

SUBMISSION COVER SHEET

IMPORTANT: Check box if Confidential Treatment is requested

Registered Entity Identifier Code (optional): 20-106

Organization: New York Mercantile Exchange, Inc. ("NYMEX")

Filing as a: **DCM** **SEF** **DCO** **SDR**

Please note - only ONE choice allowed.

Filing Date (mm/dd/yy): 02/05/20 **Filing Description:** Amendments to the WTI Houston vs. WTI Trade Month Average Price Option and the WTI Houston vs. Brent Trade Month Average Price Option Contracts

SPECIFY FILING TYPE

Please note only ONE choice allowed per Submission.

Organization Rules and Rule Amendments

- Certification § 40.6(a)
- Approval § 40.5(a)
- Notification § 40.6(d)
- Advance Notice of SIDCO Rule Change § 40.10(a)
- SIDCO Emergency Rule Change § 40.10(h)

Rule Numbers:

New Product

Please note only ONE product per Submission.

- Certification § 40.2(a)
- Certification Security Futures § 41.23(a)
- Certification Swap Class § 40.2(d)
- Approval § 40.3(a)
- Approval Security Futures § 41.23(b)
- Novel Derivative Product Notification § 40.12(a)
- Swap Submission § 39.5

Product Terms and Conditions (product related Rules and Rule Amendments)

- Certification § 40.6(a)
- Certification Made Available to Trade Determination § 40.6(a)
- Certification Security Futures § 41.24(a)
- Delisting (No Open Interest) § 40.6(a)
- Approval § 40.5(a)
- Approval Made Available to Trade Determination § 40.5(a)
- Approval Security Futures § 41.24(c)
- Approval Amendments to enumerated agricultural products § 40.4(a), § 40.5(a)
- "Non-Material Agricultural Rule Change" § 40.4(b)(5)
- Notification § 40.6(d)

Official Name(s) of Product(s) Affected: See filing.

Rule Numbers: See filing.

February 5, 2020

VIA ELECTRONIC PORTAL

Mr. Christopher J. Kirkpatrick
Office of the Secretariat
Commodity Future Trading Commission
Three Lafayette Centre
1155 21st Street, N.W.
Washington, DC 20581

Re: CFTC Regulation 40.6(a) Certification. Notification Regarding Amendments to the WTI Houston vs. WTI Trade Month Average Price Option and the WTI Houston vs. Brent Trade Month Average Price Option Contracts. NYMEX Submission No. 20-106

Dear Mr. Kirkpatrick:

New York Mercantile Exchange, Inc. (“NYMEX” or “Exchange”) is notifying the Commodity Futures Trading Commission (“CFTC” or “Commission”) that it is self-certifying amendments to the WTI Houston vs. WTI Trade Month Average Price Option and the WTI Houston vs. Brent Trade Month Average Price Option contracts (the “Contracts”) to amend the title, style, underlying futures, strike price listing, and expiration as noted in the table below effective on Tuesday, February 25, 2020 for trade date Wednesday, February 26, 2020 and commencing with the April 2020 contract month and beyond. There is no open interest in the Contracts.

Current Contract Title	Amended Contract Title	Rulebook Chapter	CME Globex and CME ClearPort Code	Current Termination of Trading	Termination of Trading Effective February 25, 2020
WTI Houston vs. WTI Trade Month Average Price Option	WTI Houston vs. WTI Crude Oil Spread Option	817	HAP	25 th calendar day of the month prior to the contract month	one business day preceding the expiration of the front-month WTI Houston Crude Oil Futures (HCL) contract
WTI Houston vs. Brent Trade Month Average Price Option	WTI Houston vs. Brent Crude Oil Spread Option	819	HCB	25 th calendar day of the month prior to the contract month	one business day preceding the expiration of the front-month Brent Last Day Financial Futures

Based on customer feedback, the Exchange will amend the style, underlying futures, strike price listing, and expiration day of the Contracts to enhance the hedging effectiveness of the Contracts. The amendments will allow customers to more precisely hedge their exposure using options that align with the timeline and structure of the customers underlying futures exposure. Specifically, the Exchange will amend the style of option to an outright spread option rather than average price option. In addition, the expiration dates of the option contracts will be amended as indicated in the table above. Further, the Exchange will amend the titles of the Contracts to accurately reflect the amendment to the style of the option. The Exchange will also amend the underlying futures reference to reflect the spread differential between the Exchange’s WTI Houston Crude Oil and Light Sweet Crude Oil Futures contracts, and the spread

differential between the Exchange's WTI Houston Crude Oil and Brent Crude Oil Last Day Financial Futures contracts.

In addition, the Strike Price Listing and Exercise Procedure table located in Chapter 300 ("Options Contracts") will be amended to reflect a change in the strike price listing schedule for the Contracts from dynamic only strikes at \$0.25 to at-the-money +/- 10 strikes at \$0.25 for months 1-24 and dynamic strikes only at \$0.25 for months 25 and beyond.

Finally, NYMEX is amending the position limit aggregation for the Contracts. Leg one of both Contracts previously aggregated into WTI Houston Trade Month Futures (Chapter 806, Code: HTE) but will now aggregate into WTI Houston Crude Oil Futures (Chapter 201, Code: HCL). Leg two of WTI Houston vs. WTI Trade Month Average Price Option (Chapter 817, Code: HAP) previously aggregated into WTI Trade Month Futures (Chapter 804, Code: TCS) but will now aggregate into Crude Oil Last Day Financial Futures (Chapter 828, Code: 26). Leg two of WTI Houston vs. Brent Trade Month Average Price Option (Chapter 819, Code: HCB) previously aggregated into Brent Crude Oil Futures (Chapter 692, Code: BB) but will now aggregate into Brent Last Day Financial Futures (Chapter 698, Code: BZ). Also, at this time, the Exchange is removing the diminishing balance for the Contracts as they are no longer average price option contracts (collectively, the "Rule Amendments").

The product chapter amendments are provided in Exhibit A below with additions underscored and deletions ~~struck through~~. Related Amendments to the Strike Price Listing and Exercise Procedure table are provided in Exhibit B under separate cover. The amendments to the Position Limit, Position Accountability and Reportable Level table located in the Interpretations and Special Notices Section of Chapter 5 ("Trading Qualifications and Practices") of the NYMEX Rulebook can be found in Exhibit C under separate cover. The cash market overview and analysis of deliverable supply is provided in Exhibit D below.

The Exchange reviewed the designated contract market core principles ("Core Principles") as set forth in the Commodity Exchange Act ("CEA" or "Act") and identified that the Rule Amendments may have some bearing on the following core principles:

- **Contracts Not Readily Susceptible to Manipulation**: The Contracts are not readily subject to manipulation as a result of the deep liquidity and robustness of the underlying cash and futures market.
- **Availability of General Information**: The Exchange will publish information on the change via a Special Executive Report ("SER") to notify the marketplace of the Rule Amendments. The SER will also be posted on the CME Group website.
- **Daily Publication of Trading Information**: The Exchange shall make public daily information on settlement prices, volume, open interest, and opening and closing ranges for the Contracts.
- **Execution of Transactions**: The Contracts are listed for trading on CME Globex and for clearing through the CME ClearPort platform. The CME Globex platform provides a transparent, open and efficient mechanism to electronically execute trades.

Pursuant to Section 5c(c) of the CEA and CFTC Regulation 40.6(a), the Exchange hereby certifies that the Rule Amendments comply with the Act, including regulations under the Act. There were no substantive opposing views to this proposal.

The Exchange certifies that this submission has been concurrently posted on the Exchange's website at <http://www.cmegroup.com/market-regulation/rule-filings.html>.

Should you have any questions concerning the above, please contact the undersigned at (212) 299-2200 or e-mail CMEGSubmissionInquiry@cmegroup.com.

Sincerely,

/s/Christopher Bowen
Managing Director and Chief Regulatory Counsel

Attachments: Exhibit A: Amendments to NYMEX Rulebook Chapters 817 and 819
Exhibit B: Amendments to NYMEX Rulebook Chapter 300 (“Options Contracts”): Strike Price Listing and Exercise Procedures Table (attached under separate cover)
Exhibit C: Amendments to NYMEX Rulebook Chapter 5 (“Trading Qualifications and Practices”): Position Limit, Position Accountability and Reportable Level Table (attached under separate cover)
Exhibit D: Cash Market Overview and Analysis of Deliverable Supply

Exhibit A
NYMEX RULEBOOK

(additions underlined; deletions ~~struck through~~)

Chapter 817

WTI Houston vs. WTI Crude Oil Spread Trade Month Average Price Option

817100. SCOPE OF CHAPTER

The provisions of these rules shall apply to all option contracts bought or sold on the Exchange for cash settlement based on the Floating Price. The procedures for trading, clearing and settlement of this contract, and any other matters not specifically covered herein shall be governed by the general rules of the Exchange.

817101. CONTRACT SPECIFICATIONS

~~The Floating Price shall be determined following the expiration of trading. A WTI Houston vs. WTI Trade Month Average Price put or call option contract is a European-style Average Price option cash-settled on expiration day.~~

The Option is a cash-settled European-style Option contract which cannot be exercised prior to expiration. A Call Option represents the cash difference of the settlement price of the front-month WTI Houston Crude Oil Futures (HCL) contract in the spread less the settlement price of the front-month Light Sweet Crude Oil Futures (CL) contract in the spread traded on the Exchange less the strike price multiplied by 1,000, or zero, whichever is greater. A Put Option contract traded on the Exchange will represent the cash difference between the strike price and the settlement price of the front-month WTI Houston Crude Oil Futures (HCL) contract in the spread less the settlement price of the front-month Light Sweet Crude Oil Futures (CL) contract in the spread traded on the Exchange multiplied by 1,000, or zero, whichever is greater.

817102. OPTION CHARACTERISTICS

The number of months open for trading at a given time shall be determined by the Exchange.

817102.A. Trading Schedule

The hours of trading shall be determined by the Exchange.

817102.B. Trading Unit

~~A WTI Houston vs. WTI Crude Oil Spread Trade Month Average Price Option is a cash-settled option. On expiration of a call option, the value will be the difference between the average daily settlement price during the Trade month period of the first nearby settlement price of the underlying WTI Houston vs. WTI Trade Month Futures and the strike price multiplied by 1,000 barrels, or zero whichever is greater. On expiration of a put option, the difference between the average daily settlement price during the Trade Month period of the first nearby settlement price of the underlying WTI Houston vs. WTI Trade Month Futures and the strike price multiplied by 1,000 barrels, or zero whichever is greater. On expiration of a call option, the value will be the difference of the settlement price of the front-month WTI Houston Crude Oil Futures (HCL) contract in the spread less the settlement price of the front-month Light Sweet Crude Oil Futures (CL) contract in the spread traded on the Exchange less the strike price multiplied by 1,000, or zero, whichever is greater. On expiration of a put option, the value will be the difference between the strike price and the settlement price of the front-month WTI Houston Crude Oil Futures (HCL) contract in the spread less the settlement price of the front-month Light Sweet Crude Oil Futures (CL) contract in the spread traded on the Exchange multiplied by 1,000, or zero, whichever is greater.~~

817102.C. Price Increments

Prices shall be quoted in dollars and cents per barrel and prices shall be in multiples of one (1) cent per barrel. A cabinet trade may occur at a price of \$0.001 per barrel, or \$1.00.

817102.D. Special Price Fluctuation Limits

At the commencement of each trading day, the contract shall be subject to special fluctuation limits as set forth in Rule 589 and in the Special Price Fluctuation Limits Table in the Interpretations & Special Notices Section of Chapter 5.

817102.E. Position Limits, Exemptions, Position Accountability and Reportable Levels

The applicable position limits and/or accountability levels, in addition to the reportable levels, are set forth in the Position Limit, Position Accountability and Reportable Level Table in the Interpretations & Special Notices Section of Chapter 5.

A Person seeking an exemption from position limits for bona fide commercial purposes shall apply to the Market Regulation Department on forms provided by the Exchange, and the Market Regulation Department may grant qualified exemptions in its sole discretion.

Refer to Rule 559 for requirements concerning the aggregation of positions and allowable exemptions from the specified position limits.

817102.E. Expiration of Trading

~~A WTI Houston vs. WTI Trade Month Average Price Option shall expire at the close of trading on the last business day that falls on or before the 25th calendar day of the month prior to the contract month. If the 25th calendar day is a weekend or holiday, trading shall cease on the first business day prior to the 25th calendar day. A WTI Houston vs. WTI Crude Oil Spread Option shall expire at the close of trading one business day immediately preceding the expiration of the front-month WTI Houston Crude Oil Futures (HCL) contract in the spread.~~ A WTI Houston vs. WTI Crude Oil Spread Option shall expire at the close of trading one business day immediately preceding the expiration of the front-month WTI Houston Crude Oil Futures (HCL) contract in the spread. The expiration date shall be announced prior to the listing of the option contract.

817102.F. Type of Option

The option is a European-style ~~Average Price~~ option which can be exercised on expiration day.

817103.

EXERCISE PRICES

Transactions shall be conducted for option contracts as set forth in Rule 300.20.

Chapter 819

WTI Houston vs. Brent Crude Oil Spread Trade Month Average Price Option

819100.

SCOPE OF CHAPTER

The provisions of these rules shall apply to all option contracts bought or sold on the Exchange for cash settlement based on the Floating Price. The procedures for trading, clearing and settlement of this contract, and any other matters not specifically covered herein shall be governed by the general rules of the Exchange.

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CONTRACT SPECIFICATIONS

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The option is a European-style ~~Average Price~~ option which can be exercised on expiration day.

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EXERCISE PRICES

Transactions shall be conducted for option contracts as set forth in Rule 300.20.

EXHIBIT B
NYMEX Rulebook

Chapter 300
(“Options Contracts”)

Strike Price Listing and Exercise Procedures Table

(under separate cover)

EXHIBIT C
NYMEX Rulebook
Chapter 5
(“Trading Qualifications and Practices”)

Position Limit, Position Accountability, and Reportable Level Table

(under separate cover)

EXHIBIT D
Cash Market Overview and Analysis of Deliverable Supply

New York Mercantile Exchange, Inc. (“NYMEX” or “Exchange”) is self-certifying amendments to the WTI Houston vs. WTI Trade Month Average Price Option and the WTI Houston vs. Brent Trade Month Average Price Option contracts (the “Contracts”) to amend the title, style, strike price listing and expiration date. The Exchange conducted a review of the underlying cash markets and deliverable supply in the WTI Houston, WTI Cushing, and Brent crude oil markets.

WTI Houston Cash Market Overview

The main component NYMEX considered in estimating the deliverable supply of WTI type crude oil for delivery in Houston was pipeline capacity from the Permian Basin and Eagle Ford production areas in west Texas, given that pipeline capacity is the constraining factor that restricts the flow of crude oil from the production areas in West Texas to Houston.

There is an active physical crude oil trading center based in Houston, Texas, which is a major hub for storage and pipelines with direct connectivity to the Cushing, Midland, and the U.S. Gulf Coast markets. There is active trading in light sweet WTI type crude oil (also referred to as domestic sweet). The Houston physical delivery mechanism for the underlying WTI Houston Crude Oil Futures contract consists of free-on-board (“F.O.B.”) delivery at Enterprise Echo terminal or Enterprise Houston Ship Channel terminal or Enterprise’s Genoa Junction in Houston, Texas. These three terminals are active physical crude oil trading hubs with over 30 million barrels of storage capacity and pipeline connectivity to the Cushing, Midland, and the U.S. Gulf Coast markets. There is active cash market trading in WTI type light sweet crude oil at the Enterprise terminals.

The three Enterprise terminals are connected to all the major in-bound pipelines and refineries in the Houston area. There are substantial pipeline inflows of WTI type crude oil to the Enterprise delivery terminals from the two major oil production centers in West Texas: 1) from Midland, Texas via the Enterprise Products, BridgeTex, and Longhorn Pipelines; and 2) from the Eagle Ford production area in South Texas via the Enterprise Products and Kinder Morgan Pipelines.

The Enterprise Echo terminal has 8 million barrels of storage capacity and is connected to a network of nearly a dozen pipelines and 10 storage terminals. In addition, the Enterprise Houston Ship Channel terminal has 23 million barrels of storage capacity and is the major export facility in the Houston area, with seven ship docks that can load tankers up to 900,000 barrels capacity. Further, the Enterprise Genoa Junction facility provides an interconnection point for delivery of pipeline barrels flowing from Midland, Texas via the Enterprise Products, BridgeTex, and Longhorn Pipelines.

The WTI crude oil stream in Houston is a fungible blend of domestic light sweet streams with quality parameters of 40 to 44 degrees API gravity maximum and 0.275% sulfur maximum, which are slightly lighter than the WTI specifications in Cushing. The contract specifications for WTI type crude oil for delivery in Houston represent the export quality that is lighter than WTI at Cushing and mirror the specifications for WTI type crude oil at the export terminals in Houston.

A. *Crude Oil Pipeline Capacity to Houston*

The Enterprise physical delivery mechanism, which consists of three terminal facilities, is interconnected to a network of major pipelines and refineries in the Houston area. As mentioned above, there are substantial pipeline inflows of WTI type crude oil to Houston from the two major oil production centers in West Texas: 1) from Midland, Texas via the Enterprise Products, BridgeTex, and Longhorn Pipelines; and 2) from the Eagle Ford production area in South Texas via the Enterprise Products and Kinder Morgan Pipelines. The total pipeline capacity from the Permian Basin and Eagle Ford production areas to Houston is 2.4 million b/d. The capacity of each pipeline is presented in Table 1 below.

**Table 1
In-bound Crude Oil Pipelines from West Texas Connected to Enterprise’s Houston Terminals
(Barrels/Day)**

Incoming Pipelines	Capacity	Owner
BridgeTex Pipeline (from Midland)	400,000	Magellan
Longhorn Pipeline (from Midland)	275,000	Magellan
Enterprise’s Sealy Pipeline (from Midland)	600,000	Enterprise Products LLC
Enterprise’s Sealy 2 Pipeline (from Midland)	240,000	Enterprise Products LLC
Enterprise Products Eagle Ford Pipeline	560,000	Enterprise Products LLC
Kinder Morgan Pipeline (from Eagle Ford)	350,000	Kinder Morgan

TOTAL In-Bound Capacity: 2.4 Million Barrels/Day

B. Crude Oil Production in West Texas

For production data, NYMEX used information collected by the U.S. Department of Energy’s Energy Information Administration (“EIA”), which is a definitive source for this information. The EIA provides production data with a breakdown by play for “tight oil”, which is a light sweet stream similar in quality to WTI type crude oil. The key production plays, or production areas, are located in the Permian Basin and Eagle Ford regions in Texas. The EIA provides production data for the following plays: 1) Wolfcamp (Permian); 2) Bonespring (Permian); 3) Spraberry (Permian); 4) Eagle Ford. For the three-year period of August 2016 through July 2019, production of “tight oil”, i.e., WTI type crude oil, in Texas was 3.57 million b/d, or 107.1 million barrels per month (see Table 2 below).

The Permian Basin and Eagle Ford production areas are directly connected to the Houston market by a network of pipelines as outlined in Table 1 above. These pipelines from the Permian Basin and Eagle Ford production areas have total capacity of 2.4 million barrels per day (b/d) inbound to the Houston market.

**Table 2: EIA Data
Texas Production of Tight Oil in the Permian Basin and Eagle Ford Regions
(Note: Tight oil is similar in quality to WTI type crude oil)
(Millions of Barrels per Day)**

Month	Quantity
Aug-16	2.508
Sep-16	2.497
Oct-16	2.533
Nov-16	2.540
Dec-16	2.567
Jan-17	2.601
Feb-17	2.710
Mar-17	2.731
Apr-17	2.740
May-17	2.823
Jun-17	2.847
Jul-17	2.886
Aug-17	2.829

Sep-17	3.038
Oct-17	3.226
Nov-17	3.344
Dec-17	3.423
Jan-18	3.391
Feb-18	3.524
Mar-18	3.694
Apr-18	3.774
May-18	3.793
Jun-18	3.975
Jul-18	4.001
Aug-18	4.172
Sep-18	4.291
Oct-18	4.329
Nov-18	4.448
Dec-18	4.525
Jan-19	4.429
Feb-19	4.503
Mar-19	4.658
Apr-19	4.669
May-19	4.749
Jun-19	4.832
Jul-19	4.918
3-Year Avg. (Aug 2016-Jul 2019)	3.570

Source: <https://www.eia.gov/petroleum/data.php#crude>

C. Crude Oil Storage in Padd 3

Table 3 below provides the monthly Padd 3 storage levels for the three-year time period of July 2016 through June 2019. During that time period, inventories averaged 238.9 million barrels and ranged from 205 to 283 million barrels. However, the EIA does not provide a breakdown by type of crude oil stored in the Houston area, and consequently, the Exchange will not utilize inventory levels in the deliverable supply estimate.

**Table 3
EIA Data: PADD 3 Crude Oil Stocks excluding SPR**

Monthly Average Stocks (in Millions of Barrels)		PADD 3 Crude Oil Stocks
Year	Month	
2016	Jun	257.9
	Jul	250.9
	Aug	247.0
	Sep	239.9
	Oct	255.1

	Nov	249.7
	Dec	244.0
2017	Jan	265.3
	Feb	278.0
	Mar	282.6
	Apr	270.2
	May	262.6
	Jun	259.5
	Jul	249.9
	Aug	231.7
	Sep	238.7
	Oct	218.7
	Nov	220.7
	Dec	204.5
2018	Jan	216.3
	Feb	229.4
	Mar	217.4
	Apr	220.3
	May	217.0
	Jun	213.3
	Jul	219.8
	Aug	214.0
	Sep	220.8
	Oct	225.1
	Nov	236.9
	Dec	231.4
2019	Jan	232.3
	Feb	230.3
	Mar	234.8
	Apr	242.4
	May	244.8
Three-Year Average		238.2

EIA Data Source: <https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCESTP31&f=M>

Analysis of Deliverable Supply of WTI Houston

In its estimate of deliverable supply for the WTI Houston cash market, the Exchange has determined to focus on pipeline capacity from the Permian Basin and Eagle Ford production areas in west Texas to Houston, given that pipeline capacity is the constraining factor that restricts the flow of crude oil from the production areas in West Texas. The pipeline capacity from the Permian Basin and Eagle Ford production areas to Houston (as outlined in Table 2) is 2.4 million b/d, which is less than the total production in the Permian Basin and Eagle Ford regions which averaged 2.99 million b/d, according to the EIA data in Table

2 above. Further, the Exchange will not utilize inventory levels in the deliverable supply estimate, as the EIA data does not provide a breakdown by type of crude oil stored in the Houston area.

Given that pipeline capacity is the limiting factor in the supply of crude oil to the Houston market, the pipeline capacity will be utilized to determine the deliverable supply. The total pipeline capacity from the Permian Basin and Eagle Ford production areas to Houston (as outlined in Table 1) is 2.4 million b/d. The Exchange has determined to reduce this level for its estimation of deliverable supply to conservatively account for the pipeline utilization rates. To be conservative, the Exchange has assumed that the total pipeline capacity is not fully utilized, and consequently, the Exchange has applied a reduction of 25% to total in-bound pipeline capacity in its calculations. This converts into discounting the pipeline capacity by approximately 0.60 million b/d from the total available pipeline capacity. Therefore, the Exchange has determined the deliverable supply for WTI type crude oil to Houston to be 1.8 million b/d (calculated as 2.4 million b/d for pipeline capacity minus the reduction of 0.60 million b/d). This is equivalent to 54.0 million barrels per month, which is equivalent to 54,000 contracts per month.

The Exchange is not applying a reduction for long term contracts, however, given the liquid spot market, and the lack of restrictions applied to the resale of crude oil. Almost all first-sales of production are sold typically to middleman-firms or marketers. 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, so there are no restrictions applied to the resale of crude oil bought first-sale on a term basis from producers. The Houston and Midland markets are downstream of first-sales; in other words, these hubs are downstream of any term sales from producers. Thus, even if barrels were sold term by the producer, in the Midland and Houston markets those barrels are re-sold and re-delivered by either the purchaser from the producer or a subsequent purchaser/middleman from that original purchaser. The Houston cash market consists of active trading and physical delivery of WTI-type crude oil and provides commercial secondary (or *spot*) markets which are liquid, with broad participation, and results in a substantial quantity of physical delivery of crude oil.

Based on the foregoing, the Exchange estimates deliverable supply of crude oil deliverable against the NYMEX WTI Houston Crude Oil Futures contract (code HCL) at approximately 54,000 futures contract equivalents per month. The spot month position limit of 3,000 contracts represents 5.6% of the estimated monthly deliverable supply.

WTI Cushing Cash Market Overview

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 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.¹ 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.

¹ 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.

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 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.²

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.³ 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

² 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).

³ 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.

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, 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 2016 through 2018, the average production of crude oil available in the eight states was approximately 6.6 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 3.3 million barrels per day. The 3.3 million barrels per day of crude oil production is equivalent to approximately 99 million barrels per month, or 99,000 futures contracts equivalents (contract size: 1,000 barrels).

Table 1 in Appendix E below provides annual production data available for production in the eight states that supply the Cushing crude oil market for the period of 2016 through 2018. 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 Appendix E, 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.⁴ 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 one million barrels per day as illustrated in Appendix E, Table 3 below. On a 30-day monthly basis, actual flows of Domestic

⁴ 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.

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 Appendix E, 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 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, 2019, EIA reported that shell storage capacity at Cushing was 92.45 million barrels and working capacity was 76.96 million barrels.^{5 6} 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 5 in Appendix E below provides monthly averages of weekly Cushing stocks for the period beginning January 2016 through August 2019 as published by the EIA. For the three-year average from September 2016 through August 2019, inventories averaged 48.6 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 September 2016 – August 2019 period, the monthly average Domestic Light Sweet Common Stream Crude Oil stored at Cushing was approximately 29.1 million barrels or 29,100 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.⁷ This converts into discounting an estimated 1.96 million barrels of Domestic Light Sweet crude oil based on the three-year average storage level (or 1,960 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 September 2016 – August 2019 period is further reduced to approximately 27,135 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

⁵ <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.

⁶ <https://www.eia.gov/petroleum/storagecapacity/table1.pdf> Working Storage Capacity

⁷ 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.

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 September 2016 – July 2019 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 25,135 contract equivalents.

Analysis of Deliverable Supply of WTI Cushing

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

- Storage: 25,135 contract equivalents (which represents the average monthly inventory for the September 2016 – August 2019 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% reduction to the sum of inventory and flows into Cushing in order to conservatively account for segregated barrels that may be designated for processing by end-user refiners, and potentially not available for re-sale in the Cushing market.

Based on the foregoing, the Exchange estimates deliverable supply of crude oil deliverable against the NYMEX Light Sweet Crude Oil Futures contract at approximately **49,847** futures contract equivalents per month. The current spot month position limit of 3,000 contracts, which the Exchange is retaining, represents **6.02%** of the estimated monthly deliverable supply.

Brent Crude Oil Market Overview

The North Sea market is comprised of a series of smaller oil fields in the UK and Norwegian North oil sectors. Each of the “satellite fields” connect into the large production systems such as Brent, Forties, Oseberg or Ekofisk. Norwegian crude oil Troll was added to the basket of Brent deliverable streams from January 2018.⁸

The most important streams in the North Sea are Brent, Forties, Oseberg and Ekofisk and Troll. Each stream has a principle operator that is responsible for the day to the day control of the operations including the scheduling of the cargoes based on the production from each of the smaller producing fields. The Brent, Forties, Oseberg, Ekofisk and Troll fields (now known as “BFOET”) underpin the Brent complex and are the key grades of oil that make up the trading of Dated Brent – the international crude oil physical benchmark price. The five crude oil fields lie in the North Sea. Brent and Forties are in the UK sector, whilst Ekofisk, Oseberg and Troll are in the Norwegian sector.

The core of the Brent market is the cash market. The Brent forward market consists of the trading of cargoes of any of the five BFOET streams for delivery beyond month ahead, with no specific dates assigned for loading. The cargoes are 600,000 barrels and, in the forward market, the precise loading dates are not provided, only the delivery month, i.e., December BFOET Cargo. However, the commercial contracts, which are standardized, underlying the forward market to specify the minimum notification a seller must provide to a buyer is 10 days but the standard range is between 10 days and month ahead. After a holder

⁸ Platts press release – Troll into Brent basket <https://www.platts.com/pressreleases/2017/022017>

of a BFOET forward notifies the buyer as to the loading date and which stream is being loaded, the contract is now considered to have moved from the forward market to the Dated Brent market, historically this moment is referred to as the cargo going “wet”, i.e., it has loading dates attached to it and can therefore be sold as a Dated Brent cargo.

The Brent cash market is essentially a reseller market where buyers either: resell the oil to someone else; transport the cargo and resell it later; or transport the cargo to consume it. Most of the sales in the Brent market are conducted as spot-market transactions; in fact, Brent cargoes in the physical market are estimated to trade 10 or more times. Typically, there is a chronology of sales and purchases of crude oil in the Brent cash market that starts with a sale from the equity producer in a spot market transaction; and finishes with a purchase by an end-user to consume the crude oil. Equity producers typically utilize the robust spot market to sell their BFOET production at the cargo loading terminal as a “Free on Board” (FOB) delivery. Traders play an active role in the Brent market as middlemen with the expressed responsibility of reselling the oil. Further, the refiners typically rely on the spot market to purchase Brent crude oil, because there is vibrant liquidity in the spot market, and hence, the refiners have developed a preference for short-term spot market purchases, rather than long-term contracts. This applies to refiners affiliated with equity producers as well as those not affiliated; this is the standard practice, established and institutionalized over the past 34 years.

Production of BFOE has been declining over the past few years due to the cost of drilling and the returns on investment compared to other regions in the world. This was one of the main reasons why the Troll crude stream was added to the Brent basket. All of the Brent grades are segregated blends delivered at different locations in the North Sea, and each can be substituted by the seller in the BFOE cash market (“the forward market”).

Quality adjustments ensure that all five grades can be delivered to a buyer under the standardized forward contract. The nomination period in the forward market was changed in March 2015 by Platts to 10 days to month ahead from 10 to 25 days and the futures expiry dates were aligned with this schedule in January 2016 (for the March 2016 delivery month). The process of moving from a forward to the physical market where a forward Brent cargo becomes a physical North Sea Dated Brent cargo happens as follows:

1. Refiners, producers and traders enter into a forward agreement for a specific month.
2. The Operator of each field being Shell for Brent; BP for Forties; ConocoPhillips for Oseberg; and Statoil for Ekofisk and Troll will announce the loading programs for each contract month a few days prior to the beginning of the month (one month prior) to each loading month (i.e. cargoes in the delivery month start to load). For example, for a June 2019 contract month, the field operators will announce the loading schedules a few days prior to the beginning of April 2019. The equity producers will begin the chain of nominating cargoes to buyers (or they can decide to keep the cargo). A buyer benefiting from a nomination can keep the cargo or pass it to another player with whom it has another forward contract.
3. Buyers trade the cash BFOET on the basis that they will accept any cargo as nominated, provided it is done so within the agreed notice period (10 days to month ahead) by 4pm London time. Any cargo not nominated by this time will remain with the participant last notified. After 4pm London time, the cargo becomes wet physical with precise loading dates attached.
4. Cargoes that are wet physical will be sold as a Dated Brent cargo with cargo loading dates between 10 days and month ahead (forward).

Chart 1 below shows the makeup of the fields in the Forties pipeline system (FPS) which is currently operated by INEOS following its sale in April 2017⁹. The deal was finalized on November 1, 2017. There are over 50 offshore fields that flow through within the FPS. The delivery point for Forties crude oil is Hound Point, which is on the East coast of Scotland a short distance from the UK oil capital Aberdeen. Forties is a blended crude oil from all the fields that feed into it.

Chart 1: Forties Pipeline System



The blend changed at the beginning of 2007 when crude oil from the Buzzard field began to flow into it. Crucially, Buzzard is now the largest field within the FPS. Buzzard crude oil is a medium gravity, sour crude oil with an API of 32.6° and a sulfur content of 1.44% therefore the yield is very similar to that of Urals crude oil (from Russia). The INEOS FPS produces a forward estimate, based on the field operators of the volume of crude oil to be available in the system as well as the % blend of Buzzard crude within the Forties blend as this will affect the outright price of Forties crude oil, due to the sourer nature of the Buzzard crude oil stream. Due to the inclusion of Buzzard, the value of Forties has generally always been the cheapest of the four grades to deliver into Dated Brent as a dated cargo.

Table 4. The volume of Buzzard crude oil in the Forties Blend Estimates¹⁰

Date	Buzzard percentage in Forties	Forties Blend un-stabilized crude oil (kbd)
September 19	25.5%	381.2

⁹ BP Press Release – Forties Pipeline System sale to INEOS <https://www.bp.com/en/global/corporate/media/press-releases/bp-to-sell-forties-pipeline-system-to-ineos.html>

¹⁰ Ineos Forties Pipeline System – Forties Blend Assay <https://www.ineos.com/businesses/ineos-fps/business/forties-blend-quality/>

October 19	29.2%	414.4
November 19	29.4%	413.0
December 19	29.9%	414.5

Bloomberg LP (“Bloomberg”) provides details of the loading programs for the five (5) key fields that make up BFOET. These are Brent, Forties, Oseberg, Ekofisk and Troll which on a combined basis comprise the Brent market. Based on the most recent 3-year average of the Bloomberg data on BFOET loadings (from September 2016 to August 2019), total loadings of the 5 grades was 1,002,174 barrels per day, which is equivalent to approximately 30.07 million barrels per month.

The Monthly loading schedule of Brent, Forties, Oseberg, Ekofisk and Troll is shown in **Appendix F**.

The BFOET cash market is traded in partials of 100,000 barrels or larger full-size cargo transactions of 600,000 barrels. Physical convergence can occur through the partials market mechanism upon the trading of six parcels with the same counterparty in a single delivery month. If physical convergence does not occur then trades are booked out at the prevailing cash value on the last day of trading day of the cash market for the specific delivery month (i.e. this is currently month ahead prior to the 1st loading date of the delivery month). Full sized physical cargo BFOET trades will be used by ICE in the establishment of the Brent Index which is the mechanism by which the futures open on expiry are cash settled¹¹.

The Dated Brent or Dated BFOET, as it is sometimes referred, reflects the value of the cheapest of Brent, Forties, Oseberg, Ekofisk and Troll, of 600,000 barrels, loading 10 days to Month Ahead. Dated Brent is estimated to price around 50% of the global crude oil supply¹². Within the North Sea and beyond, grades are traded as a differential to Dated Brent or as a differential to cash Brent (BFOET). Each of the crude oil grades within BFOET are not the same quality, several adjustments have been made.

In 2007, Platts included a sulphur de-escalator for Forties crude oil within its Dated Brent and Brent related instruments. The change was made in response to inclusion of sour crude Buzzard into the Forties pipeline system (see chart 1). The de-escalator of price is applied to deliveries above a minimum sulphur level of 0.6%. Every month, Platts establishes a value de-escalator for every 0.1% of sulphur above the maximum level 0.6% (for Forties crude oil). The value of the de-escalator is established by reviewing evidence of significant and sustained changes in the crude market, as affected by refined products (crack spread values of both heavy fuel oils and light ends) and other relevant factors that affect the economics of Forties crude.

¹¹ https://www.theice.com/publicdocs/futures/ICE_Futures_Europe_Brent_Index.pdf

¹² <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2012/03/Brent-Prices-Impact-of-PRA-methodology-on-price-formation.pdf>

Analysis of Deliverable Supply of Brent Crude Oil

The basis of the deliverable supply estimate in the Brent market is BFOET loadings in the North Sea. Therefore, volumes of loaded barrels of BFOET crude oil from Brent, Forties, Oseberg, Ekofisk, and Troll are consistent with the definition of supply readily available for delivery given the specific attributes of the Brent market. In addition, the Exchange has reduced the deliverable supply of Forties to account for the long-term commitment for crude oil purchases by the Grangemouth refinery. The Grangemouth oil refinery is located close to the delivery point of the Forties pipeline and volumes from the outer fields are connected directly via a series of pipelines to the refinery.

Based on the Bloomberg data on BFOET loadings (September 2016 to August 2019), total loadings of BFOET crude oil was 1,002,174 barrels per day, or 30.07 million barrels per month. This equates to 30,065 contract equivalents (contract size 1,000 barrels). Further, to account for the crude oil purchases by the Grangemouth refinery, the deliverable supply would be reduced by 3 million barrels¹³ per month¹⁴. Therefore, the total deliverable supply of BFOET is approximately 27.07 million barrels per month, which is equivalent to 27,065 contracts.

The existing spot month limit of Brent Last Day Financial Futures (code: BZ) is 5,000 lots which is based on the monthly deliverable supply of 27,065 contract equivalents, which represents around 18.5% of deliverable supply.

Analysis of Spot-Month Position Limits

In its analysis of deliverable supply for the two (2) existing crude oil options contracts, the Exchange has provided deliverable supply estimates for the following markets: 1) WTI Houston; 2) WTI Cushing; and 3) Brent crude oil.

The spot month position limits for the underlying outright contracts are as follows:

<u>Underlying Outright Contracts</u>	<u>Spot Month Limits</u>
WTI Houston Crude Oil Futures Contract (code HCL)	3,000
NYMEX Light Sweet Crude Oil Futures Contract (code CL)	3,000
Brent Last Day Financial Futures (code BZ)	5,000

For purposes of calculating compliance with position limits, the crude oil options contracts will aggregate into the underlying legs of the outright contracts listed above.

¹³ UKPia – Petroineos Grangemouth Refinery capacity
http://www.ukpia.com/industry_information/refining-and-uk-refineries/Petroineos-grangemouth-refinery.aspx

¹⁴ Market suggests 50% of the processing capacity for Grangemouth is Forties therefore we have reduced the deliverable supply of Forties by 3-million barrels per month (the full capacity of the refinery is 6 million barrels per month).

APPENDIX E

Table 1
U.S. Crude Oil Production¹⁵
For Eight States that Supply Cushing, Oklahoma
(Thousand Barrels per Day)

Year	Crude Oil Production (Thousand Barrels per Day)
2016	5,718
2017	6,201
2018	7,786
Average	6,568

Table 2
Crude Oil Flows to Cushing (as of July 2018)
(Barrels/Day)¹⁶

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

¹⁵ 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_mbbldpd_a.htm

¹⁶ Sources: Plains All American Pipeline Company, and other industry sources.

**Table 3
Crude Oil Flows to Cushing (as of March 2015)
(Barrels/Day)¹⁷**

Incoming Pipelines	Capacity	Owner	Estimated Flows (in Barrels/Day)
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)
TOTAL In-Bound Capacity	3.0 Million Capacity		WTI Flow: 920,000 – 1,000,000 B/D

**Table 4
Crude Oil Flows to Cushing (as of February 2013)
(Barrels/Day)¹⁸**

Incoming Pipelines	Capacity	Owner	Estimated Flows (in Barrels/Day)
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)
TOTAL ESTIMATE	1.820 Million B/D		WTI Flow: 665,000 – 750,000 B/D

**Table 5
Cushing Stocks¹⁹
(Average of Weekly Stocks in Thousand Barrels)**

Year	Month	Stock
2016	Jan	63,952
	Feb	65,188
	Mar	66,658
	Apr	65,503

¹⁷ Sources: Plains All American Pipeline Company, JSK consulting, and other industry sources.

¹⁸ Sources: Plains All American Pipeline Company, JSK consulting, and other industry sources.

¹⁹ http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=W_EPC0_SAX_YCUOK_MBBL&f=W

	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
	May	36,509
	Jun	31,754
	Jul	24,175
	Aug	23,714
	Sep	23,301
	Oct	29,339
	Nov	35,977
	Dec	40,779
2019	Jan	41,574
	Feb	43,977
	Mar	46,961
	Apr	45,133
	May	48,553
	Jun	52,712
	July	50,567
	Aug	43,000
Three-Year Avg. (Sep 2016-Aug 2019)		48,574

APPENDIX F

Brent Loadings

Monthly loaded production volumes of Brent, Forties, Oseberg and Ekofisk and Troll (BFOET) crude oil.

Units: Barrels per day

Source: Bloomberg (Brent: LOSDRBTT Index; Forties: LOSDFRTT; Oseberg: LOSDOSET; Ekofisk: LOSDEKFT; and Troll: LOSDTLLT)

*Bloomberg data included the addition of the Troll crude oil loadings starting in January 2018, aligning with the Platts change to its methodology to incorporate Troll deliveries into the Brent basket. This data shows the total volume of BFOET crudes loaded by delivery month. The data set is based on data gathered by Bloomberg. Each field operator for Brent, Forties, Oseberg, Ekofisk and Troll releases the amount of crude oil that is scheduled for loading per month.

	Brent	Forties	Oseberg	Ekofisk	Troll	Total BFOET
Sep-16	100,000	320,000	100,000	260,000	266,667	1,046,667
Oct-16	77,419	329,032	120,000	270,968	290,323	1,087,742
Nov-16	100,000	420,000	100,000	260,000	260,000	1,140,000
Dec-16	58,065	464,516	116,129	270,968	251,613	1,161,291
Jan-17	96,774	483,871	135,484	270,968	232,258	1,219,355
Feb-17	107,143	407,143	128,571	257,143	192,857	1,092,857
Mar-17	96,774	425,806	135,484	251,613	193,548	1,103,225
Apr-17	80,000	420,000	120,000	260,000	220,000	1,100,000
May-17	116,129	445,161	154,839	290,323	212,903	1,219,355
Jun-17	80,000	420,000	140,000	260,000	200,000	1,100,000
Jul-17	77,419	406,452	116,129	251,613	193,548	1,045,161
Aug-17	77,419	270,968	116,129	251,613	212,903	929,032
Sep-17	80,000	360,000	100,000	260,000	180,000	980,000
Oct-17	77,419	425,806	116,129	251,613	212,903	1,083,870
Nov-17	80,000	420,000	80,000	220,000	200,000	1,000,000
Dec-17	96,774	154,839	116,129	232,258	212,903	812,903
Jan-18	58,065	406,452	116,129	232,258	161,742	974,646
Feb-18	85,714	385,714	85,714	235,714	192,857	985,713
Mar-18	96,774	367,742	96,774	270,968	193,548	1,025,806
Apr-18	60,000	400,000	60,000	260,000	198,867	978,867
May-18	77,419	406,452	38,710	270,968	174,194	967,743
Jun-18	80,000	340,000	100,000	260,000	180,000	960,000
Jul-18	77,419	348,387	77,419	232,258	212,903	948,386
Aug-18	96,774	251,613	116,129	232,258	193,548	890,322
Sep-18	100,000	360,000	100,000	300,000	160,000	1,020,000
Oct-18	58,065	367,742	77,419	232,258	193,548	929,032
Nov-18	120,000	380,000	80,000	200,000	160,000	940,000

Dec-18	58,065	290,323	77,419	251,613	232,258	909,678
Jan-19	77,419	348,387	116,129	270,968	135,484	948,387
Feb-19	64,286	364,286	85,714	278,571	192,857	985,714
Mar-19	77,419	367,742	96,774	212,903	175,097	929,935
Apr-19	100,000	340,000	100,000	240,000	140,000	920,000
May-19	77,419	348,387	135,484	270,968	193,548	1,025,806
Jun-19	80,000	340,000	100,000	40,000	160,000	720,000
Jul-19	116,129	309,677	116,129	290,323	154,839	987,097
Aug-19	96,774	309,677	96,774	251,613	154,839	909,677
3-year average	84,974	366,838	104,659	248,687	197,015	1,002,174