

## NEW YORK MERCANTILE EXCHANGE, INC.

### ANALYSIS OF DELIVERABLE SUPPLY

### LIGHT SWEET CRUDE OIL FUTURES

September 2018

In estimating deliverable supply for the Light Sweet Crude Oil Futures, the New York Mercantile Exchange, Inc. (“NYMEX” or “Exchange”) relied on long-standing precedent, which provides that the key component in estimating deliverable supply is the portion of typical production and supply stocks that could reasonably be considered to be readily available for delivery. In its guidance on estimating deliverable supply, the Commodity Futures Trading Commission (“CFTC” or “Commission”) states:

In general, the term “deliverable supply” means the quantity of the commodity meeting a derivative contract’s delivery specifications that can reasonably be expected to be readily available to short traders and saleable by long traders at its market value in normal cash marketing channels at the derivative contract’s delivery points during the specified delivery period, barring abnormal movement in interstate commerce. Typically, deliverable supply reflects the quantity of the commodity that potentially could be made available for sale on a spot basis at current prices at the contract’s delivery points. For a non-financial physical-delivery commodity contract, this estimate might represent product which is in storage at the delivery point(s) specified in the futures contract or can be moved economically into or through such points consistent with the delivery procedures set forth in the contract and which is available for sale on a spot basis within the marketing channels that normally are tributary to the delivery point(s).<sup>1</sup>

#### I. Methodology and Data Sources

The Exchange considered three components in evaluating deliverable supply estimates of the Domestic Light Sweet Common Stream Crude Oil for the Cushing, Oklahoma delivery location of the Light Sweet Crude Oil Futures contract:

- (1) Crude Oil Production;
- (2) Crude Oil Flows to the delivery area; and
- (3) Crude Oil Storage in the delivery area.

##### A. Crude Oil Production

While crude oil production information is, in part, available from other sources, particularly at the state level from energy or tax revenue authorities, the Exchange determined to use production information collected by the U.S. Department of Energy (“DOE”) Energy Information Administration (“EIA”). Specifically, the Exchange has chosen to rely on the EIA production data because it constitutes a single source, employing common standards, across all states. The EIA data are highly regarded but they do not provide sufficient breakdown on the quality characteristics of the oil production to determine the subset of total production that would qualify as Domestic Light Sweet under the terms of the futures contract.

##### B. Crude Oil Flows to the Cushing Delivery Area

To determine the flows of Domestic Light Sweet crude oil into the delivery area, NYMEX consulted with industry executives and professionals from pipeline and storage terminal operators in Cushing as well as other major industry participants. It is noteworthy that the estimates provided here are materially less than the production that can readily access the delivery mechanism and which *could* be delivered due to

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<sup>1</sup> [http://www.ecfr.gov/cgi-bin/text-idx?SID=74959c3dbae469e2efe0a42b45b8dfae&mc=true&node=ap17.1.38\\_11201.c&rgn=div9](http://www.ecfr.gov/cgi-bin/text-idx?SID=74959c3dbae469e2efe0a42b45b8dfae&mc=true&node=ap17.1.38_11201.c&rgn=div9)

the fact that the sources we used were specifically knowledgeable about *actual* Cushing deliveries. Thus, the information provided is not what *could be* delivered — the standard which is in accordance with Commission’s policy and precedent — but what *actually is* delivered. The Exchange believes that the Cushing delivery mechanism for light sweet crude oil and corresponding commercial secondary market constitutes such a sophisticated and highly-developed commercial market mechanism that, at any time, the actual flows to and stocks in the delivery area represent precisely the deliverable supply sufficient to support the mechanism. In other words, even though at any time there is additional production that *could* be delivered to the delivery mechanism, we are only including what *actually* flows in our estimate of deliverable supply.

### **C. Crude Oil Storage in the Cushing Delivery Area**

Storage data are provided on a weekly basis by EIA. Details are provided for the U.S. Petroleum Administration for Defense Districts (“PADDs”) and Cushing. There are five PADDs and, in some cases, they correspond to broad regions. PADD 2 broadly includes the Midwest; PADD 3 broadly includes U.S. Gulf Coast states and New Mexico; PADD 4 contains the Rocky Mountain States excluding New Mexico. Cushing is the only single location where crude oil official inventory numbers are collected and publicly disseminated on a regular basis anywhere in the world. The actual geographic market that is consistently most applicable to the NYMEX crude oil futures contract would, therefore, include much of PADD 2, not just Cushing.

Nonetheless, NYMEX includes only inventories reported at Cushing, so these underestimate relevant storage. As with production, EIA does not provide details on the quality characteristics of stored crude oil, but the industry experts with whom NYMEX consulted consistently estimated that 60% to 70% of the crude oil stored at Cushing qualified as Domestic Light Sweet Common Stream (to be conservative, the Exchange will discount 40% of inventory in its calculation of deliverable supply estimates).

## **II. The Cushing Physical Delivery Mechanism: Scope of Deliverable Crude Oil**

The Cushing physical delivery mechanism is comprised of a network of nearly two dozen pipelines and 10 storage terminals, several with major pipeline manifolds. Two of the storage facilities — Enterprise and Enbridge — and their pipeline manifolds are the core of the Cushing physical delivery mechanism.<sup>2</sup> Physical volumes delivered against the Light Sweet Crude Oil Futures contract within the Enterprise and Enbridge systems are at par value. Any deliveries made on futures contracts elsewhere in Cushing require the seller to compensate the buyer for the lower of the transportation netbacks from these facilities to where the delivery occurs. Detailed information about the inflowing and outflowing pipelines is contained below in Table 2.

Terminating obligations in the Light Sweet Crude Oil Futures contract are fulfilled by delivering WTI type light sweet crude oil designated as “Domestic Common Stream” by Enterprise Products LLC (formerly Teppco Pipeline). Market participants commonly refer to the light sweet deliverable streams as “WTI.” In addition, the Domestic Common Stream includes a fungible blend of light sweet streams produced in the U.S. shale oil areas, including the Bakken, Niobrara, and Permian producing areas. Furthermore, each of these light sweet crude oil streams is fungibly blended and included as part of the “Domestic Common Stream” within the complex that comprises the Cushing delivery mechanism, as well as in the WTI physical market which calls for delivery in the Cushing delivery mechanism.

## **III. Physical Market Trading Structure and Term Contracts**

### **A. Physical Market Trading Structure**

Typically, there is a chronology of sales and purchases of crude oil in the onshore U.S. market that starts with a sale from producer and finishes with a purchase by an end-user to consume the crude oil. First-sales are from producers to aggregators or other middleman-type firms with delivery at the property

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<sup>2</sup> Three of the major sources for the cash-market information provided herein are Plains All America, Enterprise and Enbridge. Enterprise oversees the vast majority of deliveries in the Cushing Delivery Market and, as indicated, Enterprise and Enbridge are the core delivery mechanism operators. Plains and Enbridge account for about 60% of the storage available at Cushing.

where it is produced. The first-sale buyer transports oil downstream from the point of sale. Usually the first-sale buyer resells the oil to someone other than the end-user but sometimes sells directly to the end-user.

Final sales are sales to end-users who when they consume the oil remove it from the supply chain. End-users, however, also resell oil. Such end-user re-sales sometimes occur during the same commercial cycle in which they purchased it; other times, they occur during a later commercial cycle after the oil has been stored for a period of time. Like end-users, other buyers of oil also can either resell it immediately or store it first for some period of time and then resell it later. Thus, it is a common commercial practice that the first-sale and multiple subsequent re-sales occur in the same delivery cycle.

As discussed above, the Cushing delivery market is essentially a major reseller market where buyers either: resell the oil to someone else; store the oil and resell it later; store the oil and then consume it later; or transport it to consume it. The Cushing market is essentially downstream of first-sales. Most of the sales in the Cushing market are for resale and not for either storage or final-sale; in fact, the physical market in “WTI,” in which the standard form of delivery is within the pipeline system at Cushing, is estimated to be 10-20 times the multiple of “WTI” oil that flows to Cushing. As such, it is clear that most sales are for resale because they constitute the selling, over-and-over (thus, *re-selling*), of the base physical oil that flows to Cushing. *Argus Media* documents about 5-8 times the flow in “WTI” sales but does not capture all of the sales.<sup>3</sup>

## **B. Term Contracts**

The Exchange has spoken with and interviewed a number of market participants regarding common commercial practices with respect to the use of term contracts in the U.S. onshore crude oil market.<sup>4</sup> The responses we received were consistent and they can be summarized as follows:

- Almost all first-sales of production are sold term; as discussed in the previous section, typically for delivery on the property where it is produced (or nearest gathering pipeline or holding tank), and typically to middleman-firms or aggregators. These middleman-firms typically resell the crude oil to other middleman-firms (or participants performing that function) or to end-users. Typically, the first-sales contracts are “evergreen” contracts that can be discontinued by either party with notice. NYMEX is including evergreen contracts in the “term contracts” category.
- There are no restrictions applied to the resale of crude oil bought first-sale on a term basis from producers. In fact, that would clearly not be applicable because sales are typically to aggregators or others acting in a middleman-firm role with the expressed responsibility of reselling the oil.
- The Cushing market is downstream of first-sales; in other words, Cushing is downstream of any term sales from producers. Thus, even if barrels were sold term by the producer, in the Cushing market those barrels are re-sold and re-delivered by either the purchaser from the producer or a subsequent purchaser from that original purchaser. The Cushing market mechanism, which consists of trading and physical delivery of light sweet crude oil, is a commercial secondary (or *spot*) market which is extremely liquid, comprised of broad participation and results in a substantial quantity of physical delivery of crude oil.
- Some end-user refiners in the Cushing market purchase specific light sweet crude oil streams, such as Bakken or Niobrara Light Sweet crude oil, on a term basis, and these refiners tend to segregate a portion of the specific light sweet crude streams for processing at their refineries. Based on conversations with refiners in the Cushing market, the Exchange estimates that approximately 10% of the deliverable supply for Cushing is segregated and designated for use by end-user refiners, and therefore is not available for re-sale in the Cushing market. Consequently,

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<sup>3</sup> The commercial market for physical delivery of light sweet crude oil in Cushing is a *secondary* (or *spot*) market mechanism. The number of physical deliveries in this market each month is 240 million barrels or higher (240,000 futures contracts equivalent or higher).

<sup>4</sup> These include: Plains All America, a major Midcontinent aggregator and marketer and operator of pipeline and storage terminals including in Cushing; and an Energy Market Participant Group of several dozen market participants organized through Hunton & Williams LLP to discuss and comment on Regulatory issues.

the Exchange will reduce its estimate of deliverable supply in Cushing by 10% to account for the specific light sweet streams that are designated for processing and segregated by the end-user refiners.

- Our sources expressly advised us that any production sold long-term was available for potential re-sale, such as during periods of refinery maintenance, and this is especially the case in the Cushing market.

### **C. Crude Oil Production**

The production area that supplies crude oil to Cushing via pipeline and rail is comprised of the following eight (8) states: North Dakota, Montana, Wyoming, Colorado, New Mexico, Onshore Texas, Oklahoma, and Kansas.

In the three-year period of 2015 through 2017, the average production of crude oil available in the eight states was approximately 6.1 million barrels per day. Based on discussions with industry participants, our estimate of the portion of that average production which would qualify as Domestic Light Sweet Common Stream is 50% or higher— i.e., approximately 3.0 million barrels per day. The 3.0 million barrels per day of crude oil production is equivalent to approximately 90 million barrels per month, or 90,000 futures contracts equivalents (contract size: 1,000 barrels).

Table 1 below provides annual production data available for production in the eight states that supply the Cushing crude oil market for the period of 2015 through 2017. The data show that production has been steadily growing in recent years and this trend is expected to continue. As indicated above, the Exchange has determined to not utilize production data in its deliverable supply estimate, but the data demonstrates that production levels are more than sufficient to support the actual flows of deliverable product to the delivery location.

### **D. Crude Oil Flows to the Cushing Delivery Area**

Currently, there is approximately 3.7 million b/d of inflow pipeline capacity to Cushing and 3.0 million barrels per day of outflow capacity. In addition, according to the EIA, there are 90.8 million barrels of storage capacity in the Cushing area which continues to grow steadily.

The Exchange collects inbound Cushing crude oil flows periodically but not on an on-going or scheduled basis as such information is proprietary and non-public. Based on information provided by industry sources in Table 2 below, as of July 2018, actual flows of crude oil to Cushing have ranged from 2.2 million to 2.5 million barrels per day, with Domestic Light Sweet Common Stream Crude Oil averaging between 1.270 to 1.450 million barrels per day.<sup>5</sup> On a 30-day monthly basis, actual flows of Domestic Light Sweet Common Stream Crude Oil range from 38.0 to 43.5 million barrels per month, or 38,000 to 43,500 Light Sweet Crude Oil futures contract equivalents.

As of March 2015, the previous time the Exchange collected such information, Domestic Light Sweet Common Stream Crude Oil flows into Cushing averaged between 920,000 and 1,000,000 barrels per day as illustrated in Table 3 below. On a 30-day monthly basis, actual flows of Domestic Light Sweet Common Stream Crude Oil compute into 27.6 million to 30.0 million barrels per month or 27,600 to 30,000 Light Sweet Crude Oil futures contract equivalents.

As of February 2013, Domestic Light Sweet Common Stream Crude Oil flows into Cushing averaged between 665,000 and 750,000 barrels per day as illustrated in Table 4 below. On a 30-day monthly basis, actual flows of Domestic Light Sweet Common Stream Crude Oil ranged from 19.95 million to 22.5 million barrels per month or 19,950 to 22,500 futures contract equivalents.

Given that the Exchange only collects pipeline flow data on a periodic basis, the Exchange is unable to provide a three-year average of Domestic Light Sweet Common Stream Crude Oil flows into Cushing. As

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<sup>5</sup> The sources were: Plains All America, an aggregator and marketer of crude oil production and pipeline and storage terminal operator at Cushing; and other industry sources.

such, the Exchange determined to average the 2013, 2015 and 2018 estimated flows data collected. The average of the ranges for 2013, 2015 and 2018 for Domestic Light Sweet Common Stream Crude Oil flows into Cushing are 28,500 to 32,000 contract equivalents. The midpoint of the average of the ranges is approximately 30,250 contract equivalents.

#### **E. Crude Oil Storage in the Cushing Delivery Area**

As of March 31, 2018, EIA reported that shell storage capacity at Cushing was 90.8 million barrels and working capacity was 77.5 million barrels.<sup>6</sup> Currently, there is substantial excess working capacity at Cushing (more than 50 million barrels). Finally, it should be noted that, at least on a temporary basis, storage can exceed working capacity and it is common for an individual tank to reach 85-90% of shell capacity (which exceeds the 83% average underlying the EIA estimates).

Table 4 below provides monthly averages of weekly Cushing stocks for the period beginning January 2015 through July 2018 as published by the EIA. For the three-year average from August 2015 through July 2018, inventories averaged 56.4 million barrels and ranged from about 24 million to 68 million barrels. NYMEX asked operators of storage in Cushing if they would share specific data on quantities of Domestic Light Sweet Common Stream Crude Oil stored at their facilities and they responded that such data were confidential. As discussed above, the Exchange estimated that approximately 60% of the total oil stored at Cushing qualified as Domestic Light Sweet Common Stream Crude Oil. Based on the foregoing, for the August 2015 – July 2018 period, the monthly average Domestic Light Sweet Common Stream Crude Oil stored at Cushing was approximately 33.8 million barrels or 33,800 futures contract equivalents.

The Exchange has further evaluated both operational practices at storage facilities as well as commercial practices by customers of storage facilities to determine if some components of inventoried product could rightfully be considered *not* to be readily deliverable.

With respect to operational practices, based on discussions with some industry experts, the Exchange conservatively estimates that 6.75% of stored product, on average, is required for operational minimums.<sup>7</sup> This converts into discounting an estimated 2.3 million barrels of Domestic Light Sweet crude oil based on the three-year average storage level (or 2,300 contract equivalents). In applying a discount of 6.75% to account for operational minimums, average monthly Domestic Light Sweet Common Stream Crude Oil for the August 2015 – July 2018 period is further reduced to approximately 31,500 contract equivalents.

With respect to commercial practices, the Exchange specifically sought whether storage customers were expressly allotting any stored barrels at Cushing for refining that were, therefore, unavailable for secondary market delivery. We consistently heard from market participants that was not the case; that barrels stored at Cushing are not specifically targeted for scheduled refining. Rather, refiners typically store barrels targeted for scheduled refining in tanks on the premises at their respective refineries or at other storage facilities. However, we did hear from one refiner that they keep barrels stored at Cushing for the contingency that there could be some unexpected interruption in their refinery supply; and, rather than refine the barrels stored at Cushing, they use them to trade for other barrels they would refine. Thus, the Exchange determined to further reduce the average monthly Domestic Light Sweet Common Stream crude oil stored at Cushing to account for this *contingency storage* in our estimate of deliverable supply. We estimate this quantity to be 2 million barrels (or 2,000 contract equivalents) of Domestic Light Sweet crude oil. Therefore, for the August 2015 – July 2018 period, the Exchange estimates stored product at Cushing (adjusted for quality specifications, operational minimums and contingency storage) and which is readily available for delivery against the Light Sweet Crude Oil futures contract to be approximately 29,500 contract equivalents.

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<sup>6</sup> <http://www.eia.gov/petroleum/storagecapacity/table2.pdf> Shell capacity is defined by EIA as the design capacity of a petroleum storage tank which is always greater than or equal to working storage capacity.

<sup>7</sup> We have been advised that, for older tanks, the operational minimum is 9% and, for newer tanks, it is 4.5%. Our assessment is that the majority of tanks at Cushing would qualify as newer. Nonetheless, to be conservative, we have applied the mid-point percentage—6.75%— for all of Cushing.

## ANALYSIS OF DELIVERABLE SUPPLY

Based on the above analysis, the Exchange determined at this time to base its estimates of deliverable supply on the sum of:

- Storage: 29,500 contract equivalents (which represents the average monthly inventory for the August 2015 – July 2018 period adjusted to account for quality specifications, operational minimums and contingency storage); and
- Inflow: 30,250 contract equivalents (which represents the midpoint of the average of the ranges of the 2013, 2015 and 2018 Domestic Light Sweet Common Stream Crude Oil flows into Cushing).

Additionally, and as noted in the above analysis, the Exchange shall apply a 10% haircut to the sum of inventory and flows into Cushing in order to discount segregated barrels that may be designated for processing by end-user refiners, and typically not available for re-sale in the Cushing market.

Based on the foregoing, the Exchange estimates deliverable supply of crude oil deliverable against the Light Sweet Crude Oil Futures contract at approximately **53,775** futures contract equivalents per month. The current spot month position limit of 3,000 contracts represents **5.6%** of the estimated monthly deliverable supply.

**Table 1**  
**U.S. Crude Oil Production<sup>8</sup>**  
**For Eight States that Supply Cushing, Oklahoma**  
**(Thousand Barrels per Day)**

Year	Crude Oil Production (Thousand Barrels per Day)
2015	6,252
2016	5,727
2017	6,221
<b>Average</b>	<b>6,067</b>

**Table 2**  
**Crude Oil Flows to Cushing (as of July 2018)**  
**(Barrels/Day)<sup>9</sup>**

Incoming Pipelines	Capacity	Owner	Estimated Flows (in Barrels/Day)
Keystone XL (from Steele City, NE)	590,000	Transcanada	350,000 - 400,000 BD (100% Heavy Sour)
Basin Pipeline (Permian)	450,000	Plains	350,000 - 400,000 (80% WTI, 20% Sour)
Centurion North Pipeline (Permian)	170,000	Occidental	120,000 - 140,000 (100% WTI)
Spearhead Pipeline (Canada)	195,000	Enbridge	150,000 - 175,000 (100% Heavy Sour)
Flanagan South (Canada/Bakken)	600,000	Enbridge	400,000 - 450,000 (10% WTI, 90% Heavy Sour)
White Cliffs Pipeline (Niobrara)	215,000	Rose Rock	100,000 - 120,000 (100% WTI)
Plains Cashion, OK Pipeline	250,000	Plains	120,000 - 145,000 (100% WTI)
Mississippian Lime Pipeline	150,000	Plains	95,000 - 100,000 (100% WTI)
Pony Express Pipeline (Niobrara)	325,000	Tallgrass	300,000 - 325,000 (100% WTI)
Saddlehorn-Grand Mesa	340,000	Magellan/Plains	140,000 - 150,000 (100% WTI)
Glass Mountain	210,000	Sem Group	30,000 - 40,000 (100% WTI)
Hawthorn (Stroud to Cushing)	90,000	Hawthorn	10,000 - 20,000 (100% WTI)
Great Salt Plains	35,000	Parnon	30,000 - 35,000 (100% WTI)
Eagle North	20,000	Blueknight	5,000 - 10,000 (100% WTI)

**TOTAL In-Bound Capacity 3.6 Million Capacity**

**WTI Flow: 1,270,000 - 1,450,000 B/D**

Outgoing Pipelines	Capacity (B/D)	Owner
Seaway Pipeline	850,000	Enterprise
Keystone MarketLink	700,000	Transcanada
BP#1 (to Chicago)	180,000	BP
Ozark (to Wood River, IL)	345,000	Enbridge
Osage (to Eldorado, KS)	165,000	Magellan/NCRA
Coffeyville CVR pipeline	110,000	CVR Energy
Phillips (to Ponca City, OK)	122,000	ConocoPhillips
Phillips (to Borger, TX)	59,000	NuStar
Plains Red River Pipeline (to Longview)	125,000	Plains All American
Plains Red River Pipeline	25,000	Plains All American
Sunoco (twin lines to Tulsa)	70,000	Sunoco
Plains Cherokee	20,000	Plains All American
Magellan Tulsa	30,000	Magellan
Diamond Pipeline (to Memphis)	200,000	Plains

**TOTAL Out-bound Capacity 3.0 Million B/D**

<sup>8</sup> The production listed here includes North Dakota, Montana, Wyoming, Colorado, New Mexico, Onshore Texas, Oklahoma, and Kansas. The web link is: [http://www.eia.gov/dnav/pet/pet\\_crd\\_crpdn\\_adc\\_mbbldp\\_a.htm](http://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbbldp_a.htm)

<sup>9</sup> Sources: Plains All American Pipeline Company, and other industry sources.

**Table 3**  
**Crude Oil Flows to Cushing (as of March 2015)**  
**(Barrels/Day)<sup>10</sup>**

<b>Incoming Pipelines</b>	<b>Capacity</b>	<b>Owner</b>	<b>Estimated Flows (in Barrels/Day)</b>
Keystone XL (from Steele City, NE)	575,000	Transcanada	200,000 - 250,000 BD (Heavy sour)
Basin Pipeline (Permian)	450,000	Plains	250,000 (80% WTI)
Centurion North Pipeline (Permian)	120,000	Occidental	95,000 - 100,000 (100% WTI)
Spearhead Pipeline (Canada)	210,000	Enbridge	150,000 - 175,000 (Canadian sour)
Flanagan South (Canada/Bakken)	585,000	Enbridge	400,000 - 450,000 (10% WTI, 90% Sour)
White Cliffs Pipeline (Niobrara)	150,000	Rose Rock	100,000 - 120,000 (100% WTI)
Plains Cashion, OK Pipeline	100,000	Plains	80,000 (100% WTI)
Mississippi Lime Pipeline	175,000	Plains	110,000 (100% WTI)
Pony Express Pipeline (Niobrara)	320,000	Tallgrass	180,000 – 200,000 (100% WTI)
Hawthorn (Stroud to Cushing)	90,000	Hawthorn	20,000 – 25,000 (100% WTI)
Great Salt Plains	30,000	JP Energy	15,000 – 20,000 (100% WTI)
Northern Cimarron	30,000	Rose Rock	15,000 – 20,000 (100% WTI)
Midcontinent Pipeline	30,000	Sunoco Logistics	25,000 – 30,000 (100% WTI)
Glass Mountain Pipeline	140,000	Rose Rock	40,000 – 50,000 (100% WTI)
<b>TOTAL In-Bound Capacity</b>	<b>3.0 Million Capacity</b>		<b>WTI Flow: 920,000 – 1,000,000 B/D (960)</b>

**Table 4**  
**Crude Oil Flows to Cushing (as of February 2013)**  
**(Barrels/Day)<sup>11</sup>**

<b>Incoming Pipelines</b>	<b>Capacity</b>	<b>Owner</b>	<b>Estimated Flows (in Barrels/Day)</b>
Keystone XL Pipeline	590,000	Transcanada	200,000 to 225,000 BD (Heavy sour)
Basin Pipeline	450,000	Plains	400,000 to 440,000 (75% WTI)
Occidental Pipeline	120,000	Occidental	100,000 to 120,000 (100% WTI)
Spearhead Pipeline	240,000	Enbridge	120,000 to 140,000 (Canadian sour)
White Cliffs Pipeline	70,000	SemGroup	65,000 to 70,000 (100% WTI)
Plains Oklahoma Pipeline	100,000	Plains	90,000 to 100,000 (100% WTI)
Cherokee Pipeline	50,000	Plains	40,000 to 50,000 (100% Sour)
Ark City Pipeline	30,000	SemGroup	25,000 to 30,000 (100% WTI)
MV Magellan Pipeline	30,000	SemGroup	25,000 to 30,000 (100% WTI)
Midcontinent Pipeline	50,000	Sunoco	45,000 to 50,000 (100% WTI)
Bakken Crude via Rail	90,000	Various	15,000 to 20,000 (100% WTI)
<b>TOTAL ESTIMATE</b>	<b>1.820 Million B/D</b>		<b>WTI Flow: 665,000 – 750,000 B/D (707)</b>

<sup>10</sup> Sources: Plains All American Pipeline Company, JSK consulting, and other industry sources.

<sup>11</sup> Sources: Plains All American Pipeline Company, JSK consulting, and other industry sources.



**Table 4**  
**Cushing Storage<sup>12</sup>**  
**Average of Weekly Stocks**  
**(in Thousand Barrels)**

Year	Month	Stock
2015	Jan	36,601
	Feb	46,689
	Mar	55,300
	Apr	61,381
	May	60,368
	Jun	57,183
	Jul	57,312
	Aug	57,389
	Sep	54,483
	Oct	53,569
	Nov	57,459
	Dec	61,150
2016	Jan	63,943
	Feb	65,188
	Mar	66,658
	Apr	65,503
	May	67,657
	Jun	65,357
	Jul	64,295
	Aug	64,640
	Sep	62,614
	Oct	59,462
	Nov	59,559
	Dec	66,400
2017	Jan	65,521
	Feb	64,103
	Mar	67,152
	Apr	68,053
	May	65,742
	Jun	61,418
	Jul	56,685
	Aug	56,798
	Sep	60,048
	Oct	63,840
	Nov	61,789
	Dec	52,238
2018	Jan	41,309
	Feb	31,941
	Mar	30,448
	Apr	35,519

<sup>12</sup> [http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=W\\_EPC0\\_SAX\\_YCUOK\\_MBBL&f=W](http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=W_EPC0_SAX_YCUOK_MBBL&f=W)

	May	36,509
	Jun	31,754
	July	24,175
<b>Three-Year Avg. (Aug 2015-Jul 2018)</b>		<b>56,415</b>