. Total Revenue does not include the indirect receipt revenue attributed to the FT-A delivery volumes of 0.957 Bcf/d multiplied by the average firm receipt rate of 18.5¢/Mcf = \$64.6 million.

BR-NGTL-003(c)

Issue:

FT-A Rate Accountability

Section:

Section 2.2, p. 7 of 55, lines 4-11

Reference:

Rate Design

Preamble:

FT-A does not have a transmission component associated with its rate because less than two percent of the total transmission costs are associated only with intra-Alberta deliveries. Transmission costs for shared facilities are included in the FT-R rate. The FT-R rate is one of the costs that parties incur in providing gas and is recovered indirectly through the price of gas when the gas is sold.

The change in the Minimum Annual Volume (MAV) and the introduction of the Extension Annual Volume (EAV) increased customer cost accountability for intra-Alberta deliveries.

Request:

Are the MAV and EAV designed to ensure that the annual cost of delivery service is fully recovered by throughput of gas to delivery points. How does NGTL determine that these receipt revenues are incremental and directly linked to specific delivery points?

Response:

No. MAV is designed to ensure that the annual costs of providing the metering associated with delivery service are accounted for via the revenues associated with the throughput of gas to the delivery point. EAV is designed to be consistent with customer commitments for receipt extension facilities, which have a three-year secondary term and a minimum volume requirement of 100 MMcf/d. If the throughput of gas does not satisfy either the MAV or EAV, a direct FCS Charge is levied.

BR-NGTL-003(c)

As to the volume of gas that is delivered, it represents direct incremental revenue through the delivery tolls or retained revenues via the retained delivery load. The receipt revenue is indirectly determined and represents incremental or retained receipt revenue.

Both the incremental and/or retained delivery revenue and the incremental and/or retained receipt revenue benefits the NGTL System through reduced firm transportation tolls as compared to not obtaining the incremental volumes and/or not retaining the load.

BR-NGTL-004

Issue:

Evolution of NGTL system and Rates

Section:

2.3, p. 10/11 of 55, lines 25- 4

Reference:

Rate Design

Preamble:

Rates for receipt service (FT-R) are set to recover the metering costs to receive gas on the system and the transmission costs associated with the facilities that were designed to transport gas from the particular receipt point. The transmission component of the rates is determined in accordance with the distance-diameter pricing methodology approved by the Board in Decision 2000-6.

Request:

Please provide a quantitative and qualitative assessment of the inception and growth of the intra-Alberta delivery volumes versus total volumes of gas transported on the system.

Response:

As evidenced in the table below, intra-Alberta delivery volumes increased during the period from 1990 – 1996. The total growth during this period was 49 Bcf. From 1997 to 2002 the trend reversed and intra-Alberta volumes decreased by a total of 159 Bcf. This decrease in intra-Alberta volumes is mainly due to reduced deliveries to ATCO Pipelines, coincidental with an increase in receipts directly connected to the ATCO system in this timeframe. Growth in intra-Alberta deliveries is evidenced again starting in 2003 and deliveries are forecast to grow further in 2004. This new growth in the intra-Alberta market is attributable to increased activity in oil sands and heavy oil production.

BR-NGTL-004

Total system deliveries increased in the period from 1990 to 1999. The increase from the period 1990 – 1996 was 1,494 Bcf of which 49 Bcf was attributable to the increase in intra-Alberta deliveries. The remaining increase during this period of 1,445 Bcf was attributable to increased demand for gas at the Border points. The total system growth for the period was attributable to a combination of growing supply in the WCSB, increased downstream market demand, and capacity additions. The increase to total system deliveries during the period from 1990 – 1999 was 1,661 Bcf.

With the exception of 2002, total system deliveries have been decreasing since 2000. Border deliveries, in particular, have been decreasing since 1999. The decrease in border deliveries of 855 Bcf was attributed to flow drops at the Border points. The decrease in total system deliveries from 2000 – 2004 is 636 Bcf. This decrease in total system deliveries was primarily due to the start-up of competitor pipelines in the basin that export natural gas to markets outside of Alberta.

Annual System Volumes (Bcf) ¹

	1990	1991	1992	1993	1994	1995	1996	
Border	2289	2436	2859	3135	3387	3598	3735	
Intra-Alberta	585	600	578	605	600	601	634	
Total System	2874	3036	3437	3740	3987	4199	4368	
Intra-Alberta % of								
Total System	20%	20%	17%	16%	15%	14%	15%	
	1997	1998	1999	2000	2001	2002	2003	2004
Border	3822	3961	4054	3976	3636	3672	3344	3199
Intra-Alberta	595	529	481	514	423	475	539	655
Total System	4416	4490	4535	4490	4059	4146	3883	3854
Intra-Alberta % of								
Total System	13%	12%	11%	11%	10%	11%	14%	17%

1. Volumes are net of fuel

2. Forecasted volumes.

Totals may not add due to rounding.

BR-NGTL-005(a)

Issue:

Cost Accountability and Rate Design

Section:

2.3, p. 15 of 55, lines 15-25

Reference:

Rate Design

Preamble:

The rates are developed such that the transmission related component of the average receipt rate is set equal to the transmission related component of the export delivery rate. This is accomplished by allocating all transmission related costs between receipt and export delivery services based on contract demand quantities. This approach is consistent with all rate design changes implemented since 1980 and is still appropriate as approximately 85% of the volume of gas received and transported on the Alberta System is destined for export markets.

Intra-Alberta delivery service does not have a transmission component associated with its rate because less than two percent of the total transmission costs are associated only with intra-Alberta deliveries. Transmission costs for shared facilities are included in the FT-R rate.

Request:

Please explain in more detail how the proposed rates are appropriate in comparison to the 85% to 15% export to intra-Alberta transported gas volume ratio.

Response:

As per the February 2004 Update, NGTL has corrected its Phase 2 evidence to reflect transmission costs associated only with intra-Alberta deliveries as 0.2% and not 2%.

BR-NGTL-005(a)

NGTL is not relating the appropriateness of the rates for gas destined to export or intra-Alberta markets with the volume of gas delivered to export or intra-Alberta markets. The rates are designed to reflect the cost of providing service to either export or intra-Alberta markets irrespective of the percentage of gas delivered ex-Alberta or intra-Alberta.

NGTL was using the reference to the volume to explain why it is still appropriate to use the historical approach to rate design. As a significant majority (85%) of the gas transported on the Alberta System is destined for export markets, NGTL believes it is still appropriate that the main methodology in its rate design addresses this component of its service offerings. This methodology is to set the transmission-related component of the average receipt rate equal to the transmission-related component of the export delivery rate.

The overall rate design is also appropriate for the remaining 15% of gas that is destined for intra-Alberta. The DOH study provides analysis showing that on average volumes transported within Alberta travel approximately half the distance of volumes traveling ex-Alberta. This supports the rate design methodology that has the transmission cost component of service for intra-Alberta volumes (FT-R & FT-A) set at approximately one-half the transmission cost component of service for ex-Alberta volumes (FT-R & FT-D).

BR-NGTL-005(b)

Issue:

Cost Accountability and Rate Design

Section:

2.3, p. 15 of 55, lines 15-25

Reference:

Rate Design

Preamble:

The rates are developed such that the transmission related component of the average receipt rate is set equal to the transmission related component of the export delivery rate. This is accomplished by allocating all transmission related costs between receipt and export delivery services based on contract demand quantities. This approach is consistent with all rate design changes implemented since 1980 and is still appropriate as approximately 85% of the volume of gas received and transported on the Alberta System is destined for export markets.

Intra-Alberta delivery service does not have a transmission component associated with its rate because less than two percent of the total transmission costs are associated only with intra-Alberta deliveries. Transmission costs for shared facilities are included in the FT-R rate.

Request:

Please indicate why the FT-A rate does not include approximately 2% of the transmission costs that are associated only with intra-Alberta deliveries, plus any shared facilities that are incorporated into the FT-R rate.

Response:

As per the February 2004 Update, NGTL has corrected its Phase 2 evidence to reflect transmission costs associated only with intra-Alberta deliveries as 0.2% and not 2%.

BR-NGTL-005(b)

The Alberta System is integrated on physical, commercial and operational levels. This degree of integration gives rise to the rolled-in treatment of the Alberta System's owning and operating costs for the purpose of determining the total revenue requirement. Rates for the various transportation services are calculated by applying various cost allocation methodologies to the total revenue requirement. In the current methodology the costs associated with transmission to intra-Alberta markets are accounted for in the FT-R rate. This is because the transmission component of the FT-R rate is designed to recover one-half of the transmission costs related to deliveries to export markets and the majority of the transmission costs related to intra-Alberta markets.

In addition, the FT-A rate does not reflect the 0.2% of costs associated only with intra-Alberta deliveries as the majority (83%) of these costs are already accounted for via FCS contracts and recovered from FCS, FT-R, FT-P, FT-D charges. These costs are not sufficiently material in relation to NGTL's total cost of service to warrant transferring the accountability from the FCS service to the FT-A service.

In order to deliver gas to an intra-Alberta market via FT-A service, it must have been received onto the system via FT-R service. If the shared facility costs were also accounted for in the FT-A rate then an intra-Alberta delivery customer would be accountable for the shared facility costs once via the FT-R rate and then again via the FT-A rate.

BR-NGTL-006(a)

Issue:

Cost Causation and Accountability

Section:

2.3, P. 19 of 55, lines 6-9

Reference:

Rate Design

Preamble:

The FT-A rate is a reasonable method for collecting the cost of facilities related to intra-Alberta deliveries and is more reflective of cost causation principles than the previous methodology that set the FT-A rate to zero.

Request:

Please provide an estimate of the FT-A rate that would be 100% cost accountable of intra-Alberta delivery costs, allocating all costs from functional areas- compression, transmission, and metering of the intra-Alberta market. Please explain whether the FT-A rate falls within 5% of unity of the revenue to cost ratio.

Response:

The 100% cost accountable FT-A rate would be 2.3 cents/Mcf. This rate would fall outside the 5% of unity of the revenue to cost ratio. The unity of the revenue to cost ratio for FT-A should not be considered on a stand alone basis but needs to be considered in conjunction with FCS and FT-R. Please refer to the response to AUMA/EDM/PICA-NGTL-004 for the detailed analysis.

BR-NGTL-006(b)

Issue:

Cost Causation and Accountability

Section:

2.3, P. 19 of 55, lines 6-9

Reference:

Rate Design

Preamble:

The FT-A rate is a reasonable method for collecting the cost of facilities related to intra-Alberta deliveries and is more reflective of cost causation principles than the previous methodology that set the FT-A rate to zero.

Request:

How does the current FT-A rate of approximately 1.8 cents/mcf reflect accountability for all costs related to delivery customers?

Response:

The FT-A rate is not meant to account for all costs related to delivery customers; the combined direct revenue from FT-A service, FT-P service and FCS Charges and the indirect revenue from receipt service provide cost recovery for intra-Alberta delivery service. Please also refer to the responses to BR-NGTL-003(b) and BR-NGTL-003(c).

BR-NGTL-006(c)

Issue:

Cost Causation and Accountability

Section:

2.3, P. 19 of 55, lines 6-9

Reference:

Rate Design

Preamble:

The FT-A rate is a reasonable method for collecting the cost of facilities related to intra-Alberta deliveries and is more reflective of cost causation principles than the previous methodology that set the FT-A rate to zero.

Request:

Please explain any effects of incorporating the transmission related costs for gas delivered to the intra-Alberta market indirectly through the FT-R rate via the gas price versus applying costs directly within the FT-A toll.

Response:

Please refer to the response to BR-NGTL-005(b).

BR-NGTL-007

Issue:

IT-S and FT-X

Section:

Section 2.4, p. 11 of 55, lines 17-19

Reference:

Rate Design

Preamble:

The rates for Firm Transportation – Extraction (FT-X) and Interruptible- Access to Storage (IT-S) are set at zero. NGTL recovers the costs associated with these services through the rates for receipt, export delivery, and FT-P services.

Request:

Please identify the costs associated with IT-S and FT-X service.

Response:

The requested information is provided in Attachment BR-NGTL-007.

2002, All figures in \$ million

<u>Cost item</u>	<u>Metering</u>		<u>Transmission</u>		<u>Total</u>	
	<u>Extraction</u>	<u>Storage</u>	<u>Extraction</u>	<u>Storage</u>	<u>Extraction</u>	<u>Storage</u>
<u>Direct Costs</u>						
Operating Return	0.1	1.3	0.8	3.7	1.0	5.0
Depreciation	0.1	0.5	0.4	1.5	0.5	2.0
Municipal Tax	0.0	0.0	0.0	0.4	0.0	0.4
Income Tax	0.1	0.5	0.3	1.4	0.4	1.8
TBO	-	-	0.0	0.0	0.0	0.0
Maintenance	<u>0.2</u>	<u>0.3</u>	<u>0.0</u>	<u>0.1</u>	<u>0.2</u>	<u>0.4</u>
<i>Subtotal Direct Costs</i>	<u>0.5</u>	<u>2.7</u>	<u>1.6</u>	<u>7.0</u>	<u>2.1</u>	<u>9.6</u>
<u>Indirect Costs</u>						
General Operating Assets	0.0	0.0	0.0	0.0	0.0	0.0
Calgary Offices	0.0	0.0	0.0	0.0	0.0	0.0
Field/Service Centers, Vehicles	0.0	0.1	0.0	0.1	0.1	0.2
Patrol	-	-	0.0	0.0	0.0	0.0
Information Technology	0.1	0.2	0.0	0.1	0.1	0.3
Cash Working Capital	0.0	0.0	0.0	0.1	0.0	0.1
Material & Supplies Inventory	0.0	0.0	0.0	0.0	0.0	0.0
Linepack Gas	-	-	0.0	0.0	0.0	0.0
Unamortized Debt Issue Costs	0.0	0.0	0.0	0.0	0.0	0.0
Information Technology	0.1	0.1	0.0	0.1	0.1	0.2
Customer Service	0.1	0.1	0.0	0.0	0.1	0.1
Other Departments	0.0	0.0	0.0	0.1	0.0	0.1
General Expenses	0.0	0.0	0.0	0.2	0.0	0.3
Other Expenses	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
<i>Subtotal Indirect Costs</i>	<u>0.4</u>	<u>0.7</u>	<u>0.1</u>	<u>0.7</u>	<u>0.4</u>	<u>1.4</u>
Allocated compression costs	<u>-</u>	<u>-</u>	<u>0.4</u>	<u>1.9</u>	<u>0.8</u>	<u>2.8</u>
Grand Total	<u>0.9</u>	<u>3.4</u>	<u>2.1</u>	<u>9.6</u>	<u>3.3</u>	<u>13.9</u>

Notes:

Allocated amounts less than \$100,000 appear as 0.0 due to rounding.

Metering costs are from tables in Section 2.7 of NGTL's Phase 2 Evidence, as updated in February 2004.

Transmission costs are from tables in Section 2.6 of NGTL's Phase 2 Evidence.

BR-NGTL-008

Issue:

Benefits of Economies of Scale

Section:

Section 2.4, p. 22 of 55, lines 22-24

Reference:

Rate Design

Preamble:

NGTL has continued its practice of rolling-in the costs of new facilities. All customers benefit from the economies of scale and all customers are responsible for the aggregate costs.

Request:

Please give an example of how all customers benefit from the economies of scale.

Response:

Customers benefit from the fact that the large export volumes transported on the Alberta System have allowed NGTL to utilize a significant proportion of large diameter pipe. The unit cost associated with large diameter pipe is exponentially lower than for smaller diameter pipe. Therefore, as a result of NGTL's rolling-in of the costs of all facilities, individual customers who on a stand-alone basis would not have sufficient volumes to utilize or justify a large diameter pipe receive the benefits of lower unit costs than would otherwise be the case.

BR-NGTL-009(a)

Issue:

Clarification

Section:

Section 2.4, p. 23 of 55, lines 9-11

Reference:

Rate Design

Preamble:

As the Alberta System rate design has moved in the direction of greater cost accountability, uneconomic border bypass has been discouraged and the unnecessary proliferation of facilities have been avoided.

Request:

Please explain what NGTL means by “uneconomic border bypass”.

Response:

NGTL is referring to the construction of additional facilities that would bypass NGTL’s current system at border delivery points, where volumes transported on such facilities would offload the Alberta System on an ongoing basis. NGTL terms such bypass “uneconomic” in the sense that additional infrastructure costs are incurred to benefit a particular shipper or group of shippers at the expense of the remaining shippers on the Alberta System, i.e., total costs are greater.

BR-NGTL-009(b)

Issue:

Clarification

Section:

Section 2.4, p. 23 of 55, lines 9-11

Reference:

Rate Design

Preamble:

As the Alberta System rate design has moved in the direction of greater cost accountability, uneconomic border bypass has been discouraged and the unnecessary proliferation of facilities have been avoided.

Request:

Please explain what NGTL means by “unnecessary proliferation”. Please explain NGTL’s viewpoint on proliferation, especially as it relates to the existence of competitive pipeline alternatives.

Response:

NGTL uses the term “unnecessary proliferation” to refer to the construction of duplicative pipeline facilities rather than utilization of existing infrastructure. In most instances, offloading one pipeline system to support duplicative facilities will incrementally increase the overall transportation cost of natural gas produced in the province. Since the costs of the offloaded system will be recovered from less remaining throughput on that system, duplicative pipelines serving the same supply source will result in higher overall transportation costs for the Alberta gas industry.

Despite the negative cost implications, duplicate facilities have been approved and constructed in Alberta and have resulted in the long-term offloading of the Alberta System (e.g., Alliance Pipeline, AEC North and South Suffield Pipelines, ATCO dual

BR-NGTL-009(b)

connections). The result has been higher tolls for Alberta System shippers, increased business risk for NGTL and reduced ability for NGTL to maintain and attract market share. Supporters of these duplicate facilities have argued that the benefits of competition and customer choice outweigh the additional overall costs.

Clearly stakeholders, including regulators, have indicated that, in some instances, duplication of facilities is acceptable or even desirable. NGTL should have the ability to compete on a level playing field to attract and maintain volumes on its system.

BR-NGTL-010(a)

Issue:

Appropriateness of NGTL's rate design

Section:

2.4, p. 21 of 55. Lines 8, 14-15. p 22 of 55, lines 2-4.

Reference:

Rate Design

Preamble:

Rates must be just and reasonable and not constitute undue discrimination. To be efficient the rate design should establish proper price signals for the various services offered. Revenue sufficiency and stability refers to the requirement that the rates provide adequate revenues to meet all necessary costs and provide a fair return to investors, while maintaining appropriate service and safety levels.

Request:

Please indicate how NGTL's rate design provides proper price signals for NGTL customers.

Response:

The Alberta System is an integrated system thereby making it difficult, if not impossible, to determine the actual costs of providing particular services. However, NGTL believes that the use of its cost allocation methodologies produces rates that adequately reflect the cost of providing services and therefore send appropriate price signals to shippers.

NGTL's rate design provides proper price signals in two ways: by establishing rates for services that reflect the costs incurred to provide the service and the terms and conditions associated with the service; and by requiring customers to commit to terms and conditions of service that ensure accountability for the costs of constructing facilities.

BR-NGTL-010(a)

NGTL's receipt point specific (FT-R) rates account for the significant cost factors of pipeline diameter and distance as a proxy for the specific cost of providing the service.

The splitting of transmission cost between FT-R and FT-D such that the transmission component of the FT-D rate equals the transmission component of the average FT-R rate signals that on average both services are equally required to transport gas destined for export markets.

Similarly the transmission component of the combination of the FT-R and FT-A rates that on average, equals one half of the transmission component of the combination of the FT-R and FT-D rates signals that on average the cost to move gas to intra markets is one half the cost to move gas to export markets.

The FT-A rate reflects the majority of the direct costs associated with intra-Alberta delivery, which, by design, are the metering costs (by design, the transmission component of the costs are accounted for in the FT-R rate). This provides the proper price signal for the stand-alone FT-A service and the combination of FT-R and FT-A service.

The FT-P rates account for the significant cost factors of pipeline diameter and distance as a proxy for the specific cost of service. This is an alternative service for delivering gas to intra-Alberta markets via the combination of FT-R and FT-A service. For deliveries of the same distance the FT-P rate equals the combined FT-R and FT-A rate. For longer distances the FT-P rate is higher signaling a greater cost and for shorter distances the FT-P rate is lower signaling a lesser cost.

The rates for IT-R, FT-RN, STFT and IT-D all contain a premium reflecting the different service attribute available for these services as compared to the service (FT-R or FT-D) their rate is based on.

The MAV commitments associated with FCS for intra-Alberta delivery facilities, the primary term calculation for FT-R and FT-P service associated with incremental receipt facilities, the ten-year minimum contract term for FT-D associated with incremental export facilities and the secondary term for receipt extensions and the EAV commitment for intra-Alberta delivery extensions ensure that shippers are accountable for the costs of constructing new facilities. This provides shippers with sufficient pricing information to determine whether or not to request incremental facilities.

BR-NGTL-010(b)

Issue:

Appropriateness of NGTL's rate design

Section:

2.4, p. 21 of 55. Lines 8, 14-15. p 22 of 55, lines 2-4.

Reference:

Rate Design

Preamble:

Rates must be just and reasonable and not constitute undue discrimination. To be efficient the rate design should establish proper price signals for the various services offered. Revenue sufficiency and stability refers to the requirement that the rates provide adequate revenues to meet all necessary costs and provide a fair return to investors, while maintaining appropriate service and safety levels.

Request:

Please indicate whether customers on the Ventures Oilsands Pipeline pay an FT-A rate.

Response:

All customers that contract with NGTL for delivery of gas within Alberta pay either an FT-A rate or an FT-P rate for such service. Consequently, Ventures Oil Sands Pipeline customers which source their gas from NGTL will also pay NGTL either an FT-A rate or an FT-P rate for deliveries to the Ventures Oil Sands Pipeline.

BR-NGTL-010(c)

Issue:

Appropriateness of NGTL's rate design

Section:

2.4, p. 21 of 55. Lines 8, 14-15. p 22 of 55, lines 2-4.

Reference:

Rate Design

Preamble:

Rates must be just and reasonable and not constitute undue discrimination. To be efficient the rate design should establish proper price signals for the various services offered. Revenue sufficiency and stability refers to the requirement that the rates provide adequate revenues to meet all necessary costs and provide a fair return to investors, while maintaining appropriate service and safety levels.

Request:

Please indicate whether all customers and related volumes that underpinned the original approval of the at-risk Ventures Oilsands Pipeline pay the same toll as the incremental volumes and customers related to the proposed TBO. If not, please explain why not? And if not, please also explain how this is consistent with rates being just and reasonable and not subject to undue discrimination.

Response:

NGTL does not know nor can it comment on the tolls paid by other Ventures Oil Sands Pipeline ("Ventures") customers in comparison to the toll NGTL would pay Ventures for the proposed TBO service.

As to the toll a customer would pay if contracted directly with Ventures as compared to the toll it would pay to NGTL for delivery service to such area, such services have different terms and conditions and would not be directly comparable.

BR-NGTL-010(c)

All customers that contract with NGTL for delivery of gas within Alberta pay either an FT-A rate or an FT-P rate for such service. Parties may contract with other service providers in conjunction with NGTL service. NGTL's proposed 2004 rate design results in rates which are just and reasonable and not unduly discriminatory.

BR-NGTL-011

Issue:

DOH Study and Alternatives

Section:

2.5, p. 29 of 55, Table 2.5.1-1

Reference:

Rate Design

Preamble:

Based on Table 2.5.1-1, the DOH studies prepared in this application support an Intra-Alberta/Ex Alberta percent DOH ratio in the range of 37.6% to 44.9%, excluding the alternative 2 that excludes extraction. The Board is interested in getting a better understanding of the DOH and its relationship with the Cost of Service Study.

Request:

Please indicate whether NGTL considers the Revised DOH Study to be only a supportive analysis justifying the rate design, or whether the DOH was a foundation to the Cost of Service Study. Please explain any linkages between the COS study and DOH, and the underlying value of the DOH studies.

Response:

As with the Existing DOH, NGTL considers the Revised DOH Study to be a supportive analysis for the rate design. The DOH was not a foundation to the Cost of Service Study.

The only linkages between the COS and DOH studies is that they are both supportive analysis for the rate design. The COS Study, for instance, provides support for the FT-A charge of 1.84 cents/Mcf. The Revised DOH study provides analysis showing that on average volumes transported within Alberta travel approximately half the distance of volumes traveling ex-Alberta. This supports the basic rate design where intra-Alberta shippers, utilizing FT-R service, pay approximately one-half of the rate that ex-Alberta shippers who utilize FT-R and FT-D services pay.

BR-NGTL-012(a)

Issue:

Evaluation of COH Study

Section:

2.5.2, p. 34 of 55, and Table 2.5.3-1 on page 40 of 55

Reference:

Cost of Haul Alternatives

Preamble:

The COH study is similar to the DOH study except that it also takes into account economies of scale of the facilities that are used to transport gas. For the COH analysis included in this Application, facility costs have been accounted for by applying a relative cost index against each pipe diameter. Thus, a COH study provides a measure of both the distance the gas travels as well as the costs associated with facilities used to provide the transportation.

Request:

Please explain why NGTL considers the revised DOH to be the more appropriate study than the COH study alternatives.

Response:

NGTL considers the DOH to be more appropriate at this time as this is the methodology supported by the stakeholders involved in the 2003 Alberta System Tariff Settlement. It is the methodology NGTL has utilized since 1989 and its continued use provides rate stability for Alberta System customers whereas the use of COH methodology could have significant distributional effects.

BR-NGTL-012(b)

Issue:

Evaluation of COH Study

Section:

2.5.2, p. 34 of 55, and Table 2.5.3-1 on page 40 of 55

Reference:

Cost of Haul Alternatives

Preamble:

The COH study is similar to the DOH study except that it also takes into account economies of scale of the facilities that are used to transport gas. For the COH analysis included in this Application, facility costs have been accounted for by applying a relative cost index against each pipe diameter. Thus, a COH study provides a measure of both the distance the gas travels as well as the costs associated with facilities used to provide the transportation.

Request:

If the Board considered adopting a DOH or COH study methodology other than the revised methodology, would NGTL contemplate any revisions its proposed rates.

Response:

Yes. NGTL only utilizes the DOH study as a reasonableness check to support setting the transmission component of the average FT-R rate equal to the transmission component of the FT-D rate. If another option was used that resulted in a different relationship between these rates, NGTL would consider other rate designs.

BR-NGTL-012(c)

Issue:

Evaluation of COH Study

Section:

2.5.2, p. 34 of 55, and Table 2.5.3-1 on page 40 of 55

Reference:

Cost of Haul Alternatives

Preamble:

The COH study is similar to the DOH study except that it also takes into account economies of scale of the facilities that are used to transport gas. For the COH analysis included in this Application, facility costs have been accounted for by applying a relative cost index against each pipe diameter. Thus, a COH study provides a measure of both the distance the gas travels as well as the costs associated with facilities used to provide the transportation.

Request:

If 15% of the gas traveling on the Alberta System is for intra-Alberta delivery markets, please provide a total cost of haul for this gas.

Response:

The total intra-Alberta COH in 2002 was 635.6. Please refer to Section 2, Appendix D pages 10 – 13 of 13 for a complete list of the results. The reference to 15% of the gas traveling on the Alberta System being for intra-Alberta markets is an approximation based on historical data. For 2002, 2003, and 2004 gas delivered to intra-Alberta markets represented approximately 11%, 14%, and 17% of the gas traveling on the Alberta System.

BR-NGTL-013(a)

Issue:

Facilities Connection Service (FCS) charges and Delivery costs

Section:

2.6, p. 48 of 55, lines 2-17

Reference:

Lateral Split between Receipt and Delivery

Preamble:

Delivery Pipes not associated with major border deliveries represent a very small percentage of the total pipes; only about 1.6% of the total NBV and total length and about 1.4% of the cost of the total transmission cost of service (\$16 million out of \$1,185 million of total pipes). The costs of intra-Alberta delivery represent about 0.2% of the total transmission costs, not significant enough to be included as a separate component in the rates for transportation service.

The costs associated with pipe used only for intra-Alberta deliveries, as well as pipe associated with storage and extraction costs, are recovered through a FCS charge or in the rates for other services. Currently 83 % of the NBV associated with pipes used for intra-Alberta deliveries is covered by FCS Agreements.

Request:

Please provide the revenues generated under FCS Agreements indirectly via receipt services, directly through FT-A and FT-P services or a direct FCS charge, or a combination of both.

Response:

The FT-A rate change, the FT-P service and the changes to the MAV calculation were implemented in October 2003. The table below is the forecast revenues for 2004.

BR-NGTL-013(a)

Year	Indirect Revenue via Receipt Service (\$ Million)	FT-A Revenue (\$ Million)	FT-P Revenue (\$ Million)	FCS Charge Revenue (\$ Million)	Total (\$ Million)
2004	64.6	6.4	21.7	5.4	98.1

BR-NGTL-013(b)

Issue:

Facilities Connection Service (FCS) charges and Delivery costs

Section:

2.6, p. 48 of 55, lines 2-17

Reference:

Lateral Split between Receipt and Delivery

Preamble:

Delivery Pipes not associated with major border deliveries represent a very small percentage of the total pipes; only about 1.6% of the total NBV and total length and about 1.4% of the cost of the total transmission cost of service (\$16 million out of \$1,185 million of total pipes). The costs of intra-Alberta delivery represent about 0.2% of the total transmission costs, not significant enough to be included as a separate component in the rates for transportation service.

The costs associated with pipe used only for intra-Alberta deliveries, as well as pipe associated with storage and extraction costs, are recovered through a FCS charge or in the rates for other services. Currently 83 % of the NBV associated with pipes used for intra-alberta deliveries is covered by FCS Agreements.

Request:

Please indicate the consequences that might arise if the recovery of all intra-Alberta delivery facilities costs were recovered through direct rates under FCS Agreements, instead of through recovery via indirect receipt services.

Response:

FCS Agreements are currently required because of the commodity nature of the FT-A rate and the recognition of the indirect relationship to receipt services. The FCS Charge essentially provides a direct charge to account for any shortfall in accountability, if the

BR-NGTL-013(b)

revenue recognized through the combination of direct revenue from delivery volumes and indirect receipt revenue is insufficient.

If a direct delivery rate was desired instead of such a combination, the FCS Agreements would likely cease to be required and instead a different delivery rate design would need to be considered, with similar cost accountability as the receipt service Primary Term calculations and Secondary Term requirements. The existing FCS and FT-A agreements would likely need to be converted to or replaced by Primary and Secondary Term type of firm demand contracts.

Firm contracts would likely not meet the requirements of all intra-Alberta delivery customers (e.g., producers, utilities and industrials) and a uniform rate may no longer be appropriate for the different intra-Alberta customers market types, which may cause NGTL to consider further distinction amongst the intra-Alberta delivery service, e.g., develop rate classes.

BR-NGTL-013(c)

Issue:

Facilities Connection Service (FCS) charges and Delivery costs

Section:

2.6, p. 48 of 55, lines 2-17

Reference:

Lateral Split between Receipt and Delivery

Preamble:

Delivery Pipes not associated with major border deliveries represent a very small percentage of the total pipes; only about 1.6% of the total NBV and total length and about 1.4% of the cost of the total transmission cost of service (\$16 million out of \$1,185 million of total pipes). The costs of intra-Alberta delivery represent about 0.2% of the total transmission costs, not significant enough to be included as a separate component in the rates for transportation service.

The costs associated with pipe used only for intra-Alberta deliveries, as well as pipe associated with storage and extraction costs, are recovered through a FCS charge or in the rates for other services. Currently 83 % of the NBV associated with pipes used for intra-alberta deliveries is covered by FCS Agreements.

Request:

Please explain how the MAV ensures cost accountability for delivery transportation costs for delivery customers, beyond an assurance of the flow of certain required volumes of gas being delivered through intra-Alberta delivery facility. Please indicate how this flow of gas ensures any incremental revenue to the overall NGTL system.

Response:

Please refer to the responses to BR-NGTL-003(b) and BR-NGTL-003(c).

BR-NGTL-014(a)

Issue:

Appropriate cost recovery of Meter costs

Section:

2.7, p. 52-55

Reference:

Tables 2.7-3 & 2.7-4 Analysis of Metering Service Costs

Preamble:

The Board is interested in gaining a better understanding of Tables 2.7-4 and 2.7-5.

Request:

Based on full cost would NGTL agree intra-Alberta delivery rates should recover \$20.5 million or approximately 6.78 cents per mcf when factoring in total cost and gas volumes?

Response:

No. NGTL believes that all the costs associated with the intra-Alberta delivery stations should be accounted for by specific customers. This is why all (100%) of the costs associated with these stations are accounted for under FCS contracts. NGTL does not believe that all of these costs need to be directly reflected in the FT-A rate. In addition, some of these costs are accounted for under FT-P.

BR-NGTL-014(b)

Issue:

Appropriate cost recovery of Meter costs

Section:

2.7, p. 52-55

Reference:

Tables 2.7-3 & 2.7-4 Analysis of Metering Service Costs

Preamble:

The Board is interested in gaining a better understanding of Tables 2.7-4 and 2.7-5.

Request:

Please explain why NGTL applies an FT-A rate at 1.8cents/mcf versus 6.78 cents/mcf as indicated in Table 2.7-5.

Response:

Metering is a common function required in every transportation service and by every customer. Thus the rate should be averaged and not calculated based on a particular segmentation of customers. Using the aggregate costs and aggregate volumes minimizes the complexity of the pricing and produces a more stable rate for all customers. For 2004, the system average cost for metering is 1.8 cents/Mcf and this cost is included in the FT-A, FT-R, FT-D, FT-P, IT-R, IT-D, FT-RN, and STFF rates.

The tables in Section 2.7, as per the February 2004 Update, reflect an aggregation of costs based on a particular segmentation of customers (receipt, border, intra-Alberta, storage, extraction). A 6.78 cents/Mcf change is an average for all customers within the intra-Alberta delivery segment. There is a wide variation in costs if this segment is further disaggregated into sub-segments (i.e., producer, industrial, utility). This would imply that charging 6.78 cents/Mcf to all customers would not be appropriate. If the disaggregation of this rate was considered appropriate, the rate should be 2.41 cents/Mcf

BR-NGTL-014(b)

for industrials, 12.85 cents/Mcf for producers, and 7.26 cents/Mcf for utilities. There is also variation among the individual customers within each sub-segment.

BR-NGTL-015(a)

Issue:

Gas Balancing Agreement (GBA)

Section:

3.2

Reference:

Service and Tariff Amendments

Preamble:

The Board requires further understanding of the GBA Agreement.

Request:

Please explain how NGTL determined that the GBA Service between NGTL and TCPL is at fair market value and is consistent with NGTL's filed code of conduct.

Response:

The GBA Service is a pipeline load balancing arrangement between NGTL and TCPL. The GBA Service has a fixed monthly rate of \$83,333. The initial rate was determined in 1997 by negotiation between TCPL and NGTL when the companies were unrelated and subsequently approved by the Board. The terms and conditions of the GBA Service have remained unchanged since its inception. The cost to NGTL of providing this service is nominal and administrative in nature and less than the revenue received from this service. Accordingly, NGTL believes the rate continues to be appropriate.

In addition to the fact that the initial rate for the GBA Service was negotiated at arm's length and subject to Board approval, the GBA Service is also consistent with NGTL's filed Code of Conduct from the following perspectives:

- The GBA Service is not a For Profit affiliate service from a TransCanada shareholder perspective. The total revenue generated by the service is applied to

BR-NGTL-015(a)

the NGTL revenue requirement and used to reduce rates for all of NGTL's firm and interruptible service customers.

- NGTL has entered into a Service Agreement with respect to the GBA Service. The Gas Balancing Agreement is filed in Section 3.2 of Phase 2 of this GRA.
- GBA Services are available to other downstream connecting pipelines under the conditions that are outlined in TTP Resolution T2003-11, as filed with the Board, to provide for equal treatment with respect to NGTL services.
- NGTL reports on the GBA Service annually through its annual application for approval of its rates, tolls, and charges that specifies the rate charged for the service and illustrates the application of Other Service (OS) revenue against the allocation of NGTL's revenue requirement to its Receipt and Delivery services.
- NGTL has provided information on this service in its annual toll filing, and will report on this transaction in its annual compliance report under its proposed Code of Conduct.

BR-NGTL-015(b)

Issue:

Gas Balancing Agreement (GBA)

Section:

3.2

Reference:

Service and Tariff Amendments

Preamble:

The Board requires further understanding of the GBA Agreement.

Request:

What are the costs of providing GBA Service?

Response:

Please refer to the response to BR-NGTL-015(a).

BR-NGTL-016(a)

Issue:

Rate Schedule IT-S

Section:

3.3

Reference:

Tariff Changes

Preamble:

The Board is interested in gaining a better understanding of NGTL's proposed amendments to the IT-S rate.

Request:

Please explain the impact storage had in the DOH and COH studies put forth by NGTL in this application.

Response:

NGTL has not proposed amendments to the IT-S rate. Please refer to the response to BR-NGTL-016(c).

Storage has no material impact in the DOH and COH studies. All volumes that are delivered into storage stations under IT-S ultimately must be received from storage and continue to their ultimate destinations. As a result they do not impact DOH or COH averages.

BR-NGTL-016(b)

Issue:

Rate Schedule IT-S

Section:

3.3

Reference:

Tariff Changes

Preamble:

The Board is interested in gaining a better understanding of NGTL's proposed amendments to the IT-S rate.

Request:

Please explain the costs related to storage delivery versus costs for other delivery points.

Response:

NGTL has not proposed amendments to the IT-S rate. Please refer to the response to BR-NGTL-016(c).

Storage facilities are subject to the same cost categories and cost allocations as any other facility on the Alberta System.

BR-NGTL-016(c)

Issue:

Rate Schedule IT-S

Section:

3.3

Reference:

Tariff Changes

Preamble:

The Board is interested in gaining a better understanding of NGTL's proposed amendments to the IT-S rate.

Request:

Please explain the reasoning between designing an IT-S rate versus applying a delivery rate.

Response:

NGTL has not proposed amendments to the IT-S rate. NGTL is proposing amendments to Rate Schedule IT-S, to clarify that volumes delivered to storage facilities that will not ultimately return to the Alberta System are declared by the storage operators under the appropriate delivery service (e.g., not declared under IT-S) so NGTL can charge the appropriate delivery rate. Rate Schedule IT-S already has corresponding language for such non-storage receipt volumes and appropriate receipt rates.

NGTL has not proposed a change to the current IT-S rate of zero because it understands that customers are not in favour of an explicit IT-S rate at this time. The incremental revenue does not warrant the additional complexity of administering such a charge. In addition, there is appropriate accountability for the costs associated with IT-S service through the FCS contract. Storage also provides broad industry benefits which NGTL discusses in AUMA/EDM/PICA-NGTL-007(b).

BR-NGTL-016(d)

Issue:

Rate Schedule IT-S

Section:

3.3

Reference:

Tariff Changes

Preamble:

The Board is interested in gaining a better understanding of NGTL's proposed amendments to the IT-S rate.

Request:

Please explain the cost impact or cost allocation associated with defining the Demmitt #2 Interconnect as an Export Delivery Point instead of a storage delivery point.

Response:

NGTL is proposing to add Demmitt #2 Interconnect to the list of Export Delivery Points in addition to, not instead of, a Storage Delivery Point. There would be no impact to the cost allocated under the Cost of Service study.

BR-NGTL-017

Issue:

Alternate Methods of determining DOH

Section:

2.5, Figure 2.51-1, p. 32 of 55

Reference:

COS Analysis

Request:

Please indicate how the Receipt/Delivery allocation ratios of 23/77 and 81/19 for Intra First Method and Export First Method were derived.

Response:

The Receipt/Delivery Allocation was calculated by dividing the average intra-Alberta distance by the average export distance. In other words:

- 23/77: $15\text{km (average intra distance)} \div 65\text{ km (average export distance)}$;
- 81/19: $45\text{km (average intra distance)} \div 55\text{ km (average export distance)}$.

The Receipt/Delivery Allocation result reflects the relationship between the distance that gas has to travel to an intra-Alberta delivery point compared to an export delivery point.

BR-NGTL-018

Issue:

Clarification

Section:

2.5, Question 26, p. 29 of 55, Table 2.5-1-1

Reference:

COS Analysis

Preamble:

Since the only change in Alternative 2 was the intra-Alberta DOH calculation, the results for the ex-Alberta DOH are the same as the results for the revised DOH Study.

Request:

Please show the alternative 2 excluding extraction DOH (km) 106.3 Intra-Alberta and Ex-Alberta DOH (km) 569.4 were derived.

Response:

In calculating Alternative #2 of the revised DOH, volumes and distance of hauls for extraction facilities were excluded from the results to obtain a DOH of 106.3 km for intra-Alberta volumes. As all border deliveries were included in this alternative, the DOH for ex-Alberta volumes remained at 569.4 km.

Please refer to Attachment BR-NGTL-018 for the detailed results for this alternative.

Distance of Haul for Ex-Alberta Deliveries - Alternative #2, Excluding Extraction:

Meter Station Number	Meter Station Name	Annual Volume (10 ³ m ³)	DOH (km)	Volume-Distance
1250	UNITY BORDER	328,909	86.4	28,402,392
1417	COLD LAKE BDR	288,330	50.9	14,681,611
1958	EMPRESS BORDER	58,917,880	560.7	33,035,059,716
2001	ABC SALES #1	10,971,008	521.3	5,719,102,109
2002	ALBERTA-MONTANA	96,193	95.5	9,190,904
2004	ABC SALES #2	10,990,813	511.6	5,622,857,165
3886	GORDONDALE BDR	18,743	24.2	453,572
6404	MCNEILL BORDER	21,910,898	667.8	14,632,819,399
8002	ESTHER DELIVERY	51,243	9.9	508,333
8003	MERIDIAN LK DLV	158,530	0.3	49,937
Subtotal for ex-Alberta deliveries		103,732,548	569.4	59,063,125,138

Distance of Haul for Intra-Alberta Deliveries - Alternative #2, Excluding Extraction:

Meter Station Number	Meter Station Name	Annual Volume (10 ³ m ³)	DOH (km)	Volume-Distance
3050	SARATOGA SALES	4,768	432.2	2,060,659
3051	SIMONETTE SALES	658	0.1	45
3052	COLEMAN SALES	4,439	512.9	2,276,472
3053	SUNDRE SALES	5,187	241.1	1,250,605
3058	LUNDBRECK-COWLE	1,247	82.1	102,387
3059	ALLISON CRK SLS	6,152	494.9	3,044,511
3060	CARROT CREEK SL	10,943	277.5	3,037,034
3061	PEMBINA SALES	30,835	171.6	5,292,670
3062	E. CALGARY B SL	42,001	0.3	13,818
3063	VIRGINIA HLS SL	2,328	21.0	48,913
3065	RAT CREEK SALES	-	-	-
3067	BIGSTONE SALES	4,840	21.4	103,539
3068	BEAVER HILL SLS	27	36.1	976
3069	WILSON CRK S SL	4,114	6.0	24,687
3071	CYNTHIA SALES	-	-	-
3072	PADDY CREEK SLS	48,820	0.6	27,730
3073	PRIDDIS SALES	26,542	390.8	10,373,150
3074	WATERTON SALES	205,154	0.0	2,052
3076	RAINBOW SALES	96	0.0	4
3077	FIRE CREEK SALE	6,165	43.1	265,767
3078	JUDY CREEK SALE	-	-	-
3080	LOUISE CREEK SL	1,230	31.2	38,329
3082	ELK RIVER S SLS	-	-	-
3083	RAINBOW LK SLS	-	-	-
3085	DEEP VLLY CR SL	4,936	0.1	336
3086	PINE CREEK SLS	5,275	40.1	211,609
3087	GOLD CREEK SLS	11,875	39.4	468,298
3088	VALHALLA SALES	3,000	208.1	624,360
3089	QUIRK CREEK SLS	-	-	-
3091	OUTLET CREEK SL	127	2.0	253
3092	MOOSEHORN R SLS	22,198	25.1	558,001
3093	HARMATTAN-LEDUC	-	-	-
3094	BRAZEAU N SALES	101	91.1	9,157

Distance of Haul for Intra-Alberta Deliveries - Alternative #2, Excluding Extraction:

Meter Station Number	Meter Station Name	Annual Volume (10 ³ m ³)	DOH (km)	Volume-Distance
3095	SAKWATAMAU SALE	24,301	10.5	255,763
3097	CHICKADEE CK SL	22,764	26.2	595,749
3098	DUTCH CREEK SLS	-	-	-
3099	SOUSA CRK E SLS	5,382	2.5	13,320
3100	HEART RIVER SLS	12,035	0.0	241
3101	CAROLINE SALES	204	247.0	50,332
3103	VIRGO SALES	4,173	16.0	66,721
3105	CRANBERRY LK SL	120,265	56.6	6,807,808
3106	CARMON CREEK SL	224	74.6	16,713
3107	FERGUSON SALES	36,225	79.4	2,875,646
3109	CALDWELL SALES	4,225	54.0	228,003
3110	MARSH HD CR W S	6,345	367.8	2,333,898
3111	MINNOW LK S. SL	1,825	8.1	14,701
3112	FALHER SALES	24,539	10.4	255,420
3113	TWINLAKES CK SL	89	85.2	7,554
3114	WEMBLEY SALES	37,391	168.9	6,314,846
3115	USONA SALES	32,555	7.4	241,295
3117	GRIZZLY SALES	31,849	31.0	987,195
3118	GILBY N#2 SALES	189	0.2	39
3119	DEADRICK CK SLS	4,626	16.4	75,988
3120	MILDRED LK SLS	1,149,307	198.6	228,200,442
3123	MILDRED LK #2 S	330,957	204.2	67,570,117
3124	DEEP VY CK S SL	111	0.0	2
3125	HUGGARD CREEK S	15,959	48.4	773,181
3300	OTAUWAW SALES	1,487	10.1	14,992
3301	SAULTEAUX SALES	374	18.7	7,002
3304	FORESTBURG SLS	6,922	328.7	2,275,137
3305	CHIGWELL N. SLS	3,731	0.0	63
3368	NOEL LAKE SALES	44,642	98.8	4,412,144
3405	RIM-WEST SALES	162,993	0.0	5,379
3406	REDWATER SALES	61,053	39.6	2,419,325
3410	VIKING SALES	53,465	31.0	1,656,036
3411	MONARCH N. B SL	2,043	0.1	131
3412	WAYNE N B SALES	19,821	0.0	614
3413	ATMORE B SALES	-	-	-
3414	HANNA S B SALES	9,358	333.2	3,118,053
3416	COUSINS A SALES	-	-	-
3418	COUSINS C SALES	1,284	50.6	64,956
3419	INLAND SALES	740,188	275.4	203,869,874
3421	WIMBORNE SALES	-	-	-
3422	THORHILD SALES	3,668	0.0	84
3423	BASHAW WEST SLS	482	13.2	6,364
3424	GRANDE CENTRE S	20,298	20.4	414,191
3425	WOOD RVR SALES	61,876	29.7	1,838,291
3427	WESTLOCK SALES	3,152	0.0	151
3429	ST. PAUL SALES	19,514	44.7	872,667
3430	FERINTOSH SALES	1,312	15.6	20,414
3437	HARMATTAN SALES	735	487.4	358,337
3438	REDWATER B SL	27,452	46.5	1,275,361
3439	SHEERNESS SALES	8,458	390.5	3,302,661
3444	PINCHER CRK SLS	7,381	93.3	688,848

Distance of Haul for Intra-Alberta Deliveries - Alternative #2, Excluding Extraction:					
Meter Station Number	Meter Station Name	Annual Volume (10³m³)	DOH (km)	Volume-Distance	
3445	KAKWA SALES	-	-	-	
3446	BITTERN LAKE SL	57,663	26.6	1,533,403	
3448	ROSS CREEK SLS	88,302	33.6	2,967,861	
3449	FLEET SALES	3,121	9.1	28,477	
3453	GREEN GLADE SLS	-	-	-	
3454	PENHOLD N SALES	157,613	64.2	10,118,984	
3456	ELK POINT SALES	13,723	5.2	71,593	
3457	MITSUE SALES	-	-	-	
3458	COUSINS B SALES	914,728	46.2	42,281,696	
3460	LONDON LAKE SLS	5,362	0.1	434	
3462	NIPISI SALES	-	-	-	
3464	GREENCOURT W SL	17,845	7.9	141,564	
3465	DEMMITT SALES	321	10.4	3,331	
3467	KILLAM SALES	-	-	-	
3468	BLEAK LAKE SLS	13,388	30.8	411,881	
3469	EVERGREEN SALES	388	0.0	6	
3470	NOSEHILL CRK SL	11,366	4.4	49,736	
3471	BLUE RIDGE E SL	49,463	1.4	71,326	
3472	INNISFAIL SALES	1,423	11.5	16,356	
3474	LLOYD CREEK SLS	-	-	-	
3476	LAC LA BICHE SL	3,307	17.9	59,208	
3477	RICINUS S SALES	-	-	-	
3478	ONETREE SALES	22,076	0.0	442	
3479	NOSEHILL CRK N.	5,135	385.3	1,978,369	
3481	SAWRIDGE SALES	33,746	0.2	8,434	
3482	LONE PINE CK SL	14,844	0.0	430	
3483	CRAMMOND SALES	19	0.0	0	
3484	CARIBOU LAKE SL	-	-	-	
3485	SHORNCLIFFE CRK	-	-	-	
3486	WESTERDALE SLS	3,685	0.8	3,107	
3488	ARDLEY SALES	12,035	51.5	620,372	
3489	ATUSIS CREEK SL	40,033	588.7	23,568,001	
3490	GAETZ LAKE SLS	6,858	0.0	69	
3491	JOFFRE SLS #2	370,051	85.8	31,744,831	
3492	JOFFRE SLS #3	512,374	86.0	44,062,043	
3493	MEYER B SALES	-	-	-	
3494	SILVER VLY SLS	842	36.7	30,903	
3495	CAVALIER SALES	477	0.0	1	
3496	CHIPEWYAN RIVER	84,750	32.0	2,710,703	
3497	SUNDAY CREEK SO	13,794	0.0	276	
3562	AMOCO SALES TAP	28	60.6	1,673	
3600	STORNHAM COULEE	9,661	37.1	358,262	
3604	MARGUERITE L SL	59,325	52.9	3,140,586	
3605	LEMING LAKE SLS	1,081,080	52.0	56,162,933	
3606	LOSEMAN LAKE SL	287,190	34.2	9,816,033	
3609	SARRAIL SALES	49,720	42.2	2,097,762	
3610	RANFURLY SALES	80,007	49.8	3,986,858	
3611	HERMIT LAKE SLS	119,689	217.4	26,015,925	
3612	CONKLIN W SALES	44,014	29.1	1,281,029	
3613	SHANTZ SALES	1,665	164.6	274,024	
3615	HAYNES SALES	8,011	66.6	533,360	

Distance of Haul for Intra-Alberta Deliveries - Alternative #2, Excluding Extraction:					
Meter Station Number	Meter Station Name	Annual Volume (10³m³)	DOH (km)	Volume-Distance	
3616	GAS CITY SALES	19,051	36.8	701,777	
3618	JENNER EAST SLS	4,479	446.5	1,999,573	
3621	LOSEMAN LK SL#2	21,175	34.2	723,983	
3622	CHEECHAM W. SLS	13,378	11.3	151,234	
3623	FERINTOSH N. SL	380	30.7	11,653	
3624	GODS LAKE SALES	28	125.4	3,460	
3626	MIRAGE SALES	-	-	-	
3632	EAST CALGARY SA	5,115	0.0	51	
3633	RUTH LK SLS	34,434	218.7	7,531,873	
3634	CANOE LAKE SALE	859	0.0	33	
3635	ROD LAKE SALES	1,746	32.6	56,900	
3637	RUTH LK SLS #2	147	240.8	35,344	
3639	VEGREVILLE SALE	2,229	274.3	611,438	
3884	COALDALE S. JCT	4,198	10.0	41,969	
3885	CHIP LAKE JCT	5,370	0.0	54	
5007	HOUSE RIVER	198,788	50.6	10,067,097	
5024	CROW LAKE SALES	8,469	47.5	402,205	
6903	MCNEILL A UTIL	61	649.1	39,464	
8000	BATTLE LAKE DVY	14,587	11.6	168,567	
	Subtotal for Intra-Alberta deliveries	8,113,895	106.3	862,840,367	
	Grand Totals and Overall DOH	111,846,443	535.8	59,925,965,504	

BR-NGTL-019

Issue:

Cost Index

Section:

2.0 Appendix D, p. 7 of 13

Reference:

COH Study 2002

Preamble:

Since the only change in Alternative 2 was the intra-Alberta DOH calculation, the results for the ex-Alberta DOH are the same as the results for the revised DOH Study.

Request:

Please provide a calculation showing how the Cost Index was derived and the base data used to derive the indices.

Response:

The requested information is provided in Attachments 1 and 2 to BR-NGTL-019.

Attachment 1 BR-NGTL-019 describes the unit cost index. Attachment 2 BR-NGTL-019 provides the calculations used for the 2004 receipt rates.

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UNIT COST INDEX CALCULATION

Attachment 2 BR-NGTL-019 provides the Unit Cost Index calculations.

This Attachment identifies the various cost and operating components incorporated in the Unit Cost Index. The following is a description of the components of Attachment 2:

1. The Unit Cost Index proportions for Pipe and Compression, and Capital and O&M are shown on page 1 of Attachment 2.
 - a) The pipe and compression portions of the Adjusted Total Revenue Requirement are based on the relative amounts of pipe and compression net book value in the Alberta System as of January 1, 2002.
 - b) The capital and O&M portions of the Adjusted Total Revenue Requirement are based on an average of NGTL's actual costs over an eight year period (1992-2002).

These proportions are used in Attachment 2 Page 2, Columns G & K, and Page 3, Columns Q & V.
2. The calculations of the Unit Cost Index are shown on pages 2 to 4 of Attachment 2. The following information is provided on page 2.

-
- 1 **Attachment 2, Page 2, Column**
- 2 A Pipe diameter is the nominal pipe size.
- 3 B The distribution of NGTL's pipe length by nominal pipe size.
- 4 C The average of the actual cost of constructing pipe on the Alberta System between
5 1992 and 2002.
- 6 D Economic Life Index is a factor reflecting the economic life of pipe
7 differentiations between pipe treated as supply-dependent (i.e., smaller than NPS
8 24) and larger pipe that is not dependent on specific supplies.
- 9 E Column C divided by Column D.
- 10 F Weighted average costs by diameter, Column B times Column E.
- 11 G The pipe capital portion of the Adjusted Total Revenue Requirement, (from page
12 1).
- 13 H The percentage of pipe capital portion of the Adjusted Total Revenue
14 Requirement attributed to each pipe diameter, Column F times Column G divided
15 by the sum of Column F.
- 16 I The Adjusted Total Revenue Requirement times the pipe O&M portion of the
17 Adjusted Total Revenue Requirement (from page 1) divided by the total length of
18 all pipe on the Alberta System.
- 19 J Weighted average costs by pipe diameter, Column B times Column I.
- 20 K The pipe O&M portion of the Adjusted Total Revenue Requirement, (from page
21 1).
- 22 L The percentage of the pipe O&M portion of the Adjusted Total Revenue
23 Requirement attributed to each pipe size, Column J times Column K divided by
24 the sum of Column J.

1	Attachment 2, Page 3, Column
2	M Power per kilometre required to compress gas for each pipe diameter calculated at
3	standard conditions.
4	N The average of the actual capital cost of compression on the Alberta System
5	between 1992 and 2002.
6	O Column N times Column M.
7	P Weighted average costs by pipe diameter, Column B times Column O.
8	Q The compression capital portion of the Adjusted Total Revenue Requirement,
9	(from page 1).
10	R The percentage of the compression capital portion of Adjusted Total Revenue
11	Requirement attributed to each pipe diameter, Column P times Column Q divided
12	by the sum of Column P.
13	S The Adjusted Total Revenue Requirement times the compression O&M portion of
14	the Adjusted Total Revenue Requirement (from page 1) divided by the total
15	amount of compression on the Alberta System.
16	T Column S times Column M.
17	U Weighted average costs by diameter, Column B times Column T.
18	V The compression O&M portion of the Adjusted Total Revenue Requirement,
19	(from page 1).
20	W The distribution of the compression O&M portion of revenue requirement
21	attributed to each pipe diameter, Column U times Column V divided by the sum
22	of Column U.

1	Attachment 2, Page 4, Column
2	
3	X Percentage of Adjusted Total Revenue Requirement attributable to Pipe Capital -
4	Column H.
5	Y Percentage of Adjusted Total Revenue Requirement attributable to Pipe O&M -
6	Column L.
7	Z Percentage of Adjusted Total Revenue Requirement attributable to Compression
8	Capital - Column R.
9	AA Percentage of Adjusted Total Revenue Requirement attributable to Compression
10	O&M - Column W.
11	AB Sum of Columns X, Y, Z and AA.
12	AC Pipe capacity calculated at standard conditions.
13	AD Relative cost per unit of capacity.
14	Column AB divided by Column B divided by Column AC times 1,000.
15	AE Column AD indexed relative to 48 inch pipe.

Unit Cost Index Calculations

	A	B	C	D	E
1					
2					
3					
4					
5					Source
6	Adjusted Total Revenue Requirement		1,355,827	%	
7	(Rev. Req.)			(\$000)	
8					
9					
10	Pipe & Compression Components based on Net Book Value as of December 31, 200:				
11					
12		Pipe	77.7%		
13		Compression	22.3%		
14					
15					
16					
17	Capital and O&M Components based on actual data from 1995 to 200:				
18					
19		Capital Related	78.9%		
20		O&M Related	21.1%		
21					
22					
23					
24	Capital and O&M components of the revenue requirement attributed to pipe and compressor				
25					
26					
27		Pipe	Capital	61.30%	C9 x C16
28			O&M	16.40%	C9 x C17
29					
30		Compression	Capital	17.59%	C10 x C16
31			O&M	4.71%	C10 x C17
32					
33				100.00%	

Unit Cost Index Calculations

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2												
3												
	Pipe											
	Capital Costs Component						O&M Costs Component					
4	Pipe Diameter	Distribution of pipe lengths	Historical Pipe Costs¹	Economic Life Index	Pipe Capital Costs	Diameter Weighted Costs	Portion of Rev. Req.	Percentage of Revenue Requirement	Annual Pipe O&M Rate	Diameter Weighted Costs	Portion of Rev. Req.	Percentage of Revenue Requirement
5	NPS	%	\$ / m		\$ / m		%	%	\$ / m		%	%
6												
7	4	5.33%	92	1	92	4.88	61.30%	1.20%	9.78	0.52	16.40%	0.87%
8	6	10.82%	105	1	105	11.39	61.30%	2.81%	9.78	1.06	16.40%	1.77%
9	8	10.28%	135	1	135	13.85	61.30%	3.41%	9.78	1.01	16.40%	1.69%
10	10	8.96%	171	1	171	15.36	61.30%	3.78%	9.78	0.88	16.40%	1.47%
11	12	10.72%	192	1	192	20.53	61.30%	5.06%	9.78	1.05	16.40%	1.76%
12	14	0.63%	237 ²	1	237	1.49	61.30%	0.37%	9.78	0.06	16.40%	0.10%
13	16	12.80%	282	1	282	36.08	61.30%	8.89%	9.78	1.25	16.40%	2.10%
14	18	1.89%	308 ²	1	308	5.81	61.30%	1.43%	9.78	0.18	16.40%	0.31%
15	20	8.04%	333	1	333	26.81	61.30%	6.60%	9.78	0.79	16.40%	1.32%
16	22	0.59%	376 ²	1	376	2.23	61.30%	0.55%	9.78	0.06	16.40%	0.10%
17	24	4.96%	418	2	209	10.36	61.30%	2.55%	9.78	0.49	16.40%	0.81%
18	26	0.17%	474 ²	2	237	0.41	61.30%	0.10%	9.78	0.02	16.40%	0.03%
19	28	0.00%	531 ²	2	266	0.00	61.30%	0.00%	9.78	0.00	16.40%	0.00%
20	30	8.53%	588	2	294	25.06	61.30%	6.17%	9.78	0.83	16.40%	1.40%
21	32	0.00%	624 ²	2	312	0.00	61.30%	0.00%	9.78	0.00	16.40%	0.00%
22	34	1.89%	661 ²	2	330	6.24	61.30%	1.54%	9.78	0.18	16.40%	0.31%
23	36	6.32%	697	2	349	22.03	61.30%	5.43%	9.78	0.62	16.40%	1.04%
24	42	5.36%	1135	2	567	30.41	61.30%	7.49%	9.78	0.52	16.40%	0.88%
25	48	2.72%	1165	2	582	15.86	61.30%	3.91%	9.78	0.27	16.40%	0.45%
26		100.00%			248.80			61.3%		9.78		16.4%

¹ Costs are based on NGTL facilities constructed between 1992 and 2002.

² Costs have been interpolated for 14, 18, 22, 26, 28, 32, and 34 NPS pipe.

1 A B M N O P Q R S T U V W

Compression		Capital Costs Component										O&M Costs Component											
Pipe Diameter	Distribution of pipe lengths	Power Required ³	Historical Compression Cost ¹	Compression Capital Cost	Diameter Weighted Costs	Portion of Rev. Req.	Percentage of Revenue Requirement	Power Rate	Annual Compression O&M Rate	Diameter Weighted Costs	Portion of Rev. Req.	Percentage of Revenue Requirement	kW per km	\$/kW	\$/m	%	kW per km	\$/kW	\$/m	%			
																					1	2	4
4	5.33%	1	1441.0	0.9	0.0	17.6%	0.01%	71.97	0.04	0.00	4.7%	0.00%	1	1441.0	0.9	0.0	17.6%	0.01%	71.97	0.04	0.00	4.7%	0.00%
6	10.82%	2	1441.0	2.5	0.3	17.6%	0.07%	71.97	0.13	0.01	4.7%	0.02%	2	1441.0	2.5	0.3	17.6%	0.07%	71.97	0.13	0.01	4.7%	0.02%
8	10.28%	4	1441.0	5.1	0.5	17.6%	0.13%	71.97	0.25	0.03	4.7%	0.03%	4	1441.0	5.1	0.5	17.6%	0.13%	71.97	0.25	0.03	4.7%	0.03%
10	8.96%	6	1441.0	9.0	0.8	17.6%	0.20%	71.97	0.45	0.04	4.7%	0.05%	6	1441.0	9.0	0.8	17.6%	0.20%	71.97	0.45	0.04	4.7%	0.05%
12	10.72%	10	1441.0	14.0	1.5	17.6%	0.36%	71.97	0.70	0.08	4.7%	0.10%	10	1441.0	14.0	1.5	17.6%	0.36%	71.97	0.70	0.08	4.7%	0.10%
14	0.63%	12	1441.0	17.8	0.1	17.6%	0.03%	71.97	0.89	0.01	4.7%	0.01%	12	1441.0	17.8	0.1	17.6%	0.03%	71.97	0.89	0.01	4.7%	0.01%
16	12.80%	18	1441.0	25.8	3.3	17.6%	0.80%	71.97	1.29	0.16	4.7%	0.21%	18	1441.0	25.8	3.3	17.6%	0.80%	71.97	1.29	0.16	4.7%	0.21%
18	1.89%	24	1441.0	34.3	0.6	17.6%	0.16%	71.97	1.71	0.03	4.7%	0.04%	24	1441.0	34.3	0.6	17.6%	0.16%	71.97	1.71	0.03	4.7%	0.04%
20	8.04%	32	1441.0	46.4	3.7	17.6%	0.90%	71.97	2.32	0.19	4.7%	0.24%	32	1441.0	46.4	3.7	17.6%	0.90%	71.97	2.32	0.19	4.7%	0.24%
22	0.59%	40	1441.0	57.7	0.3	17.6%	0.08%	71.97	2.88	0.02	4.7%	0.02%	40	1441.0	57.7	0.3	17.6%	0.08%	71.97	2.88	0.02	4.7%	0.02%
24	4.96%	52	1441.0	74.6	3.7	17.6%	0.90%	71.97	3.73	0.18	4.7%	0.24%	52	1441.0	74.6	3.7	17.6%	0.90%	71.97	3.73	0.18	4.7%	0.24%
26	0.17%	63	1441.0	91.3	0.2	17.6%	0.04%	71.97	4.56	0.01	4.7%	0.01%	63	1441.0	91.3	0.2	17.6%	0.04%	71.97	4.56	0.01	4.7%	0.01%
28	0.00%	77	1441.0	111.1	0.0	17.6%	0.00%	71.97	5.55	0.00	4.7%	0.00%	77	1441.0	111.1	0.0	17.6%	0.00%	71.97	5.55	0.00	4.7%	0.00%
30	8.53%	92	1441.0	132.9	11.3	17.6%	2.75%	71.97	6.64	0.57	4.7%	0.74%	92	1441.0	132.9	11.3	17.6%	2.75%	71.97	6.64	0.57	4.7%	0.74%
32	0.00%	110	1441.0	158.1	0.0	17.6%	0.00%	71.97	7.89	0.00	4.7%	0.00%	110	1441.0	158.1	0.0	17.6%	0.00%	71.97	7.89	0.00	4.7%	0.00%
34	1.89%	129	1441.0	185.4	3.5	17.6%	0.85%	71.97	9.26	0.17	4.7%	0.23%	129	1441.0	185.4	3.5	17.6%	0.85%	71.97	9.26	0.17	4.7%	0.23%
36	6.32%	148	1441.0	212.9	13.5	17.6%	3.26%	71.97	10.63	0.67	4.7%	0.87%	148	1441.0	212.9	13.5	17.6%	3.26%	71.97	10.63	0.67	4.7%	0.87%
42	5.36%	220	1441.0	317.1	17.0	17.6%	4.12%	71.97	15.84	0.85	4.7%	1.10%	220	1441.0	317.1	17.0	17.6%	4.12%	71.97	15.84	0.85	4.7%	1.10%
48	2.72%	310	1441.0	446.7	12.2	17.6%	2.95%	71.97	22.31	0.61	4.7%	0.79%	310	1441.0	446.7	12.2	17.6%	2.95%	71.97	22.31	0.61	4.7%	0.79%
													72.6		17.6%		3.63		4.7%				

³ Power requirements have been determined at the following conditions:

- down stream pipe pressure = 8450 kPa
- discharge piping pressure loss = 35 kPa
- upstream piping pressure loss = 35 kPa
- compression ratio = 1.35
- up stream pipe pressure = 6320 kPa
- suction temperature = 20 degrees C
- Compressibility = 0.829
- Gas isentropic temp. exponent = 0.25
- compressor efficiency = 0.75
- base temperature = 15 degrees C
- base pressure = 101.325 kPa

Unit Cost Index Calculations

1 A B X Y Z AA AB AC AD AE

Unit Cost Index		Revenue Requirement										Distribution of pipe lengths	
2	3	Pipe Capital	Pipe O&M	Comp. Capital	Comp. O&M	Total	Capacity ⁴	Pipe Capacity	Relative cost per unit of capacity	Unit Cost Index			
4	Pipe Diameter	%										%	
5	NPS	mmcf/d										%	
6	4	1.20%	0.87%	0.01%	0.00%	2.09%	5.73	68.39	66.45				
7	6	2.81%	1.77%	0.07%	0.02%	4.66%	16.46	26.20	25.45				
8	8	3.41%	1.69%	0.13%	0.03%	5.26%	32.77	15.61	15.16				
9	10	3.78%	1.47%	0.20%	0.05%	5.50%	58.24	10.55	10.25				
10	12	5.06%	1.76%	0.36%	0.10%	7.28%	90.76	7.48	7.27				
11	14	0.37%	0.10%	0.03%	0.01%	0.50%	115.16	6.97	6.77				
12	16	8.89%	2.10%	0.80%	0.21%	12.00%	166.44	5.63	5.47				
13	18	1.43%	0.31%	0.16%	0.04%	1.94%	221.33	4.64	4.51				
14	20	6.60%	1.32%	0.90%	0.24%	9.07%	299.65	3.76	3.66				
15	22	0.55%	0.10%	0.08%	0.02%	0.75%	372.97	3.40	3.30				
16	24	2.55%	0.81%	0.90%	0.24%	4.50%	482.27	1.88	1.83				
17	26	0.10%	0.03%	0.04%	0.01%	0.18%	590.11	1.74	1.69				
18	28	0.00%	0.00%	0.00%	0.00%	0.00%	717.95	1.61	1.57				
19	30	6.17%	1.40%	2.75%	0.74%	11.05%	859.06	1.51	1.47				
20	32	0.00%	0.00%	0.00%	0.00%	0.00%	1021.26	1.39	1.35				
21	34	1.54%	0.31%	0.85%	0.23%	2.92%	1198.02	1.29	1.26				
22	36	5.43%	1.04%	3.26%	0.87%	10.60%	1375.59	1.22	1.18				
23	42	7.49%	0.88%	4.12%	1.10%	13.59%	2048.86	1.24	1.20				
24	48	3.91%	0.45%	2.95%	0.79%	8.09%	2886.55	1.03	1.00				
25		61.3%	16.4%	17.6%	4.7%	100.0%							
26		100.00%											

⁴ Pipe capacities are based on the standard AGA fully turbulent flow equation at the following conditions:

- base temperature = 15 degrees C
- base pressure = 101,325 kPa
- up stream pressure = 8450 kPa
- pressure drop = 20 kPa / km
- length = 30 km
- effective roughness = 19 microns
- specific gravity = 0.6
- average temperature = 20 degrees C
- average Z factor = 0.829