

# Negative Price Differential Pressure on the Williston Basin Crude Oil Market: Contributing Factors and Potential Solutions

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This is an update of the “Negative Price Differential Pressure on the Williston Basin Crude Oil Market: Contributing Factors and Potential Solutions” White Paper prepared by ALL Consulting in December of 2006. This report will update information provided in that report and elaborate on what has taken place since that date.

## Executive Summary

During the winter of 2005/2006 significant crude oil pricing differentials began to negatively impact producers operating in the Rocky Mountain region and Williston Basin markets in particular. These price differentials have continued through early 2009. The driving factors behind the price differential are numerous, but most importantly include limited regional refining capacity, limited export pipeline capacity, near-term increasing crude production within the Rocky Mountain region, longer-term increasing production and importation of heavy Canadian oil sands crude (referred to hereafter as Canadian oil sands crude), and inadequate and untested regulatory regimes. Potential solutions are also numerous, but can be summarized as increasing regional refining capacity, increasing export pipeline capacity, and revision of pipeline nomination and apportionment protocols. The first two solutions would require potentially significant capital expenditure and lead-time for implementation, the efficacy of which may be limited as Canadian oil sands crude imports are projected to increase, so addressing US Federal Energy Regulatory Commission rules for the nomination of crude volumes and pipeline apportionment protocols may well offer the greatest benefit to Williston Basin producers over the near-term with increasing export pipeline capacity and refinery capacity providing a benefit over the long-term. It should be noted that increasing regional export capacity would only be successful in alleviating current price differentials if the markets that currently receive exports from the Rocky Mountain region, Cushing, OK, Wood River – Patoka, IL, and Clearbrook, MN, have the capacity to receive the oil exported. Currently, there are plans for adding pipelines to provide increased export capacity for Canadian oil sands crude directly to each of these three markets.

## Introduction

Crude oil production within the Williston Basin currently totals approximately 267 M bpd (thousand barrels per day) (NDIC, 2009). This crude is shipped to refineries within the Rocky Mountain region (for the purposes of this discussion: Colorado, Idaho, Montana, North Dakota, Utah, and Wyoming) or it is exported out of the region on either the Enbridge North Dakota pipeline to Clearbrook, MN or from the Guernsey, WY hub via Kinder Morgan’s Platte Pipeline to Wood River, IL (NDIC, 2007). Refining capacity within the Rocky Mountain region actually exceeds the region’s crude oil production (see mass balance, **Table 1**); however, the regional refineries also process significant volumes of crude imported from Canada (Richards, 2006 and EIA, 2009). Crude oil exports from the Rocky Mountain region are currently limited by the approximate 253 M bpd combined capacity of crude oil export pipelines (see **Table 1**) however this is expected to increase in 2010 to 306 M bpd with expansion of the Enbridge North Dakota pipeline system. Likewise, the market for refined products within the Rocky Mountain region is limited, as is export product pipeline capacity to growing markets outside the region (ND DMR, 2006 and NDIC, 2007). Together, these factors serve to limit regional consumption and overall export capacity.

Since late 2005 (PPLC, 2006) this combination of factors has resulted in a net excess of crude oil within the Rocky Mountain region which in turn exerted significant downward pressure on spot market prices for Williston Basin crude – up to \$31 less on the New York Mercantile Exchange (NYMEX) in 2006 which decreased to approximately \$5 per barrel in late 2007 (NDIC, 2007) but has increased to \$8 to \$15 in late 2008 (EIA, 2009). With a range of \$5 to \$15 per barrel discount there is a \$1MM to \$3MM daily loss for the Williston Basin regional producers as well as significant losses in state and local tax revenues. This below market crude pricing potentially threatens future investments geared towards:

- 1) continuing to produce marginal wells
- 2) exploring for new opportunities
- 3) engaging in significant enhanced oil recovery (EOR) projects

The purpose of this paper is to examine the contributing factors and to discuss potential strategies to mitigate future price differential within the Rocky Mountain region and Williston Basin in particular. The contributing factors considered include:

- 1) growth and decline of domestic production
- 2) imports of Canadian oil sands crude
- 3) limitations on refining within the Rocky Mountain region
- 4) limitations on pipeline exports from the Rocky Mountain region
- 5) related administrative/regulatory issues
- 6) softness in the consumer market

## **Background**

A material balance for the Rocky Mountain region has been prepared and is provided as **Table 1**. The material balance includes imports into the region, regional crude oil production, refining within the region, and crude oil exports out of the region. Refined product exports from the region are not included because the first limiting factor facing regional crude is available capacity at the refineries themselves or pipeline export capacity as crude.

Williston Basin oil production has increased significantly from a low in 1995 to present volumes which approach the record production of the early 1980's (NDIC, 2007 and Muse Stancil, 2007). Enbridge (Enbridge, 2009) has projected Williston Basin production to peak in the 2010-2011 timeframe; others have predicted the peak to occur as early as 2008. Currently, production from the Williston Basin is approximately 267 M bpd (NDIC, 2009); Rocky Mountain regional production, including North and South Dakota, totals approximately 517 M bpd and is predicted to increase to approximately 562 M bpd (see **Table 1**).

A significant portion of this crude is refined locally within the Rocky Mountain region. In fact, regional refinery capacity exceeds regional production by over 100 M bpd (see **Table 1**); so, substantial volumes of imported Canadian crude oil are also refined in the region. In 2007, refineries in the Rocky Mountain region processed 280 M bpd of Canadian crude oil. Oil is also exported from the region; including domestic production and a portion of throughput Canadian crude oil. Currently, two pipelines export crude out of the region; numerous other pipelines transport crude to refineries within the Rocky Mountain region. The two export pipelines are Kinder Morgan's Platte Pipeline (PPLC) from Casper, Wyoming to Wood River, Illinois which has a capacity of 170 M bpd outbound from Guernsey, Wyoming to Gurley, Nebraska and 143 M bpd

from Gurley, Nebraska to Wood River, Illinois (Kinder Morgan, 2009). The second export pipeline is the Enbridge North Dakota Pipeline originating in Alexander and Grenora, North Dakota and flowing to Clearbrook, Minnesota with a capacity of approximately 110 M bpd. An expansion of the Enbridge North Dakota Pipeline is scheduled for completion in mid-2010 and will increase the capacity of the pipeline to 161 M bpd (Enbridge, 2009). Relatively minor amounts of Williston Basin crude are exported by truck to Canada (NDIC, 2007). Imports of Canadian crude oil into the Rocky Mountain region are transported via the Kinder Morgan Express Pipeline, the Plains All American Pipeline Co. Western Corridor (Glacier) Pipeline System, the True Eastern Corridor Pipeline System and the Cenex Front Range Pipeline (see **Table 1**).

<b>Table 1</b>						
<b>Rocky Mountain Region Oil Balance</b>						
in thousand barrels per day (M bpd)						
<b>Category</b>	<b>2006 Actual <sup>1</sup></b>	<b>2007 Actual <sup>1</sup></b>	<b>2008 Actual <sup>1</sup></b>	<b>2009 Predicted <sup>2</sup></b>	<b>2010 Predicted <sup>2</sup></b>	<b>2011 Predicted <sup>2</sup></b>
<b>Regional Pipeline Import Capacity (M bpd)</b>						
KM - Express Pipeline *	280		280			
Cenex - Front Range Pipeline - approx.	75		75			
PAAP (Western Corridor-Glacier) *	25		25			
True - Eastern Corridor *	30		30			
<b>Import Capacity Total</b>	<b>410</b>	<b>410</b>	<b>410</b>	<b>410</b>	<b>410</b>	<b>410</b>
<b>Regional Production by State (M bpd)</b>						
Colorado	64.1	63.8	60.5	59.3	58.1	56.9
Montana	99.3	95.3	81.3	74.8	68.8	63.3
North Dakota	109.3	123.6	166.2	187.8	212.2	239.8
South Dakota	3.9	4.6	5.0	5.0	5.0	5.0
Utah	49.2	53.6	58.7	59.3	59.9	60.5
Wyoming	145	148.2	145.2	142.3	139.5	136.7
<b>Production Total <sup>3</sup></b>	<b>470.8</b>	<b>489.1</b>	<b>516.9</b>	<b>528.5</b>	<b>543.5</b>	<b>562.2</b>
<b>Regional Refinery Capacity (M bpd)</b>						
<b>Refinery</b>	<b>Refinery Capacity 2006</b>		<b>Refinery Capacity 2008</b>			
Billings - Cenex	55		59.6			
Billings - ConocoPhillips	58		58			
Billings - ExxonMobil	60		60			
Casper - Little America	24.5		24.5			
Cheyenne - Frontier Oil	52		52			
Denver - Suncor	90		94			
Evanston - Silver Eagle	3		3			
Great Falls - Montana Refining	8.2		9.5			
Mandan - Tesoro	58		58			
Newcastle - Wyoming Refining	12.5		14			
Rawlins - Sinclair	66		66			
Salt Lake - ChevronTexaco	45		45			
Salt Lake - Big West (Flying J)	31		29.4			
Salt Lake (Woods Cross) - Holly	24.7		25.05			
Salt Lake (Woods Cross) - Silver Eagle	10.25		10.25			
Salt Lake - Tesoro	58		58			
<b>Refining Capacity Total <sup>4</sup></b>	<b>656.15</b>	<b>666.3</b>	<b>666.3</b>	<b>666.3</b>	<b>666.3</b>	<b>666.3</b>
<b>Regional Pipeline Export Capacity (M bpd)</b>						
KM- Platte Pipeline (east of Gurley, NB) *	143	143	143	143	143	143
Enbridge - ND Pipeline *	91.5	110	110	110	161	161
<b>Export Capacity Total <sup>5</sup></b>	<b>234.5</b>	<b>253</b>	<b>253</b>	<b>253</b>	<b>304</b>	<b>304</b>
<b>Balance</b>	<b>-10</b>	<b>-20</b>	<b>8</b>	<b>19</b>	<b>-17</b>	<b>2</b>

Notes:

\* = Capacity as stated by company website, as of April 2009.

1 = Actual production data from EIA website 2009.

2 = Predicted production data based on current production trends for each state with the exception of North Dakota (See below):

- Colorado decreases at 2% per year.
- Montana decreases at 8% per year.
- North Dakota increases at 13% based on production data from Jan. 2004 through Dec. 2007. Current trend from Jan. 2008 for N. Dakota shows an increase of 45%, however to be conservative, the 13% determined for Jan. 2004 through Dec. 2007 was used for predicted years.
- South Dakota remains constant at 0%.
- Utah increases at 1 % per year.
- Wyoming decreases at 2% per year.

3 = data through January 2009.

4 = predicted refinery capacity is based on the stated capacity for 2008 (EIA, 2009) and remaining constant (2009 Annual Energy Outlook and EIA, 2009).

5 = data through April 2009.

Negative balance = combined refining and export pipelines have available capacity to accept more crude oil.

Positive balance = combined refining and export pipeline capacity is exceeded creating a net surplus of crude oil.

A material balance for the Williston Basin alone has not been prepared because accurately identifying the transportation and refining uptakes specific to regionally produced crude oil proved to be impractical; much of this data appears to be proprietary and not publicly available. As shown on **Table 1**, the stated capacities of the pipelines and refineries shows a negative balance for 2005 through 2007 indicating available capacity to refine or export additional crude oil. However, available excess capacity was not the experience domestic producers encountered during that timeframe. In fact, from December 2005 through 2007 there existed a significant over abundance of crude oil in the Rocky Mountain regional market resulting in pipeline proration and downward pressure on spot market crude prices resulting in a dramatic price differential. For 2008 and 2009 a positive balance or excess of supply is indicated; this is due to the current trend of increased production from the Bakken in North Dakota. This excess is expected to be somewhat alleviated in 2010 with the increased export capacity of the Enbridge North Dakota pipeline but would reappear in 2011 if North Dakota production continues to increase at an annual trend of 13%.

## Contributing Factors

### Domestic Production Trends

Beginning in early 2005, NYMEX spot market prices have climbed to record levels reaching a peak in mid-2008 since which time they have declined to levels that are comparable to mid-2005 (EIA, 2009). The increase in prices experienced from early 2005 to mid-2008 stimulated domestic production and exploration thus reversing the regional production decline trend and creating a production growth mode (IOGCC, Undated a). The growth in production was not paralleled by an increase in export transportation capacity. The result has been that production exceeds export transportation capacity creating either an inability to market the oil or a depressed price for the oil that can be marketed (NDIC, 2007).

### Canadian Production Trends

Production and importation of Canadian oil sands crude and Canadian synthetic crude oil are both increasing (CAPP, 2008; IOGCC, Undated a; and Muse Stancil, 2007). To service this production, Kinder Morgan expanded capacity on their Express Pipeline from 172 to 280 M bpd (CAPP, 2008). The Express Pipeline transports Canadian oil sands crude from Hardisty, Alberta to Casper, Wyoming where it connects with Kinder Morgan's Platte Pipeline which has a capacity of 170 M bpd from Casper to Guernsey, Wyoming and on to Gurley, Nebraska but reduces to a 143 M bpd takeaway capacity downstream of Gurley (Kinder Morgan, 2009).

Consequently, there has been an oversupply of Canadian oil sands crude into the markets upstream of Gurley, Nebraska, specifically the Guernsey Market, following expansion of the Express Pipeline (IOGCC, 2007).

### Refining Capacity

Limited refining capacity and temporary loss of a portion of that capacity due to fires at the Suncor Refineries in 2006 contributed to the 2006 price differential. There have been no significant changes in refining capacity among Rocky Mountain region refineries in the last 20 years (IOGCC, 2007). The total US refining capacity at the end of 2008 and early 2009 is 17.6 MM bpd, a 1.7 % increase over that in 2006 and an 11.4 % from 1998 (no new refineries have been built in the US in the last 30 years). Suncor which operates two neighboring refineries in Commerce City, Colorado experienced two fires which resulted in a temporary loss of 60 M bpd refining capacity from December 2005 through May 2006 (ND DMR, 2006). Suncor upgraded its refining equipment during that time to allow processing greater volumes of Canadian oil sands crude (Suncor, 2006). Refinery utilization within the Rocky Mountain Region has decreased slightly over the last three years operating at approximately 93% capacity in 2006 which decreased to 91% in 2007 and 89% in 2008 and early 2009 (EIA, 2009). The lower refinery utilization may be a contributing factor to the current, or continued, price differential within the region. The 2005 hurricanes caused damage and disruption to the Gulf Coast refinery market. This decrease in Gulf Coast refining capacity required Rocky Mountain region refineries to continue at full output during their normal maintenance season (IOGCC, 2007 and Undated a). This may have actually created some additional demand for Williston Basin crude as compared to a “normal” year. Therefore, had the Rocky Mountain refineries decreased capacity, as they normally would during their turn-around season, it is possible that the oversupply of crude and resultant price differential could actually have been worse in 2006 than what was experienced.

### Export Pipeline Capacity

There is limited market choice for Rocky Mountain and Williston Basin crude because of limited export transportation options (IOGCC, 2007). Currently, only two pipelines provide for the transport of crude oil out of the Rocky Mountain region: the Kinder Morgan Platte Pipeline (143 M bpd) and the Enbridge North Dakota Pipeline (currently 110 M bpd expanding to 161 M bpd in 2010). Together, these pipelines have a carrying capacity of 253 M bpd which will increase to 304 M bpd by year end 2010 (see discussion of Enbridge expansion under solutions).

The Petroleum Administration for Defense District (PADD) system divides the US into five geographic districts established during World War II to facilitate regional allocation of oil. At that time, the first use of long distance, high volume pipelines was established as a countermeasure to pre-empt marine tanker sinkings by German submarines along the Atlantic and Gulf Coast. Ultimately, the pipeline systems and PADDs largely shaped the petroleum industry and post-war economic boom within the US (Trench, 2001). The pipeline system that the Guernsey market is controlled by is typical of the US PADD system of pipeline based crude and product distribution. The Rocky Mountain region is within PADD IV; the Clearbrook, Minnesota and Wood River – Patoka, Illinois hubs fed by the Kinder Morgan Platte and Enbridge North Dakota Pipelines are located within PADD II. Strictly speaking, North and South Dakota (discussed herein as part of the Rocky Mountain region) is part of PADD II; however, because the exporting pipelines are the same as those for PADD IV it can be included in the Rocky Mountain region as defined herein.

### Administrative/Market Issues

The federal fuels standard for Ultra Low Sulfur Diesel (ULSD) required refinery modifications before June 2006. Additionally, some Rocky Mountain region refineries have added (or are planning to add) coking units

allowing processing of low gravity, high sulfur crudes, such as heavy Canadian oil sands crude, into fuels rather than just into asphalt. Therefore, some refineries are no longer as dependent on Wyoming Sweet Crude for fuel production as they previously had been (IOGCC, 2007 and Undated a).

The large volume production of Canadian oil sands crude and Canadian synthetic crude oil provide for negotiation of large volume, long-term contracts with refineries (IOGCC, 2007 and Undated a) and in some cases the US refineries are actually owned by Canadian companies (e.g. Suncor) or, as is the case for two refineries in PADD II where ConocoPhillips has entered into a joint venture with a Canadian company, Encana. The average regional domestic producer does not have a similar volume; therefore, they are at a potential pricing disadvantage when negotiating contracts resulting in excess crude not being purchased by refiners within the region.

### Regulatory Issues

Oil pipelines are governed by the US Federal Energy Regulatory Commission (FERC) through the Interstate Commerce Act (ICA). The ICA requires that rates charged for crude oil transport must be just and reasonable. The ICA prohibits an oil pipeline company from subjecting a shipper to undue or unreasonable preference or disadvantage. When requests for product shipments on a common carrier's facilities exceed the pipeline's capacity, the space must be allocated among shippers in a non-discriminatory manner. This usually occurs on what is called a "pro rata" basis but there are other methods of allocation.

*"As common carriers, oil pipelines cannot allocate capacity on a first-come, first-served basis, or to the highest bidder. If more volumes are tendered than the pipeline can accommodate, the pipeline must allocate capacity in a non-discriminatory manner. Many pipelines allocate pro rata based on the volumes nominated. Some pipelines use, and FERC has approved, historical shipments as a basis for the pro rata allocation.<sup>i</sup> Under this method, a shipper's volumes over a specified period (3-12 months) form the basis for rationing the capacity, and a small amount of capacity, ranging from 3-15%, but typically 5% is reserved for "new" shippers to allow shippers to build up historical volumes over time. FERC requires that an oil pipeline's prorationing method be included in its tariff<sup>ii</sup>" (IPAA, 2006).*

Prorationing on the Platte Pipeline (PPLC, 2006 a and EPL, 2008) had been based on shippers "...nominations as a percentage of available capacity..." with "...an obligation on shippers to either ship or pay for 95% of their 'binding nominations' once prorationing is declared for a given month." This FERC system allowed for the manipulation of pipeline allocations by submission of inflated nominations vs. actual delivery (IOGCC, 2007; PPLC, 2006 a and b), albeit with the stated penalty. The penalty for over nominating in some instances appeared inadequate to discourage over-nominations by some shippers who sought to protect their own capacity. By over-nominating a shipper could minimize the proportional reduction of pipeline capacity they would otherwise experience, giving them greater ability to ship in a constrained market. In 2006, PPLC moved to modify this system by adopting an alternative prorationing program based on a six-month rolling average to establish nomination history, providing for 10% capacity reserve for "new shippers" (vs. the 3% previously held) and a shipper can qualify as "new" if they have shipped in four or fewer months of the six-month rolling average period), and the re-allocation among all shippers of any capacity unused by a regular shipper. This new proration scheme was proposed specifically to address the problem of gamesmanship through inflated nominations to secure, or maintain, a transportation share in the face of increased production and decreased refining (PPLC, 2006 a, EPL, 2008).

### Regional Market Issues

Relatively soft consumer market demand also contributed to the oversupply of crude oil due to reduced driving (as a result of higher fuel costs) and milder average winter temperatures (IOGCC, 2007). Refinery turnaround required by seasonal fuel formulation requirements also serves to temporarily reduce refinery throughput. Overall however, the long-term market is one of increasing consumer demand (IOGCC, Undated a).

In light of significant importation of Canadian oil sands crude, the near-term NYMEX price differentials that appeared in late 2005 and early 2006 and have continued through early 2009 for the Guernsey market and the Rocky Mountain region in general are likely to continue a depressed market state over the short-term due primarily to insufficient relief of export transportation constraints and regional refining capacity. Proposed pipeline projects may serve to alleviate this situation, as long as Canadian oil sands crude imports do not expand to fill the capacity made available and, thereby, continue to pressure lower volume domestic crude contracts. However, the current price differentials could persist even if regional pipeline export capacity is expanded should increased Canadian oil sands crude exports to other regions fill refinery and pipeline capacity in the Wood River – Patoka, IL; Clearbrook, MN; and Cushing, OK markets which are the outlets to Rocky Mountain region crude oil exports.

### Export Market Issues

At present, excess crude oil that is either produced in the Rocky Mountain region or imported into the Rocky Mountain region (i.e. crude oil that is not processed by a refinery within the region) is exported via the Enbridge North Dakota pipeline to Clearbrook, MN or the Kinder Morgan Platte pipeline to Wood River, IL. Excess crude oil from the Clearbrook, MN market is transported to Superior, WI or Chicago, IL area refineries or through Flanagan, IL to either the Cushing, OK market or the Wood River – Patoka, IL market. Enbridge Pipeline purchased the Spearhead pipeline in mid-2006 and reversed its flow so that it could carry Canadian crude oil from Flanagan, IL to Cushing, OK and from Cushing, OK to refineries on the Gulf Coast. In 2006, approximately 60 M bpd of Canadian oil sands crude was transported through Cushing, OK to refineries on the Gulf Coast (PADD III). This increased to approximately 95 M bpd in 2007 and 100 M bpd in 2008 (EIA, 2009). Excess crude oil from the Wood River – Patoka, IL market is also transported to the Cushing, OK market.

Data on planned, or ongoing, expansions of existing pipelines and new pipelines that would be importing or exporting crude oil into Rocky Mountain region and its export markets, as well as expansions to refineries in those markets, has been compiled and is provided in **Table 2**. This data is provided on a timeline extending to 2015 to show when the expansions or changes in import, export, and refinery capacity will occur at a particular market.

Current plans for increasing the import of Canadian oil sands crude into the US market include the TransCanada Keystone and Keystone XL pipeline system, the Enbridge Alberta Clipper pipeline, and the TEPPCO/Kinder Morgan Chinook-Maple Leaf pipeline. An additional express pipeline has been proposed by Altex Energy to transport Canadian oil sands crude from Alberta directly to the Gulf Coast (see **Table 2**).

**Table 2**  
**Pipeline and Refinery Expansions within the Rocky Mountain Region**  
**and within the Rocky Mountain Region's Export Markets**  
in thousand barrels per day (M bpd)

Region/Market	Routing	In Service Date	Timeline						
			2009	2010	2011	2012	2013	2014	2015
<b>Rocky Mtn. – Guernsey, WY</b>									
<b>Increased Pipeline Import Capacity (M bpd)</b>									
None Planned			0	0	0	0	0	0	0
Pipeline Import Increase Total			0	0	0	0	0	0	0
<b>Increased Pipeline Export Capacity (M bpd)</b>									
Enbridge N. Dakota	N. Dakota to Clearbrook, MN	Jan. 2010	0	51	51	51	51	51	51
Pipeline Export Increase Total			0	51	51	51	51	51	51
<b>Increased Refinery Capacity</b>									
None Planned			0	0	0	0	0	0	0
Refinery Increase Total			0	0	0	0	0	0	0
<b>Midwest – Clearbrook, MN – Superior, WI</b>									
<b>Increased Pipeline Import Capacity (M bpd)</b>									
Enbridge Alberta Clipper	Hardisty, Alberta to Clearbrook, MN/Superior, WI	July 2010	0	450	450	450	450	450	450
Enbridge N. Dakota	N. Dakota to Clearbrook, MN	Jan. 2010	0	51	51	51	51	51	51
Pipeline Import Increase Total			0	501	501	501	501	501	501
<b>Increased Pipeline Export Capacity (M bpd)</b>									
Enbridge Southern Access	Superior, WI to Flanagan, IL to Patoka, IL	2nd qtr. 2009	0	400	400	400	400	400	400
Pipeline Export Increase Total			0	400	400	400	400	400	400
<b>Increased Refinery Capacity (M bpd)</b>									
None Planned			0	0	0	0	0	0	0
Refinery Increase Total			0	0	0	0	0	0	0
<b>Midwest – Wood River – Patoka, IL</b>									
<b>Increased Pipeline Import Capacity (M bpd)</b>									
TransCanada Keystone	Hardisty, Alberta to Wood River – Patoka, IL	Late-2009	435	435	435	435	435	435	435
Enbridge Southern Access	Flanagan, IL to Patoka, IL	2nd qtr. 2009	400	400	400	400	400	400	400
Exxon Mobil Mustang Conversion	Lockport, IL (Chicago) to Patoka, IL	2010	0	50	50	50	50	50	50
Pipeline Import Increase Total			835	885	885	885	885	885	885
<b>Increased Pipeline Export Capacity (M bpd)</b>									
Exxon Mobil/Enbridge Texas Access	Patoka, IL to Beaumont, TX	Mid-2011	0	0	445	445	445	445	445
Exxon Mobil Pegasus	Patoka, IL to Gulf Coast	1st qtr. 2009	30	30	30	30	30	30	30
Pipeline Export Increase Total			30	30	475	475	475	475	475
<b>Increased Refinery Capacity (M bpd)</b>									
WRB Refining, LLC	Wood River, IL	2011	0	0	50	50	50	50	50
Refinery Increase Total			0	0	50	50	50	50	50
<b>Midwest – Cushing, OK</b>									
<b>Increased Pipeline Import Capacity (M bpd)</b>									
TransCanada Keystone - Cushing Extension	KS/NE Border to Cushing, OK	4th qtr. 2010	155	155	155	155	155	155	155
TransCanada Keystone XL	Hardesty, Alberta to Cushing, OK	2011/2012	0	0	500	500	500	500	500

**Table 2**  
**Pipeline and Refinery Expansions within the Rocky Mountain Region**  
**and within the Rocky Mountain Region's Export Markets**  
in thousand barrels per day (M bpd)

Region/Market	Routing	In Service Date	Timeline						
			2009	2010	2011	2012	2013	2014	2015
Enbridge Spearhead	Flanagan, IL to Cushing, OK	3rd qtr. 2009	65	65	65	65	65	65	65
TEPPCO/Kinder Morgan - Chinook-Maple Leaf	Hardest, Alberta to Cushing, OK	Late-2011/Early-2012	0	0	440	440	440	440	440
Pipeline Import Increase Total			220	220	1160	1160	1160	1160	1160
<b>Increased Pipeline Export Capacity (M bpd)</b>									
TransCanada Keystone XL	Cushing, OK to Gulf Coast	2011/2012	0	0	700	700	700	700	700
Sunoco	Cushing, OK to Gulf Coast	2011	0	0	300	300	300	300	300
Centurion Pipeline Reversal	Cushing, OK to Slaughter, TX	4th qtr. 2009	60	60	60	60	60	60	60
TEPPCO/Kinder Morgan - Chinook/Maple Leaf	Cushing, OK to Gulf Coast	Late-2011/Early-2012	0	0	550	550	550	550	550
Pipeline Export Increase Total			60	60	1610	1610	1610	1610	1610
<b>Increased Refinery Capacity (M bpd)</b>									
WRB Refining, LLC	Borger, TX	2011	0	0	25	25	25	25	25
Refinery Increase Total			0	0	25	25	25	25	25
Notes: Pipeline data from CAPP, 2008; NEB, 2008 and company websites. Refinery data from company websites.									

TransCanada Pipeline has plans for two pipelines that would deliver Canadian oil sands crude directly to Midwest and Gulf Coast markets and refineries, the Keystone and Keystone XL pipelines. The Keystone pipeline would have a capacity of 435 M bpd delivering Canadian oil sands crude from Hardesty, Alberta to Wood River - Patoka, IL with a 155 M bpd capacity extension to Cushing, OK. Planned completion date for the Keystone pipeline and Cushing extension is late 2009. The Keystone XL pipeline would be complimentary to the Keystone pipeline and would deliver Canadian oil sands crude from Hardesty, Alberta to existing markets and refineries in the Texas Gulf Coast. The Keystone XL would incorporate that part of the Keystone pipeline that extends through Kansas into Cushing, OK and would, in 2012, increase the capacity of the Keystone pipeline system to approximately 1.1 MM bpd delivering Canadian oil sands crude through Cushing, OK to the Gulf Coast (CAPP, 2008 and TCPL, 2009).

Enbridge and British Petroleum have entered into an agreement to develop a pipeline system, the Alberta Clipper pipeline, that would deliver Canadian oil sands crude from Hardesty, Alberta directly to Flanagan, IL and then to Patoka, IL or to Cushing, OK through the Spearhead pipeline and then from Cushing, OK to the Gulf Coast. This pipeline would have a capacity of approximately 140 M bpd to Cushing, OK and a capacity of 250 M bpd from Cushing to the Gulf Coast with an expected completion date in late 2012 (CAPP, 2008 and Enbridge, 2009).

TEPPCO and Kinder Morgan have proposed a pipeline, the Chinook-Maple Leaf pipeline, which would ship crude oil from Hardesty, Alberta to the U.S. Gulf Coast. The Chinook-Maple Leaf pipeline would have a

capacity of 440 M bpd from Hardisty, Alberta to Cushing, OK and a 550 M bpd takeaway capacity from Cushing, OK to the gulf Coast with an expected in service date of late 2011 or early 2012 (CAPP, 2008).

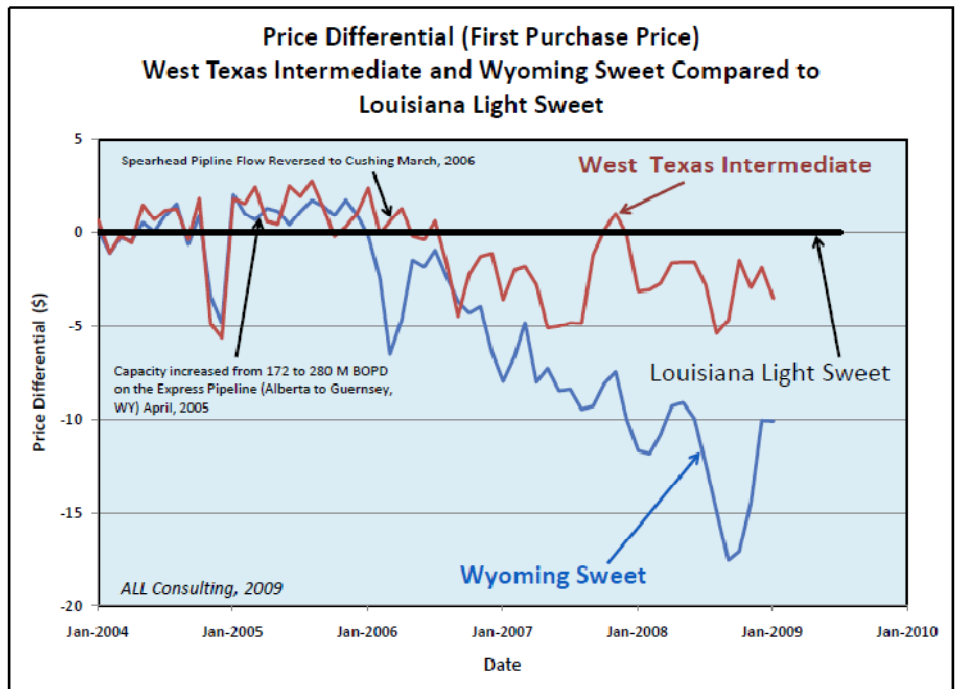
Altex Energy is currently working to develop an express pipeline to ship heavy crude oil/bitumen from various locations in Alberta to the Port Arthur/ Beaumont, Texas area. It will have an initial capacity of 425 M bpd and can expand to 1 million bpd with pumping additions. The system will employ 100,000 barrel batches and no break out tanks which will enhance batch integrity. It would be a contract carrier with some capacity for spot shippers, and could be in service in 2013/2014. This pipeline is still in the planning stages and it is unclear if it would pass through the Cushing, OK market in route to the Gulf Coast (CAPP, 2008 and Altex, 2009).

ConocoPhillips entered into a joint venture with Encana (the joint venture name is WRB Refining, LLC) to expand and upgrade the ConocoPhillips refineries at Wood River, IL and Borger, TX to receive Canadian oil sands crude. The capacity of the Wood River, IL refinery is being increased by 50 M bpd to 356 M bpd and the Borger, TX refinery capacity is being increased by 25 M bpd to 171 M bpd. Expansion upgrades for both refineries are expected to be completed in 2011.

Planned expansions or new pipelines for the transport of Canadian oil sands crude to the same markets outside of the region that would be the points of export for Rocky Mountain regional oil (Clearbrook, MN; Wood River – Patoka, IL; Cushing, OK; and the Gulf Coast) could result in a continued oversupply/bottleneck situation outside of the Rocky Mountain region similar to that experienced in the Guernsey, WY market and Rocky Mountain region.

**Figure 1**

From January 2004 to July 2006, the first purchase price for West Texas Intermediate (WTI) at Cushing, OK averaged approximately \$0.50 above Louisiana Light Sweet (LLS). Since the reversal of the Spearhead pipeline in July, 2006 bringing Canadian oil to Cushing, OK from the Chicago – Flanagan, IL market area, the first purchase price of WTI, through January, 2009, has averaged approximately \$2.50 less than LLS (EIA, 2009) (See Figure 1).



**Resulting Market Conditions**

The combination of required seasonal refinery maintenance, lack of increase in refinery capacity and lower refinery utilization within the Rocky mountain region, increased importation of Canadian oil sands crude, increased domestic production within the Williston Basin (particularly from the Bakken Formation in North Dakota and eastern Montana), and the failure of pipeline export capacity to keep up with the increased regional production and imported Canadian oil sands crude have contributed to a net excess of oil available to the regional refineries which has resulted in price differentials that began in late 2005 and have continued into

early 2009. Inflated nominations by shippers have served to further pressure spot market prices. Simply put, supply exceeded demand and export capacity within the Rocky Mountain region. Refinery maintenance issues aside, demand at the refineries has been relatively constant for the region and it is the increases in production and importation that have led to an oversupply of crude. The simple solution would be to export oil out of the region to other refining markets; however, necessary export pipeline capacity is currently lacking (**Table 1**) and bottlenecks to export may still exist due to increased volumes of Canadian oil sands crude entering those same refining markets as presented in **Table 2**. An example is the Cushing, OK market where the price of WTI has been an average of \$2.50 less than LLS since the reversal of the Spearhead pipeline allowed the transport of Canadian oil sands crude into Cushing.

### **Future Projections**

The Rocky Mountain region's narrow balance - imbalance between local refining and pipeline exporting capacity means that perturbations on the demand side, both within and outside of the region, can have significant short-term impacts on price differentials (Muse Stancil, 2007). With the predicted increase in regional crude production, it is likely that the pricing differentials will continue to exceed historical averages (IOGCC, Undated a). This tendency is likely to persist until:

- 1) new pipelines accessing additional refining markets are built
- 2) existing export pipelines are expanded
- 3) new refining capacity is built within, and outside of, the region
- 4) domestic production rates decline to a level at which the system is again in balance, and/or
- 5) there is a reduction in Canadian oil sands crude production and resulting imports\*

\*Based on CAPP (2008) projections, importation rates can only be expected to increase for the next decade and; therefore, Canadian production and imports are not likely to contribute to a return to balance. Current projections are for Canadian imports into the Rocky Mountain region to increase from 280 M bpd to 310 M bpd in 2012 (CAPP, 2008).

Longer-term NYMEX price differentials are dependent on the future balance between the critical factors discussed herein. It is likely that the price differential will continue to exceed historical (pre-2003) averages unless new pipeline capacity is added (Muse Stancil, 2007). Long-term continuation of the market depression may occur for the same reasons it did initially. This is not meant to imply that any long-term effects are the result of the original market downturn which was certainly exacerbated by the Suncor refinery fires in 2006 and ULSD retooling; rather, long-term effects may simply be a result of continued overall imbalance between production, importation, refining capacity and utilization, export capacity and increase in supply of Canadian oil sands crude coming into the Rocky Mountain region as well as existing export markets and refineries.

The combined import capability of pipelines originating in Canada transporting into PADD IV is 410 M bpd (**Table 1**). They are currently utilizing only about 70% of the potential import carrying capacity of the existing pipelines. Substantial volumes of Canadian oil sands crude are refined within the Rocky Mountain region. Therefore, it is reasonable to conclude that the Canadian import volumes are limited by the transporting capacity of the Platte Pipeline exporting from the Rocky Mountain region. This, along with the increasing trend in Canadian oil sands production, provides ample justification for planned projects such as the TransCanada Keystone and Keystone XL pipelines, the Enbridge Alberta Clipper pipeline, and the TEPPCO/Kinder Morgan Chinook – Maple Leaf pipeline (see potential solutions discussion below and **Table 2**). However, it also suggests that if the carrying capacity of the Platte Pipeline were increased, that greater throughput volumes of

Canadian oil sands crude would be possible and; therefore, that a continuation of long-term price differential may occur. *(In fact, if additional pipeline capacity is “taken up” with additional Canadian oil sands crude, then price differentials will continue to be extended.)*

The Canadian Association of Petroleum Producers (CAPP, 2008) has predicted total oil and oil equivalent production for Canada to increase from 2.8 MM bpd in 2008 to approximately 4.5 MM bpd in 2020. Of that, oil sands production accounts for approximately 46% of total production, or 1.3 MM bpd, in 2008 and approximately 77% of total production, or 3.5 MM bpd, in 2020, and all of the increasing volume. This is because Canada’s conventional production has been on a declining trend since the mid-1990s. In 2008 Canada delivered 280 M bpd into PADD IV which is a decrease from the high of 303 M bpd in 2007 indicating that imports may be slowing. Imports for the first two months of 2009 are averaging approximately 275 M bpd showing the same downward trend (EIA, 2009). A slowing of the import of Canadian crude could serve to alleviate some of the supply pressure within the Rocky Mountain Region as well as other export markets.

### **Summary**

Repairs and upgrades to the Suncor refinery have been completed and the facility is fully back on line (Suncor, 2009). All refineries should have completed the ULSD retrofits as well. Therefore, these issues no longer provide an unbalancing effect as they did in late 2006. Moving forward, seasonal fuel formulation refinery turnarounds will still occur; however, barring unforeseen future incidents these should not have the same detrimental effect that the Suncor refinery fires precipitated in 2006.

It appears that the primary bottleneck in the system is the pipelines; specifically, the Rocky Mountain region crude oil export pipelines. Imports and refining capacity also have considerable influence on the crude oil balance; however, it is the export pipelines that currently occupy the “weakest link” position. There is a need to increase crude oil export capacity specifically to accommodate domestic production. Increases in regional as well as export market refining capacity, orchestrated in concert with pipeline expansions, will be required in order to support the increased regional production. Any pipeline capacity *increases must be balanced on a holistic system-wide basis* in order to have a true positive impact. That is, for a hypothetical example, an expansion in Pipeline-X transporting crude to Hub-Y could serve to export more crude from the Rocky Mountain region; however, if refineries or other pipelines at Hub-Y do not have the capacity to assimilate this crude then apportionment on Pipeline-Z leaving Hub-Y is a likely outcome. So there is little, if any, net benefit realized by the Pipeline-X expansion unless refining capacity at Hub-Y or takeaway capacity of Pipeline-Z are also expanded to achieve a net balance. An example is the Cushing, OK market where the price of WTI has been an average of \$2.50 less than LLS since the reversal of the Spearhead pipeline allowed the transport of Canadian oil sands crude into Cushing. Prior to the transport of Canadian oil sands crude to Cushing, the price of WTI had averaged \$0.50 higher than LLS.

### **Potential Solutions**

Canada is the #1 importer of crude oil to the US (the top five countries importing crude oil in 2008 were: Canada, 2,459 M bpd; Saudi Arabia, 1,532 M bpd; Mexico, 1,299 M bpd; Venezuela, 1,191 M bpd; and Nigeria, 990 M bpd) (EIA, 2009) ; a situation which is highly advantageous to US energy security. In light of the growing demand in the US market and the potential for increased Canadian production, there is little doubt that additional import pipeline capacity from Canada will be needed. However, this must be accomplished in a balanced manner that also accommodates the markets for domestic crude. Rocky Mountain and Canadian business interests must cooperatively examine the various contributing factors to ensure future growth in all sectors of the oil and gas industry in both countries. Creative resolution of the situation will no doubt present a

complex dilemma requiring politically appropriate, equitable, and economically practicable foresight and planning in order to achieve appropriate solutions.

The following activities merit further consideration as potential solutions to the Williston Basin supply/demand imbalance and consequent price depression:

#### Capital Improvements – planned

- Enbridge is in the process of expanding the capacity of its' North Dakota Pipeline from Minot, North Dakota to Clearbrook, Minnesota (Enbridge, 2009). This is a phased project which is projected to be completed in January 2010 and will increase capacity from 110 M bpd to 161 M bpd.
- Enbridge and British Petroleum have entered into an agreement to develop a pipeline system, the Alberta Clipper pipeline, that would deliver Canadian oil sands crude from Hardisty, Alberta directly to Flanagan, IL and then to Patoka, IL or to Cushing, OK through the Spearhead pipeline and then from Cushing, OK to the Gulf Coast. This pipeline would have a capacity of approximately 140 M bpd to Cushing, OK and a capacity of 250 M bpd from Cushing to the Gulf Coast with an expected completion date in late 2012 (CAPP, 2008 and Enbridge, 2009). Improving capacity for the transport of Canadian oil sands crude that does not pass through the Rocky Mountain region would potentially provide for additional pipeline capacity within the region unless that capacity continues to be taken up by increased production and transport of Canadian oil sands crude. Additionally, increasing the transport of Canadian oil sands crude to Rocky Mountain region export markets, such as Wood River – Patoka, IL and Cushing, OK, has the potential to result in downstream bottle necks due to oversupply.
- WRB Refining (a joint venture between ConocoPhillips and Encana) is increasing capacity at its' Wood River, IL refinery by 50 M bpd and its' Borger, TX refinery by 25 M bpd as well as making upgrades to these refineries that are necessary to process heavy Canadian oil sands crude. Increasing refinery capacity in these export markets may provide some relief to refineries within the Rocky Mountain region but does not solve the issue of limited pipeline export capacity from the region.
- TransCanada Pipelines Limited (TCPL) has plans to construct two new pipelines. The Keystone Pipeline will transport oil from Hardisty, Alberta to Wood River - Patoka, Illinois with a capacity of 435 M bpd when completed in late 2009 with an expansion to 590 M bpd in late 2010 when a 155 M bpd capacity extension to Cushing, OK is planned for completion. The second pipeline is the Keystone XL which will transport oil from Hardisty, Alberta to Cushing, OK and then extend south to access the Gulf Coast refineries and markets. It is planned for completion in the 2011 to 2012 timeframe and will add an additional 500 M bpd to the Keystone pipeline system for a total of approximately 1.1 MM bpd (TCPL, 2009). To date, long-term contracts commitments of 910 M bpd are in place for the pipeline representing approximately 83% of the Keystone systems capacity (TCPL, 2009). Therefore, approximately 190 M bpd transportation capacity remains available. In order for Williston Basin crude oil to access the Keystone pipeline, construction of an additional pipeline from North Dakota north into Canada or east to eastern North Dakota to intercept the Keystone pipeline in the US would be required. A Feasibility Study recommending the northern route into Canada was completed by the North Dakota Industrial Commission in April, 2009.

Any oil shipped by the Keystone pipeline system (Keystone and Keystone XL pipelines) would have to be piped in 200 M barrel, or larger, batches (ND DMR, 2006). This represents a significant portion of the entire Williston Basin daily production (much of which is currently routed through Guernsey, away from the Keystone pipeline route); therefore, crude would need to be stockpiled in tankage and metered into the Keystone pipeline in large batches adding still more infrastructure capital expenditures.

In any case, construction of the Keystone pipeline system, which will essentially bypass the Rocky Mountain refining market, could provide some relief from Canadian import pressures experienced in the Guernsey market area. If Canadian oil sands crude that is currently transported on the Platte Pipeline could be diverted to the Keystone pipeline (a possibility since ConocoPhillips is a major importer on the Express/Platte system and they are a partner in the Keystone project), then this could provide significant relief to the Guernsey market even without construction of the additional pipeline from North Dakota into Canada to access the Keystone pipeline. Therefore, if capacity made available on the Express/Platte system is not “taken up” by other Canadian producers, then the construction of the Keystone Pipeline may represent one of the more positive solutions available for the near future with completion of the Keystone pipeline scheduled for late 2009. The effectiveness of this solution will ultimately rely on the ability of downstream markets and refineries to accommodate Rocky Mountain region oil exports along with the additional volume of Canadian oil sands crude entering their markets from the new pipelines. The import of Canadian oil sands crude into the Cushing market starting in mid-2006 has apparently exerted sufficient pressure on that market to result in the price differential experienced there (WTI at Cushing, OK averaging \$2.50 less than LLS) (EIA, 2009) (**Figure 1**).

Similarly, success might be achieved if it were possible to expand the Platte Pipeline; again assuming that any increased capacity was not fully “taken up” by Canadian oils sands crude. As noted earlier, the Express Pipeline is running significantly below capacity and appears to be constrained by both the limited Rocky Mountain refining capacity and the takeaway capacity of the Platte Pipeline. Therefore, it is only realistic to assume that any expansion of the Platte Pipeline would most likely be filled by large-volume; long-term contracts that only the Canadian oil sands producers are able to negotiate. It is not known if Kinder Morgan Canada has any plans for expansion or improvements to Platte Pipeline but it remains a bottleneck to regional production (NDIC, 2007).

#### Capital Improvements – proposed or contemplated

- Suncor is considering expansion of its Commerce City, Colorado refinery (IOGCC, Undated a); the upgrades and retrofits completed in May 2006 already allow it to process more Canadian oil sands crude (Suncor, 2006). Because this is a Canadian owned refinery, it is unclear if this would benefit domestic production from the Williston Basin.
- Reversing the flow direction of Enbridge’s Portal pipeline Berthold, ND to Steelman, Saskatchewan in Canada would potentially transport 25 M bpd of Williston Basin crude into Canada (Enbridge, 2009).
- It has been proposed that Kinder Morgan’s Pony Express pipeline from Riverton, Wyoming to Kansas City, Missouri be reconverted from transportation of natural gas back to crude oil (IOGCC, Undated a). Reportedly, this pipeline had a capacity of approximately 150 M bpd (Richards, 2006). No action has occurred on this since it was proposed in 2006.
- Belle Fourche Pipeline is exploring ways to reconfigure their pipeline system serving western North Dakota. By reversal of traditional north to south flow on one of its pipelines and the construction of a 35- mile loop into the Alexander area, Belle Fourche hopes to create additional outlets for southwestern North Dakota-produced crude oil. In conjunction with other regional pipelines, Belle Fourche is working to make other changes to their operations that will create multiple market outlets for all Williston Basin crude oil (NDIC, 2007).
- TEPPCO/Kinder Morgan has proposed the Chinook-Maple leaf express pipeline that would have a capacity of 440 M bpd from Hardisty, Alberta to Cushing, OK and a capacity of 550 from Cushing to the Gulf Coast. The in service date for this pipeline is projected for late 2011 to early 2012. Altex Energy has proposed an express pipeline that would transport Canadian crude oil directly from Alberta

to the Gulf Coast with a capacity of 425 M bpd and a projected completion in the 2013/2014 timeframe. The construction of express pipelines that bypass the Rocky Mountain region, as well as their export markets, would potentially free up regional pipelines from carrying Canadian oil sands crude and provide local producers with additional regional pipeline capacity for transport to regional refineries or to export markets.

- Expansion of the Tesoro Mandan refinery would provide a long-term solution for refining; however, a refined products pipeline would be necessary to export the products as the local market has no growth opportunities. It would likely require a long pipeline to reach an expanding market (ND DMR, 2006). This potential solution seems unlikely in light of market challenges facing the refined products (NDIC, 2007).
- In April of 2009, the North Dakota Industrial Commission conducted a Feasibility Study addressing the potential for a new pipeline to increase export capacity for Williston Basin oil as a result of increased production from the Bakken Formation. The Feasibility Study proposed a new 55 M bpd pipeline that would extend north and connect to the TransCanada Keystone pipeline. No date has been set to begin this project but permitting, design and construction was estimated to take three years (NDIC, 2009).
- Aggregation of crude among regional producers to facilitate marketing of domestic production by creating a greater volume supply that would be available over a longer term (IOGCC, 2007). Such a concept is interesting in that it would provide greater collective negotiating power than each of the smaller US producers have independently; however, it is still limited by the pipeline capacity stranglehold.

#### Market Incentives – to drive expansion of pipeline and/or refinery capacity

- Quality Bank (this is a project currently under consideration by the North Dakota Oil and Gas Research Council) – involving the concept at looking at "quality banks" (blending facilities) to see if crude oil quality can be blended/combined to optimize marketability.

#### Institutional Measures

- Creation of a US/Canadian forum to evaluate a means towards achieving an optimal balance between the need for importation of Canadian crude and the necessity of avoiding displacement of the Rocky Mountain regional production. Such a forum should include representatives of the refining industry for input regarding the most advantageous volumetric ration for Canadian oil sands crude and Wyoming Sweet etc.
- FERC rules regarding pro-rationing should be revised to sufficiently discourage shippers from over nominating during periods of constrained pipeline capacity. Pro-rationing of crude oil pipelines that export oil from the Williston Basin based on revised pro-rationing rules and tariffs, if done in conjunction with additional capacity capabilities, will avoid recreating a similar problem on a larger scale in the future. But, if additional capacity is created without commensurate changes in regulatory protocol, price differentials are likely to be repeated in the Williston Basin.
- Establish state tax incentives or royalty relief to incentivize companies to commit to new construction or expansion projects that will provide a degree of over capacity in the system (IOGCC, 2007). Such an approach should provide for a coordinated effort among the affected states Public Utility Commissions to ensure comprehensive planning.
- The IOGCC should continue the regional task force to explore the possibility of establishing consortiums for aggregation of crude oil for marketing purposes (such as might be employed to collectively commit to the available volume on the Keystone Pipeline project) or for the development of

new or expanded pipelines or refineries, and otherwise provide regional coordination and planning for production, shipping and refining capacities, and projections.

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<sup>i</sup> *Id.*, at P 14 n.8 (citing *Total Petroleum, Inc. v. Citgo Products Pipeline, Inc.*, 76 FERC ¶ 61,164, at 61,947 (1996); see also *ConocoPhillips Transportation Alaska, Inc.*, 112 FERC ¶ 61,213, at P 28 (2005)(finding that “prorationing policies based on historical volumes are an acceptable means of allocating capacity.”).

<sup>ii</sup> 18 C.F.R. § 341.8 (2005)(“Carriers must publish in their tariffs rules governing such matters as prorationing of capacity . . . .”); see also, *SFPP, L.P.*, 86 FERC ¶ 61,022, at 61,114-16 (1999).