CENTRA GAS MANITOBA INC.
TRANSPORTATION & STORAGE PORTFOLIO APPLICATION

EVALUATION PROCESS

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EVALUATION PROCESS

7.0 Introduction

Centra has considered a wide range of transportation, storage and associated supply options in anticipation of the expiry of its current arrangements at the end of March 2013. The following sections will discuss Centra's evaluation of the various storage options and related transportation and supply implications associated with those options. The storage options have been broadly categorized as Eastern options (those in the Michigan and Southern Ontario region) and Western options (Canadian and other U.S. locations).

7.1 The Use of Storage and Locational Considerations

Natural gas storage provides a number of benefits to natural gas distribution companies and the location of storage may affect how those benefits are realized. The use of storage by a utility:

1) may improve a utility's upstream load factor in comparison to its downstream load factor, and may thereby reduce the overall cost of providing natural gas to its customers;
2) enables a utility to inject gas throughout the non-heating season during summer months, which affords it the opportunity to capture any pricing differentials between winter and summer months;
3) assists in smoothing sales rates for a utility's customers, as gas purchased and injected throughout the summer season is withdrawn and incorporated into rates

at the weighted average cost of the inventory at the end of the summer season;

4) provides the utility with operating flexibility when weather-related load fluctuations occur on a daily basis. Centra utilizes TransCanada Mainline's STS which has the operational flexibility for a shipper to provide a late-night (5 a.m.) nomination to adjust flow for the last four hours of the gas day. This enables shippers to mitigate possible load balancing charges on the Mainline;

5) increases the security of supply for a utility at times when physical supply liquidity may be impaired or when markets may be closed. In addition, storage enables a utility to minimize its market purchases on high demand days when prices may be high; and

6) facilitates supply diversity if storage is geographically situated such that it may connect to remote market hubs and access transactional points apart from AECO in the WCSB.

The location of storage is an important consideration with respect to TCPL's STS, which is an annual service that facilitates the transportation of gas for both storage injections and withdrawals. Monthly demand charges are based on the contractual injection demand if the storage facility is located downstream of the LDC's delivery area, or on the contractual withdrawal demand if the storage facility is located upstream of the LDC's delivery area. Currently, Centra's contracted storage capacity and STS injection and withdrawal point (Emerson) are located downstream of its delivery areas. Centra's STS contract provides for 54,000 GJ/day summer injection capacity to Emerson, and 215,614 GJ/day withdrawal capacity from Emerson in winter. The STS monthly demand charge is based on the 54,000 GJ/day injection capacity year-round, which provides for cost-effective TCPL transportation of gas withdrawn from storage via Emerson.

In Centra's case, there are two disadvantages to locating storage upstream of the service territority rather than having it situated downstream of the market. First, the contracted capacity of pipeline transportation on the Mainline and interconnecting pipelines between the upstream storage and the service territory must be large enough to meet the peak load, whereas downstream storage locations enable a reduction in the overall level of contracted capacity from Western Canada to Centra's delivery areas. In addition, an upstream storage location (such as in Alberta or Saskatchewan) would only have access to WCSB supply and would not, of itself, facilitate the purchase of supply from other basins or hubs for supply diversity.

7.2 Qualitative Evaluation of Alternatives

The following alternatives were considered by Centra in assessing its storage and transportation portfolio options.

7.2.1 Western Options

Alberta Storage

Alberta storage, located physically or notionally at AECO, faces the challenge of requiring transportation for storage gas withdrawals from AECO to Empress on NGTL and from Empress to Manitoba on the TCPL Mainline. Centra would lose the benefit of improving its transportation load factor if all gas were stored in Alberta, thus increasing firm transportation requirements on the Mainline in the winter and reducing the amount of transportation otherwise used in the summer months to move gas to storage downstream of Manitoba. This would also result in increased exposure to TCPL transportation toll escalation and volatility. The cost of transportation from AECO to

Manitoba is significantly higher than from the Eastern storage options. On a final point, Alberta storage would eliminate any portfolio diversity as all gas put into Alberta storage would be sourced from the WCSB.

Saskatchewan Storage

Saskatchewan storage faces similar challenges to Alberta storage in requiring significant TCPL transportation capacity to Manitoba to accommodate storage withdrawals. Transportation capacity would also have to be held on the TransGas system in Saskatchewan from storage to TCPL (typically at an interconnect on TCPL just east of Empress) to accommodate storage withdrawals, plus additional TransGas transportation capacity from Empress to Saskatchewan storage if sourcing AECO supply for storage injections. The transportation costs on the TransGas system in Saskatchewan to inject and withdraw storage gas, combined with high and volatile TCPL transportation costs from Saskatchewan to Manitoba, make Saskatchewan storage more costly than Eastern storage alternatives. With respect to supply diversity, while some supply sourced from Saskatchewan production could be used to fill Saskatchewan storage in addition to supply from the AECO hub in Alberta, Saskatchewan gas prices are largely derived from AECO prices, thus providing no real measure of supply diversity from AECO.

Williston Basin Interstate Pipeline

WBIP operates one of the largest storage fields in North America near the Montana-South Dakota border, but has very limited ability to accommodate daily withdrawals in the large and variable quantities required by Centra. Due to the location, pipeline transportation to Manitoba would be uneconomic and operationally challenging. For these reasons, WBIP storage is not a viable option for Centra.

Northern Natural Gas Storage

NNG operates storage in Iowa and is currently sold out with no available capacity. In any event, pipeline transportation from this region to Manitoba is very limited and may potentially be unreliable. For these reasons, NNG storage is not a viable option for Centra.

Virtual Storage

Virtual storage is a service offered by some marketers. It consists of virtual "injections" of quantities of gas to a marketer in the summer to accommodate virtual "withdrawals" of gas from the marketer in winter. While the rates for virtual storage are generally competitive with physical storage, virtual storage presents a number of risks to Centra, specifically:

1) Marketer supply risk – Centra would be at risk of failure of the marketer to supply the service contracted for. In the event of default, Centra would be left to attempt to arrange the required supply and to pursue the marketer for damages for breach of contract. This risk is not only financial, but puts security of supply into question for an LDC such as Centra that serves a cold-weather market;
2) Bankruptcy risk – the risk of bankruptcy of the marketer to whom Centra would have paid a fee for storage service and delivered summer gas purchases, without access to specific assets in the event of bankruptcy; and
3) Renewal risk – virtual storage arrangements generally do not contain renewal rights or have the permanence of physical storage, posing renewal risk in the event that a marketer declines to continue to provide the service at contract

expiry, potentially leaving Centra without a storage service.

Centra can be confident in the availability of physical commodity owned by Centra, placed into physical storage, and connected to the load in Manitoba via firm transportation services, thereby improving security of supply and reliability relative to a virtual storage service. Further, physical operators have an ongoing need to sell storage and transportation services providing some comfort that service will be available in the future.

When attempting to compare physical storage and virtual storage, the specific attributes offered by a virtual storage provider must be carefully considered against the specific requirements and circumstances of an LDC such as Centra in order to make a meaningful comparison. For example, the proposed virtual storage service may be very basic and not make provisions for intra-day storage withdrawal rights (provision of day-ahead withdrawals only). This would eliminate one of the primary benefits of storage for an LDC, which is the ability to respond to weather-driven, intra-day load swings.

Given the availability of physical storage at attractive rates and the inherent risks associated with virtual storage, contracting for physical storage and transportation services remains the prudent course of action for Centra.

7.2.2 Eastern Storage Options

There are several Michigan and Southern Ontario based storage operators that could potentially provide service to Centra. Centra held discussions with five storage operators in this region and received four proposals. As the proposals contained customized

services and commercially sensitive information, the proponents will hereby be referred to as ANR and Parties B, C and D.

ANR and Parties B, C, and D all presented storage proposals to Centra, which Centra reviewed to determine the leading alternatives. ANR and Party B's proposed arrangements were found to be superior to those from Parties C and D on a total cost basis, which included consideration of: source of supply to fill storage; cost to transport supply to storage; cost of storage; and cost of transporting gas withdrawn from storage to Manitoba. In addition to having a cost advantage, Party B was better than or equal to Parties C and D with respect to assurances of its ability to reliably accommodate Centra's highly variable daily storage withdrawal requirements, including intra-day and late-night modifications to withdrawal quantities. ANR was better than all parties with respect to reliability, as will be discussed in Section 7.6. On this basis, Centra eliminated the proposals of Parties C and D. Centra then modelled the proposals from ANR and Party B to evaluate the total cost of the gas supply, transportation, and storage portfolios.

7.3 Modelling of Portfolio Data

Centra conducted the modeling of ANR and Party B portfolios using the SENDOUT optimization model. SENDOUT is a proprietary network optimization model that is used by natural gas utilities to evaluate gas supply, transportation and storage options. SENDOUT runs were conducted separately for ANR portfolios and Party B portfolios, to arrive at the optimal modeled portfolio for each which could then be compared. Inputs included demand and historical weather data, all relevant reservation, commodity, and fuel rates for storage and transportation paths, and forward price curves for various

supply points. SENDOUT then selects transportation paths and capacities, storage capacities and deliverability, and quantities of supply from various sources in order to determine the least cost solution over a range of weather scenarios.

It should be noted that this model utilizes the weather data inputs to choose the lowest cost mix of supply, storage and pipeline resources for the period of interest. The results of the SENDOUT simulation must be examined in light of its "perfect foresight" of the weather conditions. That said, the simulation exercise is useful in comparing two alternative supply portfolios under equal weather assumptions and the results are useful in providing portfolio cost comparisons to assist in the decision making in selecting the most appropriate portfolio to meet the LDC's objectives.

7.3.1 North American Price Curves

SENDOUT performed optimization modeling utilizing commodity price curves based on futures market prices for the following annual periods:

- 2013-14 (April 2013 to March 2014), or the "year one" ("y01") curves; and
- 2017-18 (April 2017 to March 2018), or the "year five" ("y05") curves.

SENDOUT therefore produced two sets of results for each portfolio scenario:

1) a lowest cost portfolio based on 20 years of weather for y01 prices; and
2) a lowest cost portfolio based on the same 20 years of weather for y05 prices.

<u>Centra's Price Curves</u>

Price curves were developed for the five-year forward period based upon futures market prices as per published gas trading exchange data. Futures prices for Canadian market

hubs were obtained from NGX, a Calgary based Canadian energy exchange. NYMEX futures prices were utilized for U.S. gas trading points. The intent was not to attempt to predict future gas prices with certainty for any particular period, but rather to test the robustness of portfolio scenarios against different market pricing scenarios based on publicly available market trading data.

Upon examination of the price curves, y01 and y05 were considered to provide sufficient variability to serve as appropriate scenarios to run portfolio optimization trials through SENDOUT.

For the five-year period from April 2013 to March 2018, futures settlement prices were taken as of the January 9, 2012 market close for the following market pricing points:

- AECO
- Empress
- MichCon
- Chicago
- Oklahoma
- Louisiana
- Emerson
- Dawn

Monthly futures prices were then converted to seasonal averages for use in SENDOUT, so as to avoid having the portfolio optimization determining unique monthly supply acquisition decisions assuming perfect foresight of monthly price differentials that would

otherwise have been embedded in the model. The CAD/USD exchange rates used in the model were the implied exchange rates embedded in futures market prices for year one and year five of the price curves, which were $1.033 CAD/USD and $1.043 CAD/USD respectively. Implied exchange rates were determined utilizing an available pricing point posted by NGX in both $CAD/GJ and $USD/Dth. Using the implied exchange rate embedded in futures prices avoids disrupting the dynamic relationship between exchange rates and Canadian/US gas prices. Schedule 1 to this Tab displays the monthly price curves, seasonal averages and CAD/USD exchange rates used for SENDOUT inputs.

ICF's Price Curves

While the use of futures pricing is a reasonable approach for modeling purposes, Centra also undertook the modeling exercise using the gas price forecast from ICF's October 2011 GMM Base Case for these points. Schedule 2 to this Tab provides the ICF monthly market price forecasts, seasonal averages and CAD/USD exchange rates utilized. Consistent with the use of Centra's futures-based price curves, portfolio optimization was conducted using ICF's proprietary price forecasts for y01 (April 2013 – March 2014) and y05 (April 2017 – March 2018). The forecast CAD/USD exchange rates associated with ICF's October 2011 GMM Base Case Price Forecast for these years were also input into SENDOUT, which equated to $1.029 CAD/USD for y01 and $1.036 CAD/USD for y05.

Other Pricing Information Employed in the Analysis

Futures market prices and proprietary price forecasts were not available for Empress Swing supply, ANR injection point and Farwell supplies. These were relevant pricing

points to Centra's portfolio and therefore must be included for portfolio optimization assessment. In order to derive price curves for these points, reasonable price adders based on market intelligence were applied to both futures prices and ICF's proprietary price forecasts as follows:

1) Empress Swing supply – due to the higher expected cost of acquiring Swing supply at Empress relative to Baseload supply, a $0.10 CAD/GJ adder was applied to Empress gas prices derived from futures or from ICF's forecast;
2) ANR injection point supply – summer gas acquired at this point for storage injection on the ANR system in Michigan was assumed to require an adder of $0.05 USD/Dth over the MichCon price derived either from futures or from ICF's forecast; and
3) Farwell supply – winter gas acquired for transport on GLGT to Emerson at this large interconnect between ANR and GLGT in Michigan was assumed to bear a price premium of $0.10 USD/Dth over the MichCon price derived from futures or from ICF's forecast.

7.3.2 Model Inputs for Transportation and Storage

Rates used in SENDOUT for transportation and storage services included reservation/demand rates, commodity rates, and fuel rates. Rates were either provided by service providers in the course of negotiations, or obtained through their published rates. In the case of published TCPL tolls, special consideration was given to several factors:

1) under the 2007-11 Mainline Settlement, tolls for 2011 would have been higher than the 2011 final tolls that were subsequently carried forward as the current interim 2012 tolls (EZT of $2.45/GJ versus current $2.24/GJ);
2) the current TransCanada Application before the NEB contemplates charging premiums for TCPL discretionary services (such as STFT and IT) of 140% to 160% above annual FT tolls for certain markets; and
3) market circumstances, such as growth in U.S. shale gas, that may continue to place upward pressure on TCPL tolls.

After considering these factors, Centra used tolls based on the current TCPL benchmark toll of $2.24/GJ EZT in the model while assuming a premium of 140% of FT tolls for a seasonal block of STFT (e.g. five-month winter block from November to March) and 150% of FT tolls for monthly contracting of STFT as per the current TCPL Application before the NEB. This approach acknowledges the current TCPL Application and the continued upward pressure on TCPL tolls.

With respect to transportation options available in the model, Centra used STFT as a proxy for any short-term discretionary services from western Canada, including delivered services (bundled supply and transportation to Centra's delivery areas) from marketers.

7.3.3 Model Constraints

Centra applied several constraints within the SENDOUT model. The use of constraints in a model takes into account issues such as supply liquidity and contract constraints. In the model, supplies at Emerson, ANR injection point, and Farwell were limited to a daily maximum of 21,101 GJ/day (20,000 Dth/day) due to comparatively less liquidity than major supply hubs. ANR winter transportation from the Joliet Hub to ANR storage was limited to 42,202 GJ/day (40,000 Dth/day). Daily winter purchases of MichCon supply for the Party B portfolio were limited to 52,753 GJ/day (50,000 Dth/day). TCPL STS transportation was set at the levels in Centra's current STS contract (54,000 GJ/day summer, 215,614 GJ/day winter). Levels of desired "unserved" demand were also specified in the model to allow for the assumed use of peaking services, including up to 50,000 GJ/day of firm "unserved" demand in the winter months to be met with firm peaking services.

7.4 Model Results

As per the table provided below, on a total cost basis, the ANR and Option B portfolios are very close. In y01 using both futures prices and ICF prices and in y05 using ICF prices, the ANR portfolio has a small total cost advantage over Option B. Using futures prices, Option B has a small total cost advantage over the ANR portfolio in y05. Option B relies more heavily on a single alternative supply hub (MichCon) to WCSB supply via Empress and Emerson. The ANR portfolio has more diversity in having Chicago supply available on the same transportation path used for injections of WCSB sourced supply, in addition to having supply options within Michigan priced relative to the MichCon hub (ANR injection point supply and Farwell supply). The model results also indicate that

WCSB supply will continue to be a cost effective source of supply for summer storage injections.

	Futures Curves				ICF Curves			
	Case 1 - ANR		Case 2 - Option B		Case 3 - ANR		Case 4 - Option B	
	y01	y05	y01	y05	y01	y05	y01	y05
Average annual costs (CAD millions)*								
Supply	188.5	268.6	187.2	271.6	188.4	330.0	186.8	329.9
Storage	9.2	9.3	9.0	10.0	9.1	11.1	8.3	10.0
Transport	49.2	48.7	51.3	44.8	49.5	47.7	52.3	49.4
Total	246.9	326.5	247.5	326.3	247.0	388.8	247.3	389.2
Incremental cost vs Case 1			0.6	-0.2				
Incremental cost vs Case 3							0.3	0.4
Storage								
Capacity (PJ)	15.6	15.4	14.8	16.5	15.2	19.9	13.9	16.5
Deliverability (TJ/d)	214.1	216.0	228.0	253.2	214.0	236.4	213.6	253.2
Average Annual Supply (PJ)*								
Empress - Baseload	42.9	42.3	44.2	31.4	43.1	39.7	44.6	42.3
Empress - Swing	6.5	6.4	6.9	7.4	6.6	4.2	7.4	5.2
Emerson	1.0	1.0	0.8	0.4	0.9	0.2	0.8	1.0
MichCon	N/A	N/A	3.2	15.7	N/A	N/A	2.4	6.7
ANR injection point	2.7	3.7	N/A	N/A	2.4	3.7	N/A	N/A
Chicago	1.1	0.6	N/A	N/A	1.3	6.9	N/A	N/A
Farwell	1.1	1.4	N/A	N/A	0.9	0.6	N/A	N/A

*Annual average over 20 weather years.

7.5 ICF Analysis

In addition to Centra's evaluation of transportation and storage options and associated supply options as discussed in Sections 7.1 through to 7.4, ICF was engaged to perform a supply portfolio optimization analysis of future natural gas supply, transportation, and storage options. Please see Attachment 1 to this Tab for ICF's Conclusions of Supply Portfolio Optimization Analysis dated February 2012.

In summary, after using its own proprietary natural gas market forecasting and optimization models to conduct the analysis, ICF concluded that the ANR storage option presents a better value than storage option B.

7.6 Evaluation Conclusions

On a total cost basis, the ANR and Option B portfolios are generally very close, including the SENDOUT model results using both futures and ICF price curves, as well as the ICF model results.

ANR and GLGT have to date flawlessly delivered Centra's storage gas to Manitoba, including accommodation of intra-day and late night modifications to storage withdrawals. Under both the current and proposed portfolios, ANR can use one of two ANR/GLGT interconnects (Deward and Farwell) to deliver Centra's storage gas to GLGT. These are two of the largest interconnects on GLGT's system, providing greater assurance of ANR's ability to deliver Centra's storage gas to GLGT under constrained operating conditions and making ANR ideally situated in Michigan to provide reliable service to Centra. Further, as affiliated companies, the ANR and GLGT systems are operated from the same control room, providing for optimal communication between

these pipeline systems to facilitate reliable operations.

The ANR/GLGT portfolio also provides the ability to diversify from WCSB supply transported on TCPL using both Chicago and Michigan purchases. The summer injection transportation path for WCSB sourced supply has the Joliet Hub in-path enabling access to Chicago supply, while Michigan purchases at the ANR injection point can also be used to fill storage. In winter, Chicago purchases can be used to manage storage levels, and Michigan purchases at Farwell can be used to directly serve Centra's requirements. In contrast, the Option B portfolio places greater reliance on supply at a single alternative hub to WCSB sourced supply.

Centra determined that ANR/GLGT was the preferred portfolio and that new storage and transportation arrangements should be pursued with this supplier. The ANR/GLGT portfolio offers a demonstrated record of reliability, provides supply diversity and the flexibility to adapt to changing market conditions, and effectively carries no cost premium relative to any other comparable option.