



*Independent Statistics & Analysis*  
U.S. Energy Information  
Administration

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# Implications of Increasing Light Tight Oil Production for U.S. Refining

May 2015



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# 1. Background and Analytical Framework

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## Background

Recent and projected increases in U.S. crude production have sparked discussion about the implications of current limitations on crude oil exports for prices, including both world and domestic crude oil and petroleum product prices, and for the level of domestic crude production and refining activity.

In response to multiple requests, the U.S. Energy Information Administration is developing analyses that shed light on these issues. Studies completed since May 2014 have considered the characteristics of domestic crude production streams, price formation for gasoline and other petroleum products, tools to better track displacement of crude imports by domestic production, and technical options for processing additional light tight crude oil.

Given that some responses to the growth in production that has already occurred since 2011, including the like-for-like replacement of crude oil imports comparable in quality to new domestic streams, are inherently limited going forward, the question of how domestic and international markets for both crude and products might evolve in scenarios with and without a relaxation in current limitations on crude oil exports continues to hold great interest for policymakers, industry, and the public.

Recognizing that refiner responses beyond like-for-like substitution are an important pathway to increasing the use of domestic crude by refiners much beyond its current level, EIA retained Turner, Mason & Company (TM) to provide an analysis of the implications of increasing domestic light tight oil production for the U.S. refining, focusing on

- regional crude supply/demand balances
- refinery crude slates
- operations
- capital investment
- product yields
- crude oil exports/imports
- petroleum product exports
- infrastructure constraints and expansions
- crude oil price relationship

The TM report is intended to be considered in the context of prior and forthcoming EIA analyses. TM was asked to consider likely refining responses to specific crude production scenarios, both with and without current limitations on crude oil exports. In this regard, the TM study goes beyond the recently published EIA report on [Technical Options for Processing Additional Light Tight Oil Volumes within the United States](#), which focused on technical options for the U.S. refining industry to process additional volumes of light tight oil.

Given their focus on refining, the TM report and this paper summarizing its context and findings do not address all key questions related to the implications of crude export policy choices. For example, the TM

report uses assumed scenarios of domestic crude production provided by EIA and does not consider how possible feedback from crude export policies on domestic crude oil prices could, in turn, potentially affect domestic crude production levels. Similarly, the report does not consider international market arbitrage on crude or products; or international refinery competitive analysis to support increased U.S. product exports. Some of these issues will be considered in forthcoming EIA efforts.

**Table 1. EIA studies/activities related to implications of increased crude production and relaxation of crude export restrictions**

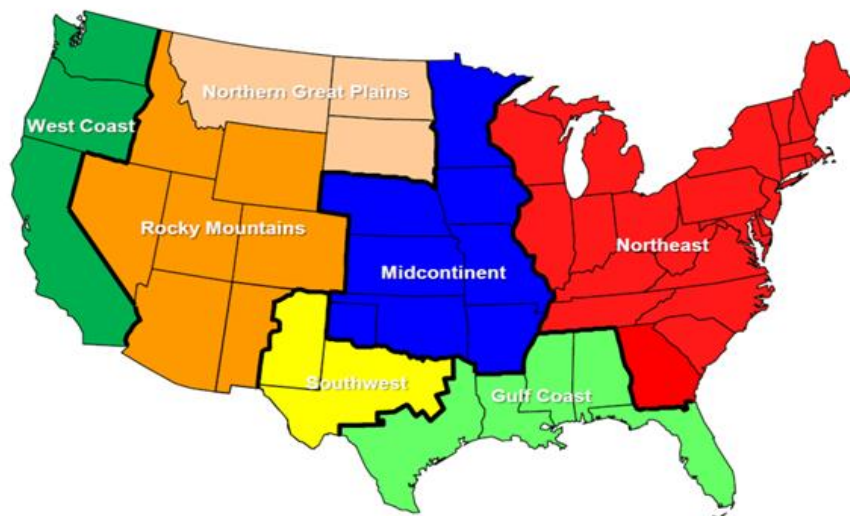
<b>Study/Activity</b>	<b>Status</b>
<a href="#">U.S. Crude Oil Production Forecast-Analysis of Crude Types</a>	May 2014
Condensate Workshop	September 2014
<a href="#">What Drives U.S. Gasoline Prices?</a>	October 2014
<a href="#">U.S. Crude Oil Import Tracking Tool</a>	November 2014
<a href="#">Technical Options for Processing Additional Light Tight Oil Volumes within the United States</a>	April 2015
Turner Mason Study: Implications of Increasing Light Tight Oil Production for U.S. Refining	May 2015
<i>U.S. Crude Oil Production to 2025: Updated Projection of Crude Types</i>	May 2015
<i>Analysis of Removing Current Limitations on U.S. Crude Oil Exports</i>	May/June 2015

## Analytical Framework

The TM analysis considers operational changes and investments in capacity expansion that domestic refiners would likely make to process increasing volumes of light oil, under two crude production scenarios and two crude export policy scenarios, one representing continuation of current crude export policies, the other a relaxation of those policies. The analysis covers the period 2014 through 2025, using 2013 as the base year.

TM used its own proprietary domestic refinery modeling platform for the analysis. EIA provided detailed year-by-year forecasts of U.S. crude production by region, basin, and crude quality category for two cases, a low production (LP) case and a high production (HP) case. For both production cases, U.S. crude oil was classified into nine crude types produced from eight regions. EIA did not provide a forecast for Canadian crude oil production. TM used its own forecast of Canadian crude oil production for the study.

Figure 1. Crude production regions



For the purposes of this study, the Rocky Mountains and Northern Great Plains crude production profiles were combined. Although Alaska and Lower 48 Offshore regions are not shown on the map above, they are included in the study.

Table 2. Crude quality types

Crude Oil Type	API Gravity (degrees)	Sulfur Content (wt.%)
API 50+	API $\geq$ 50	<0.5
API 40-50 sweet	40 $\leq$ API<50	<0.5
API 35-40 sweet	35 $\leq$ API<40	<0.5
API 35+ sour	35 $\leq$ API	$\geq$ 0.5
API 27-35 med-sour	27 $\leq$ API<35	<1.1
API 27-35 sour	27 $\leq$ API<35	$\geq$ 1.1
California	API<27	1.1-2.6
API<27 sweet	API<27	<1.1
API<27 sour	API<27	$\geq$ 1.1

EIA provided TM with the following additional inputs:

- Brent and WTI prices for low production case
- Brent prices for high production cases
- Refined product demand projections for the United States

The crude production and price forecasts EIA provided for this study were generated while crude prices were dropping rapidly and price uncertainty was increasing; however, as refineries make decisions based on the relative prices of different types of crude oil, and the relative prices of crude oil and refined petroleum products, the study results are still meaningful.

EIA also provided TM with a specification of current policies that limit crude oil exports for use in this study. Crude oil exports to Canada are allowed. Alaska Cook Inlet crude may also be exported provided that conditions related to transportation are met. Also, consistent with determinations by the U.S. Department of Commerce, Bureau of Industry and Security, condensate processed through a distillation tower is classified as a petroleum product and may be exported without a license. The specification of current policy outlined above is less restrictive than the base case assumptions used in some other studies that have considered the implications of relaxing current limits on crude oil exports.

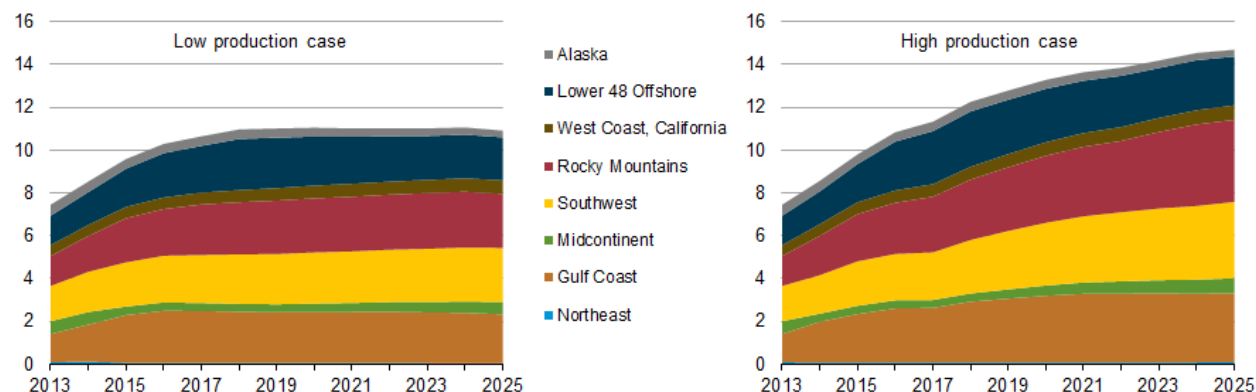
Three cases were analyzed:

- Low crude production under current export restrictions
- High crude production without export restrictions
- High crude production with current export restrictions

A fourth case, low crude production without export restrictions, was also considered for analysis. However, results obtained for the low crude oil production case under current export restrictions found that domestic production volumes, which reach 10.9 million barrels per day (bbl/d) in 2025 in that case, could be processed domestically without the need for significant capacity expansion after consideration of crude export opportunities available under current policies. Absent a requirement for major investments in incremental capacity that might only be incentivized by a widening of the gap between domestic and international crude prices, TM found that current export policies did not cause the spread between domestic and global crudes to widen in the low production case. Based on this finding, TM determined that refining results for the low production case would not materially differ between low production case with current export limitations and the low production case without those limitations. For this reason, the latter combination of production and policy was not pursued as a separate case in the TM report.

**Figure 2. Crude production by region**

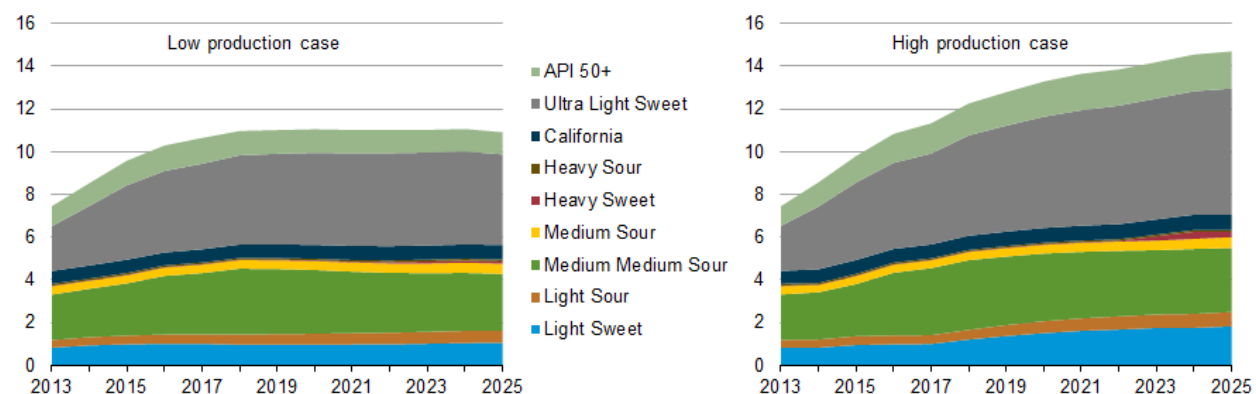
million barrels per day



Note: Northern Great Plains states (Montana, North Dakota, and South Dakota) are included with the Rocky Mountains region.

**Figure 3. Crude production by quality type**

million barrels per day



## 2. Results

### 2.1. Overview

In all three scenarios developed by TM, increasing domestic crude oil production leads to a decline in crude imports, an increase in refinery runs, new investments to expand refinery capacity, and higher crude and refined petroleum product exports. However, the magnitudes of the changes, which are tabulated in Table 3, vary across the scenarios.



Table 3. Scenario results

	Low production/ exports restricted	High production/ exports unrestricted	High production/ exports restricted
<b>Crude production</b>			
2025 vs. 2013	+3.5 million bbl/d	+7.2 million bbl/d	+7.2 million bbl/d
2025 vs. 2013 % change	46% higher	97% higher	97% higher
2025 production	10.9 million bbl/d	14.7 million bbl/d	14.7 million bbl/d
<b>Crude imports</b>			
2025 vs. 2013	-1.5 million bbl/d	-2.8 million bbl/d	-2.9 million bbl/d
2025 vs. 2013 % change	19% lower	36% lower	37% lower
2025 imports	6.3 million bbl/d	4.9 million bbl/d	4.9 million bbl/d
<b>Existing refinery crude runs (a)</b>			
2025 vs. 2013	+1.3 million bbl/d	+1.4 million bbl/d	+1.5 million bbl/d
2025 vs. 2013 % change	8% higher	9% higher	10% higher
2025 refinery runs	16.3 million bbl/d	16.4 million bbl/d	16.5 million bbl/d
<b>New refinery unit runs (b)</b>			
2025 vs. 2013 inputs	+0.3 million bbl/d	+0.7 million bbl/d	+2.1 million bbl/d
<b>Crude exports</b>			
2025 vs. 2013	+0.4 million bbl/d	+2.3 million bbl/d	+0.7 million bbl/d
2025 crude exports	0.6 million bbl/d	2.4 million bbl/d	0.8 million bbl/d
<b>Existing refinery investment (c)</b>			
Total capacity added	0.4 million bbl/d	0.4 million bbl/d	0.4 million bbl/d
<b>New refinery unit investment (d)</b>			
Dollars spent	\$1.8 billion	\$2.3 billion	\$11.0 billion
Total capacity added	0.5 million bbl/d	0.8 million bbl/d	2.4 million bbl/d
<b>Net refined product exports (e)</b>			
2025 vs. 2013	+2.0 million bbl/d	+1.8 million bbl/d	+3.4 million bbl/d
2025 net fin. prod. exports	3.1 million bbl/d	2.9 million bbl/d	4.5 million bbl/d
<b>Brent-WTI spread</b>			
2015-2025 average	\$6.78/bbl	\$6.64/bbl	\$13.78/bbl

Notes:

(a) Existing refinery crude runs increase as a result of both increased capacity and utilization.

(b) New refinery units include stabilizers, splitters, and hydroskimming refining capacity, which combine distillation and basic upgrading units.

(c) Existing refinery investment for currently planned refinery projects (which include projects to expand light crude capacity as well as other substantial refinery unit expansions) total between \$6–7 billion, according to Turner Mason estimate.

(d) New refinery unit investment costs for splitters and hydroskimmers are estimated by EIA based on correspondence with Turner Mason on March 11, 2015. New refinery unit investment costs for stabilizers are estimated by EIA based on brownfield stabilizer cost from Table ES-1 in EIA's Technical Options for Processing Additional Light Tight Oil Volumes within the United States.

(e) Net refined product exports include gasoline, jet/kerosene, distillate, residual fuel, aviation gas, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas, and other miscellaneous products. Net refined product exports do not include NGL.

Source: U.S. Energy Information Administration, based on Turner Mason & Company.

## 2.2. Low Production Case

In the low production case, by 2025, the U.S. refinery system accommodates 3.5 million bbl/d of incremental (relative to a 2013 baseline) light crude production by investing \$1.8 billion in new, less sophisticated processing units, i.e., splitters. This is in addition to the already announced investment to expand and debottleneck existing capacity, some of which has already been completed. A list of these announced projects is provided in the report's Input Table 5. The incremental production is absorbed by reducing crude imports by 1.5 million bbl/d; increasing refinery runs by 1.3 million bbl/d day; increasing crude exports by 0.4 bbl/d; and processing 0.3 bbl/d of crude in the new splitter units. The increase in crude runs at domestic refineries results in higher U.S. net exports of refined products, based on the assumption across all cases that U.S. refineries remain competitive in the global market. The price of U.S. crude WTI does not change relative to the price of global benchmark Brent as the U.S. refining system does not require significant new capacity investments beyond that which has already been planned.

## 2.3. High Production, Current Crude Export Restrictions Case

In the high resource case and with no changes to current export restrictions, by 2025, additional processing capacity investment is required to absorb 7.2 million bbl/d of incremental (relative to a 2013 baseline) domestic light crude production. An estimated \$11.0 billion dollars is invested to expand U.S. processing capacity by 2.4 million bbl/d in the form of new stabilizers, splitters, and hydroskimming refining capacity, which combine distillation and basic upgrading units. This is in addition to the already announced plans to expand and debottleneck existing capacity. The 0.4 bbl/d crude processing capacity expansions at existing refineries, combined with an increase in utilization, increases crude runs at existing refineries by 10% to 16.5 million bbl/d. By 2025, the increase in crude runs results in net refined product exports of 4.5 million bbl/d, an increase of 3.4 million bbl/d compared with 2013. Crude exports increase modestly, limited by the volume of U.S. crude that Canadian refineries can absorb, but crude imports decline by 37%. Imports of most all grades of crude except heavy sour crude decline to zero. The price of WTI crude oil declines relative to Brent reflecting the price discount required to incentivize incremental U.S. refiner investment needed to process higher volumes of light crude oil. The Brent-WTI spread increases to \$18/bbl in 2018 and then falls to \$12.60/bbl in 2022 and remains between \$12/bbl and \$13/bbl through 2025, reflecting the costs of hydroskimming refinery investments.

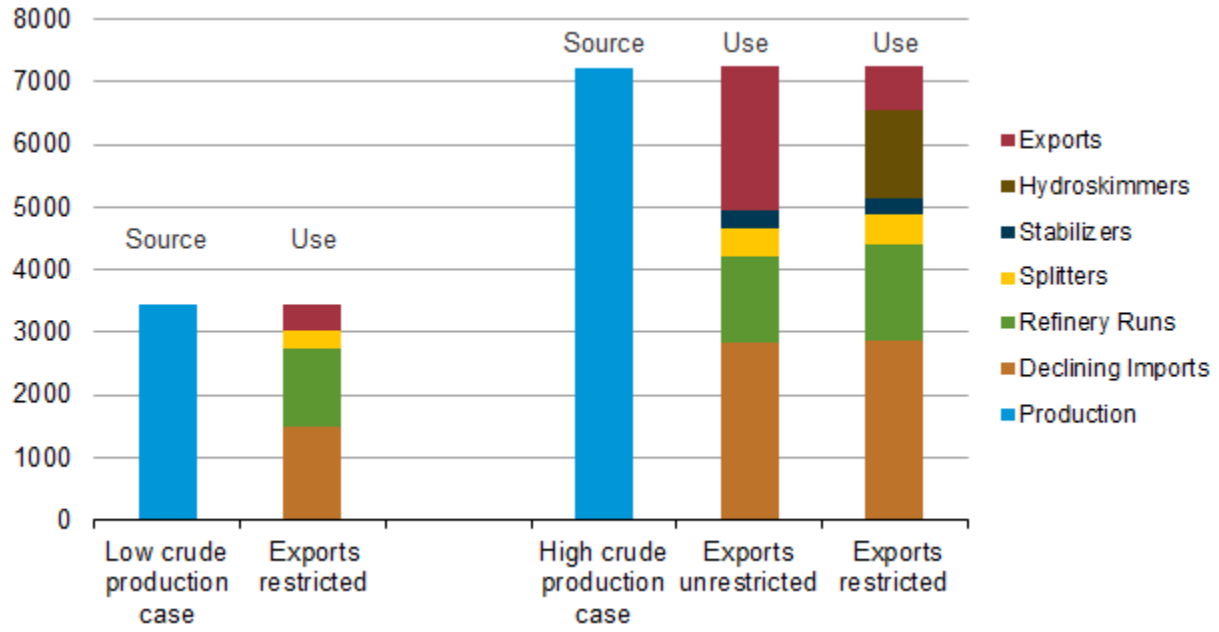
## 2.4. High Production, No Crude Export Restrictions Case

When the high resource case is considered in a scenario without crude export restrictions, crude exports increase to 2.4 million bb/d in 2025. Domestic processing capacity also increases, but to a significantly lesser extent than in the high production case with current crude export restrictions, as \$2.3 billion is invested to build 0.8 million bbl/d of new stabilizer and splitter capacity. More costly hydroskimming refineries are not built, because the ability to export crude oil prevents the price of WTI from declining to a level that would support such investment. Crude imports decline, falling by 36% from 7.8 million bbl/d in 2013 to 4.9 million bbl/d in 2025, as refiners make the same adjustments to back out light and medium crude imports as in the high production case with current export restrictions, run their refineries at high utilization rates, and process light oil through splitters.

Figure 4 illustrates how the growth in crude oil production by 2025 is absorbed for each of the three scenarios.

**Figure 4. Change 2025 versus 2013**

thousand barrels per day



### 3. Appendix

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Full text and data tables from TM.

# Implications of Increasing U.S. Light Tight Oil Production

A study for the

Energy Information Administration

Presented by

**Turner, Mason & Company** |  
CONSULTING ENGINEERS

Suite 2920  
2100 Ross Avenue  
Dallas, Texas 75201  
214/754-0898  
turnermason.com

April 28, 2015

John R. Auers  
John M. Mayes

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## Introduction

The Energy Information Administration (“EIA”) retained Turner, Mason & Company (“TM&C”) to provide an analysis of the implications of increasing domestic light tight oil production on the U.S. refining sector under two crude production scenarios and two crude export scenarios over the period 2014 through 2025. For each case, this analysis considered the impacts on regional crude supply/demand balances, refinery crude slates, operations, capital investment, product yields, crude oil exports/imports, petroleum product exports, infrastructure constraints and expansions and crude oil price relationships.

## Background

This work will be used by the EIA as input to its assessment for government policy makers of potential impacts under various crude export scenarios and production forecasts. TM&C’s domestic refinery modeling platform was used to provide the specialized supplemental input that the EIA desired to assist them in preparing this assessment.

It should be noted that this project was initiated prior to the sharp drop in crude prices, which has taken place since the middle part of 2014. As a result, the crude production and price levels in the cases provided to us by the EIA are higher than what would be projected today; however, the dynamics driving the impacts on all of the key parameters identified above (crude supply/demand, product yields, price relationships, etc.), from production levels and export policy, are still valid. Therefore, the forecasts still provide valid information to help the EIA make the necessary policy assessments despite input parameters being “out of sync” with the current environment.

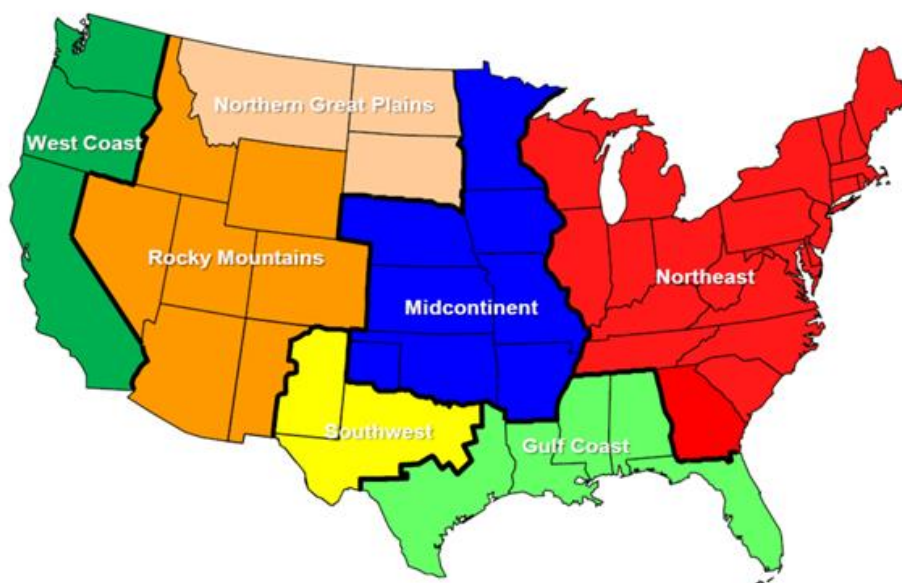
At the commencement of the study, the EIA provided TM&C a detailed year-by-year forecast of U.S. crude production by region, basin and crude quality category for a Low Production Case and a High Production Case. U.S. Production has been classified into nine crude types covering seven regions shown below and on page 3.

Crude Oil Type	API Gravity (degrees)	Sulfur Content (wt. %)
API 50+	API $\geq$ 50	<0.5
API 40-50 sweet	40 $\leq$ API<50	<0.5
API 35-40 sweet	35 $\leq$ API<40	<0.5
API 35-40 sour	35 $\leq$ API<40	<1.1
API 27-35 med-sour	27 $\leq$ API<35	<1.1

Crude Oil Type	API Gravity (degrees)	Sulfur Content (wt. %)
API 27-35 sour	$27 \leq \text{API} < 35$	$\geq 1.1$
California	API < 27	1.1-2.6
API < 27 sweet	API < 27	< 1.1
API < 27 sour	API < 27	$\geq 1.1$

The EIA did not provide a forecast for either U.S. natural gas liquids (NGL) production or Canadian crude oil production. Rather, TM&C generated forecasts for these volumes, consistent with the crude price and production levels in the EIA-provided Low Production and High Production Cases.

The seven U.S. production regions are defined by the map below, with the Northern Great Plains being combined with the Rocky Mountains and Alaska (not shown) being the seventh region. Lower 48 Offshore production is included in its nearest defined region (e.g., Gulf of Mexico production is in the Gulf Coast region). For this study, the EIA's regional forecasts included production estimates for each of the EIA crude categories.



## Key Study Assumptions and Data Table Descriptions

The foundation of *Implications of Increasing U.S. Light Tight Oil Production* is two crude oil production forecasts supplied by the EIA. The Low Production Case details



moderate oil production growth, peaking in 2020 at 11.05 million BPD. The High Production Case has a more aggressive trajectory, with output at 14.7 million BPD in 2025. TM&C was tasked with assessing crude oil refining demand (by region and grade) and calculating refining product output. The refining output was compared with a product demand forecast (also supplied by the EIA) to determine product balances and export requirements. These results were evaluated for two crude export cases: the Base Case, which would not allow crude exports except to Canada, and the Export Case, which would allow unlimited crude exports. As a result, this study is based on substantive input from both the EIA and TM&C to determine the implications of rising U.S. production levels. The three study cases are summarized below:

- The **Low Production Case** utilizes the EIA-supplied Low Production crude forecast and assumes current export regulations are unchanged, both from a policy and an administrative perspective.
- The **High Production Base Case** utilizes the EIA-supplied High Production crude forecast and assumes current export regulations are unchanged, both from a policy and an administrative perspective.
- The **High Production Export Case** utilizes the EIA-supplied High Production crude forecast and assumes unlimited crude exports are permitted.

The output of the study is provided in a series of tables at the end of this document:

- Input Tables – Series I Tables
- Low Production Case – Series II Tables
- High Production Base Case – Series III Tables
- High Production Export Case – Series IV Tables
- Appendix Tables – Series V Tables

One of the early conclusions of the study was that no crude exports would be required using the Low Production Case. With production peaking at slightly over 11 million BPD and significant movements to Canada (550 MBPD), the U.S. refining system could process the remaining domestic supply. This eliminated the need for a Low Production Export Case.

### ***Input Table Descriptions***

#### **Table I-3, Canadian Crude Production Forecast**

The Canadian crude production forecast was supplied by TM&C. We have researched Canadian production trends for several years as part of our **NORTH AMERICAN CRUDE AND CONDENSATE OUTLOOK** and **WORLD CRUDE OIL OUTLOOK** studies. The principal

input source is from the yearly, “*Crude Oil Forecast, Markets and Transportation*,” published by the Canadian Association of Petroleum Producers. We also incorporate third-party assessments of production capabilities from producers, governmental agencies and media outlets.

Canadian production is divided into two regions: Western Canada includes British Columbia, Alberta, Saskatchewan, and Manitoba and Eastern Canada comprises the remaining provinces. This division is necessary to track oil flow (both inside Canada and to the various U.S. PADDs), but it is also utilized for the refining classifications.

A distinction, which is unique to Canada, is the tracking of both oil production and shipments. Oil shipments include diluents which have been imported into Canada (primarily from the U.S.) for blending with the heavy, bitumen-based streams. Canadian diluents are considered to have already been blended into the heavy crude streams.

#### Table I-4, U.S. Refining Capacities – 2013

This data was generally derived from EIA reports, but has been modified based on information received by TM&C. Refining capacities were utilized to estimate crude run levels in the forecast years by applying estimated utilization rates for each case. These utilization rates are shown in Tables II-6, III-6 and IV-6.

#### Table I-5, Projected U.S. Refinery Projects Through 2019

TM&C routinely monitors new refining projects in the U.S. and throughout the world as a primary component of its biannual **CRUDE AND REFINED PRODUCTS OUTLOOK**. The list in Table I-5 is a portion of our recent survey and details the projects, which will have an impact on crude demand; either by increasing crude runs or shifting to a different mix of crude grades. There are 22 projects on the list, which add an additional 416 MBPD of crude capacity to U.S. refineries. While there is a modest increase in heavy crude runs, the bulk of the increase is in light sweet crude, reflective of the current shift to process additional quantities of shale grades. The projects are grouped by PADDs and are used to estimate crude run levels (by grade) in the forecast years.

#### Table I-6, 2013 Charge and Yield Data by PADDs

Before the analysis phase of the study could be conducted, it was necessary to establish the refining feedstocks and output by PADD for the base year of 2013. The principal source of data for this table was from the EIA web site. This data became the foundation for estimating future product outputs for each PADD. TM&C utilized its proprietary refining modeling system to calculate changes in refining charges and yields, which were then added to the 2013 base values.

Table I-9, Census Regions to PADD Conversion; Table I-10, EIA Product Demand – Low Production Case; and Table I-11, EIA Product Demand – High Production Case

The EIA provided two product demand forecasts. Table I-7 (U.S. Domestic Petroleum Product Demand – Low Production Case) details a moderate product demand forecast, which was used in conjunction with the Low Production Case crude forecast. Table I-8 (U.S. Domestic Petroleum Product Demand – High Production Case) has a more robust forecast reflective of the High Production crude forecast. These two forecasts detail product demand by grade, but are listed in nine Census Bureau geographic divisions. It was necessary to convert this data to a PADD format. Table I-9 (Census Regions to PADD Conversion) details the percentage of each Census Bureau region in each PADD. The percentages are from the Census Bureau web site for populations in 2013. This methodology assumes that petroleum product demand is proportional to population. Tables I-10 and I-11 are the adjusted demand tables for the two cases in a PADD format.

Table I-12, TM&C Natural Gas Liquids Forecast

The demand forecasts in Tables I-7 and I-8 (and the revised I-10 and I-11) are for all petroleum products, including those derived from the production of Natural Gas Liquids (NGLs). NGLs are light hydrocarbon products; including ethane, propane, butane, and small volumes of pentane and hexane. Because these products are also derived from crude oil, it was necessary to produce an NGL forecast in order to estimate total product yields and export requirements. Table I-12 (TM&C Natural Gas Liquids Forecast) details a Low Production and High Production NGL forecast to be used with the respective crude oil forecasts.

Table I-13, Other Refining and Logistic Assumptions

Table I-13 lists a series of logistic, refining and other assumptions which were previously agreed to by the EIA in a series of discussions. Some of the items are duplicates to other tables in the workbook.

***Output Table Descriptions***

The structures of the three output workbooks are similar. The first four tables detail the individual crude grades processed in each PADD for the base year of 2013 and the forecast years of 2015, 2020, and 2025. Tables 7-12 list the product yields for each of these crude slates, while Tables 13-18 compare the refining yields to the product demand forecast to determine product imbalances. Tables 21-28 outline crude and product export requirements.

### Tables 1-4, Crude Oil Supply and Demand Balances

Because of its advantaged pricing, refiners are continually incentivized to process steadily increasing volumes of light tight oil crudes. There are limits as to how much each refinery can accommodate of the lighter grades. In general, refiners are induced to back out other foreign light grades and even foreign medium grades to process domestic light. This transition does not come without a cost, however. Substantial incremental capital costs may be required to revamp atmospheric units, expand light ends processing and handling capabilities, and even expand isomerization or reforming capacities. TM&C has assumed the necessary capital expenditures will be made and refineries will eliminate all foreign light and medium imports where necessary.

While TM&C believes refiners are willing to back out medium grades to process more domestic light, we do not believe this transition will extend to foreign heavy grades. In recent decades, refiners have made considerable capital investments to expand coking units in order to process greater volumes of heavy crudes. This shift was first made to accommodate the growing volumes of heavy Mexican and Venezuelan grades, but more recently has focused on rising Canadian volumes. TM&C does not feel these investments will be under-utilized in the future for prolonged periods.

As a result, the primary balancing mechanism for Tables 1-4 was based on the computed vacuum tower bottoms. This is the primary feedstock for coking units for most refiners. This volume was calculated for 2013 and then held constant for each forecast year, except where coking unit additions have been announced. This process insured the coking units would be fully utilized during the forecast years, and residual fuel and asphalt yields would be held relatively constant in noncoking refineries. This methodology was used to calculate the maximum amount of domestic light penetration for each PADD.

### Table 6, U.S. and Canadian Utilization Rates

Refining utilization rates are generally related to refining margins. As margins increase, refiners are induced to process greater quantities of crude oil until maximum limits are hit. On the assumption that refining margins would be highest in the High Production Base Case (no crude exports except to Canada), we have U.S. utilization rates at 86.6% in 2025. In this scenario, crude is constrained in the U.S. and prices must stimulate additional construction of new hydroskimming facilities. In the High Production Export Case (where margins would be expected to be lower than the High Production Base Case), average utilization rates in 2025 are at 85.9%. In the Low Production Case, utilization rates are 85.2%. All of these levels are significantly higher than the 80.3% rate seen in 2013.

### Tables 7-12, Charge and Yield Data

TM&C has calculated product yields for each PADD in each of the forecast years using its proprietary refining models. Product yields were determined as changes from the base year of 2013, and then added back to the calibrated 2013 data shown in Table I-6. All splitter and hydroskimmer projects were assumed to be built in PADD III.

### Tables 13-18, Refinery Product Supply and Demand Balances

These tables compare the changes in refinery production with the changes in product demand for the main product groups. In Tables 7-12, the heavy fuel included both residual fuel and asphalt, but in Tables 13-18, only residual fuel is shown to conform to the EIA product categories. Asphalt production and demand is in the Other category.

Table 18 also includes an NGL balance along with a correction factor to tie back to the 2013 summary balance currently on the EIA web site. The correction factor is the sum of inventory changes, EIA adjustments, supply inputs into refineries, and other factors. It is included in the Other product category.

### Table 19, Crude Oil Flows

These tables highlight the change in crude flows during the forecast years. The balances on the left side of the worksheet summarize the total crude inputs for each region. The balances on the right side of the worksheet detail the changes from 2013 going forward. Increases of greater than 100 MPBD are highlighted to indicate regions that may require additional infrastructure. Decreases are not relevant in that it is assumed the infrastructure is already in place.

### Table 20, Required Crude Oil Logistic Improvements

These worksheets detail the logistic improvements which we estimate will be necessary to handle the additional crude flows in the forecast years. Increases within production areas (such as the Gulf Coast for example) were not assessed as it was assumed that necessary logistic improvements were to be constructed as needed. Supporting documentation for these tables is shown in the Appendix Tables.

### Tables 21-26, Supply and Demand Balances by Products

These tables summarize the product imbalances by product. The product surpluses shown for 2013 are the actual net export volumes. Table 25 (Other Products) includes the NGL balance and the adjustment factor.

### Tables 27-28, Crude and Product Exports

These tables summarize the volumes and likely export destinations of U.S. and Canadian crudes and U.S. products.

### Table 29, Crude Price Forecasts

These tables summarize the annual yearly price forecasts through 2025 for key market crudes, including **Brent, LLS, WTI, Bakken, Mexican Maya** and **Western Canadian Select (WCS)**. They also show the key differentials between these crudes.

EIA provided TM&C a Brent price forecast for both the Low Production Case and the High Production Case. From this absolute view on crude prices, we then generated forecasts for the other crudes using TM&C's proprietary modeling platform, which considers the various factors that we believe drive petroleum pricing. These factors include crude supply and demand, logistical limitations, export policy, crude quality, product supply and demand, refinery capabilities, as well as all other relevant drivers. For each case, the forecast prices and relationships are consistent with the supply estimates, crude and product flows, export policy assumptions and other key assumptions spelled out in this report (both descriptively and in the data Tables).

### ***Low Production Case – Background Assumptions***

The absolute (Brent) prices provided by EIA are higher in this scenario than for the High Production Cases. This is consistent with the lower supply environment which this case is based on. Since domestic crude production does not grow fast enough in this case to exceed the total of domestic and allowable export market demand, price relationships in this case are not impacted by export restrictions and therefore, there was no need for a separate Low Production Export Case.

### Brent – LLS Differential

**The domestic crude discount, as measured by the Brent – LLS differential, is expected to stay generally in a range from \$1.50 to \$2 per barrel (on an annual average basis),** and is consistent with an environment where domestic crude has displaced all waterborne light imports on the USGC. However, production levels have not gotten to the point where export restrictions are binding and domestic crude (including LLS) is priced to compete with the remaining waterborne medium imports on the USGC and light imports to the USWC.

### LLS – WTI Differential

Over the last year, sufficient pipeline capacity has been put into place to allow Permian Basin crude to reach USGC refining markets. This includes pipelines from both the Permian directly to the USGC and pipelines from Cushing to the coast (see Appendix Tables 2 and 3). Additional pipelines are being built and we believe “connectivity” will be maintained going forward. As a result, we expect the **WTI (Cushing) price to trade at a level equal to pipeline transportation and quality-adjusted parity with LLS (St. James) on the USGC (about \$5.00 to \$5.50 per barrel discount) on a sustainable basis.**

### WTI – Bakken Differential

After filling available space in the local, Midcontinent and Pacific Northwest markets, incremental production of Bakken will move to both the East Coast and USGC by unit train. There, it will compete with Brent-linked, waterborne imports. Considering rail transportation costs, quality differentials between Bakken and Brent, and the Brent/LLS and LLS/WTI differentials discussed above, **we expect the Bakken (Clearbrook) price will average a discount of about \$4.25 to \$4.75 per barrel compared to WTI (Cushing) throughout the forecast period.**

### LLS – Maya Differential

The light-heavy differential (as represented by LLS – Maya price) will be based on supply/demand fundamentals between light and heavy crudes in North America and more specifically on the USGC. As a result, factors such as relative light vs. heavy supply growth, investment in refining capabilities targeted to run either light or heavy crudes and build out of logistics facilities to move heavy Western Canadian crude to the USGC will be key drivers.

In the short term, relatively strong growth in light crude production combines with continued stagnation of heavy crude production from Mexico and Venezuela, and the inability of growing Canadian heavy production to reach the USGC to keep the spread relatively compressed (although the recent Seaway expansion has increased Canadian connectivity). On the demand side, the strong growth in light crude production actually increases the demand for heavy crude as it is necessary as a blend stock to create a “pseudo” medium crude. Together these factors result in our forecast of a **Maya (FOB) discount vs. LLS (St. James) of about \$11 to \$12 per barrel over the next three years.**

In the longer term, TM&C expects the differential to grow as Canadian heavy production picks up and accessibility to the USGC is facilitated by the increase in both pipeline and

rail capacity. We also expect Latin American heavy crude production to grow as the traditional U.S. suppliers, Mexico and Venezuela, improve their upstream results. Continued growth of production, from similar heavy crude reserves in Colombia and offshore Brazilian subsalt deposits, will add to the Latin American totals. On the demand side, the low coking margins of recent years, and in the first half of our forecast period, will result in no new coking capacity being developed or built. Factoring all of this into the supply/demand balance, **TM&C expects the LLS/Maya spread to grow to levels exceeding \$15 per barrel by 2022 and reach \$17 per barrel by 2025.**

#### Maya – WCS Differential

Until recently, the ability of heavy Western Canadian crude to reach USGC markets was extremely limited. As a result, WCS and Maya were not “connected” and the differential between the crudes was very volatile and unpredictable. In most cases, because of the “stranded” condition for WCS and its inability to readily reach markets, the WCS (Hardisty) price was discounted significantly compared to Maya (FOB), sometimes by as much as \$40 and more. With the recent completion of the Seaway “twin,” which more than doubled the capacity of that pipeline system to 850 MBPD, a sustainable “connection” to the USGC has been established and the Maya (FOB) – WCS (Hardisty) differential has declined to levels equal to pipeline transportation and quality-adjusted parity at the USGC (about \$7 per barrel). We have assumed that this connectivity will remain as pipeline capacity stays sufficient to move crude from Hardisty to markets and thus, **we expect the Maya – WCS differential to stay in the \$7 to \$8 per barrel range throughout the forecast period.**

#### ***High Production Base Case – Background Assumptions***

As noted earlier, the absolute (Brent) prices provided by EIA are lower in this scenario than for the Low Production Cases due to the higher level of production. By 2020, this difference approaches \$7 per barrel and grows further to about \$14 by 2025. Domestic crude production is significantly higher than in the Low Production Case and quickly exceeds the total of domestic and allowable export market demand. As a result, domestic discounts and even light/heavy discounts are significantly different between the Base Cases (Exports Restricted) and Export Case, as described in the paragraphs to follow.

One thing to note is that the EIA provided TM&C a single Brent price set for the High Production Case and we held to that, leaving Brent prices identical between the Base Cases and the Export Case.



### Brent – LLS Differential

Due to the “stranded” condition that develops in the High Production Base Case as domestic production exceeds allowable market options, the domestic crude discount (measured by the Brent – LLS differential) is significantly higher than in either the Low Production Base Case or the High Production Export Case. **We expect that the domestic crude discount grows rapidly from an average of \$3.20 per barrel in 2015 to exceed \$13 per barrel (annual average) in 2018. Thereafter, investment in “crude-to-product” processing facilities (incentivized by the large discounts) will begin to come on line and the discount declines to a level of \$7 to \$8 per barrel by 2022 and stays at this sustainable range for the remainder of the forecast period.** TM&C believes this level of discount will be necessary to incentivize continued investment in processing to keep up with domestic production growth.

### LLS – WTI Differential

Our assumption is that sufficient pipeline capacity will be added to maintain “connectivity” to USGC refining markets for Permian crude. As a result, **we expect the LLS – WTI differential to be identical in this case to that for the Low Production Case, again based on pipeline transportation and quality-adjusted parity. This was a WTI (Cushing) discount of about \$5.00 to \$5.50 per barrel vs. LLS (St. James).**

### WTI – Bakken Differential

With relative production levels between WTI and Bakken similar between the Low Production Base Case and High Production Cases and impacts of export restrictions similar as well, we expect WTI and Bakken to move in tandem relative to each other in all of the cases. As a result, **the Brent (Clearbrook) price will average a discount of about \$4.25 to \$4.75 per barrel compared to WTI (Cushing) throughout the forecast period, the same relationship as in the Low Production Case and the High Production Export Case.**

### LLS – Maya Differential

Although Mexican produced Maya is not directly impacted by U.S. crude export restrictions, it (along with other Latin America and Canadian heavies) will be indirectly impacted; however, this impact will be less than that for U.S. produced crudes as they will have some ability to access foreign markets. As a result, the light/heavy (LLS – Maya) differential will be lower in the High Production Base Case than in either the Low Production Base Case or the High Production Export Case.

On a sustainable basis, we believe heavy crude producers will have to reduce prices somewhat to continue to incentivize USGC coking refineries to run heavy crudes. This is because of the inability to fully place these barrels in alternate markets due to limited available deep conversion capacity in the rest of the world. We believe a LLS – Maya differential of \$7 per barrel provides marginally sufficient economics for most USGC deep conversion refineries to run heavy crudes, and that this will be the sustainable “floor” for the differential. Our forecast, therefore, is for **LLS - Maya to decline from \$11 per barrel in 2015 to the \$7 per barrel floor by 2018 as U.S. export restrictions drive the domestic crude discount to double digit levels. It stays at these levels through 2019 and starts to increase in 2020, reaching and exceeding \$13 per barrel by 2025 as investment in “crude-to-product” processing facilities decrease the domestic discount.** The 2025 level is about \$4 per barrel less than in the Low Production Case.

#### Maya – WCS Differential

As with the LLS/WTI and Bakken/WTI relationships, the price dynamics between all three of the cases (Low Production, High Production Base, and High Production Export) for Maya vs. WCS remain the same. In all cases we assume sufficient pipeline capacity is in place to maintain connectivity between Western Canada and the USGC and the two heavy crudes compete with each for the attention of USGC refineries based on their quality differences. As a result, we expect the **Maya (FOB) – WCS (Hardisty) differential stays in the \$7 to \$8 per barrel range throughout the forecast period, based on quality and transportation (to the USGC) differences.**

#### ***High Production Export Case – Background Assumptions***

For the absolute (Brent) prices, see the discussion on page 11 for the High Production Base Case. Absolute prices are assumed to be the same in the High Production Base Case and the High Production Export Case.

#### Brent – LLS Differential

With crude exports allowed, a “stranded” situation does not develop and the Brent – LLS differential does not “blow out” as in the Base Case. Instead, domestic crude essentially moves to an “export parity” relationship with Brent. Because it takes some time to develop export facilities and markets, we show this happening over a three-to-four year period. **From a level of \$2.15 per barrel in 2015, we forecast the LLS discount (vs. Brent) to decline to about \$0.90 per barrel by 2018. As U.S. production continues to grow, we forecast that this discount will increase gradually to about \$1.40 per barrel by 2025 due to supply/demand factors.**

### LLS – WTI Differential

Export policy should not affect this differential. Therefore, for the same reasons as in the High Production Base Case, we have the **LLS – WTI differential identical in this case to that for the Low Production Case, again based on pipeline transportation and quality-adjusted parity. This has WTI (Cushing) discounted by about \$5.00 to \$5.50 per barrel vs. LLS (St. James).**

### WTI – Bakken Differential

Again, we expect export policy to impact WTI and Bakken in the same way. As a result, this differential is the same in the High Production Export Case as in both the Low Production Case and the High Production Base Case.

### LLS – Maya Differential

The trajectory of the light/heavy differential in this case is forecast to be similar to that in the Low Production Case, as in neither case are crude export restrictions impacting. The level of the discount is a bit lower in this High Production Case, due to the higher relative level of light crude production compared to the Low Production Case. As a result, we forecast a **Maya (FOB) discount vs. LLS (St. James) of about \$11 to \$12 per barrel over the next three years, growing to reach \$16 per barrel by 2025.** At that point, the differential is about \$1 per barrel below that in the Low Production Case.

### Maya – WCS Differential

As with the LLS/WTI and Bakken/WTI relationships, the price dynamics between all three of the cases (Low Production, High Production Base, and High Production Export) for Maya vs. WCS remain the same. As a result, we expect the **Maya (FOB) – WCS (Hardisty) differential stays in the \$7 to \$8 per barrel range throughout the forecast period, based on quality and transportation (to the USGC) differences.**

### ***Appendix Tables – Key Logistical Assumptions***

These tables summarize the most important crude logistics facilities currently serving or proposed for U.S. and Canadian crude markets. Data shown includes ownership, capacities and start-up timing (for new facilities). Included are both pipelines and rail offloading terminals. The tables are arranged by region and cover the most critical supply corridors in North America.

### Table 1, PADD I Rail Offloading Facilities

This table shows the rail offloading facilities which are either in place or proposed to be built to allow domestic crude, primarily Bakken, to reach PADD I refineries. These include terminals located both within and outside of refinery gates.

### Table 2, Permian Basin Exit Pipelines

This table shows the pipelines, both existing and proposed dedicated to moving Permian Basin crude oil to either refineries on the USGC or to the Cushing terminal complex.

### Table 3, Cushing, OK and Patoka, IL Exit Pipelines

This table shows the pipelines, existing and proposed, which provide capacity for movements from the key Midcontinent crude junctions/terminals in Patoka, Illinois, and Cushing, Oklahoma.

### Table 4, PADD V Rail Offloading Facilities

This table shows the rail offloading facilities, which are either in place or proposed to be built to serve PADD V refineries. These include terminals located both within and outside of refinery gates. In contrast to the PADD I facilities listed in Table 1, most of the PADD V rail terminals are not yet completed and located away from the actual refineries. Included are facilities which target a wide variety of domestic crudes, including Bakken, Rocky Mountain crudes and Permian Basin crudes

### Table 5, Western Canadian Exit Pipelines

This table shows the pipelines, existing and proposed, which provide capacity for movements from the Western Canadian crude fields to either the U.S. or to ports on both the Pacific and Atlantic Oceans.

## Implications of Increasing U.S. Light Tight Oil Production

### Input Tables

<u>Number</u>	<u>Tab</u>	<u>Table Name</u>
I-1	<a href="#">Low Production Case</a>	U.S. Crude Production Forecast - EIA Low Production Case
I-2	<a href="#">High Production Case</a>	U.S. Crude Production Forecast - EIA High Production Case
I-3	<a href="#">Canada</a>	Canadian Crude Production Forecast
I-4	<a href="#">RefCapacities</a>	U.S. Refining Capacities - 2013
I-5	<a href="#">New Projects</a>	Projected U.S. Refinery Projects Through 2019
I-6	<a href="#">2013</a>	2013 Charge and Yield Data by PADDs
I-7	<a href="#">LP Demand</a>	U.S. Domestic Petroleum Product Demand - Low Production Case
I-8	<a href="#">HP Demand</a>	U.S. Domestic Petroleum Product Demand - High Production Case
I-9	<a href="#">Regions</a>	Census Regions to PADD Conversion
I-10	<a href="#">Adj. LP Demand</a>	EIA Product Demand by PADDs- Low Production Case
I-11	<a href="#">Adj. HP Demand</a>	EIA Product Demand by PADDs- High Production Case
I-12	<a href="#">NGLs</a>	TM&C Natural Gas Liquids Forecast
I-13	<a href="#">Other Assumptions</a>	Other Refining and Logistic Assumptions

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**Table I-1**  
**U.S. Crude Production Forecast - EIA Low Production Case**

(million barrels per day)

Production	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
<b>Domestic Crude Oil Production</b>	<b>7.46</b>	<b>8.54</b>	<b>9.59</b>	<b>10.30</b>	<b>10.65</b>	<b>10.97</b>	<b>11.02</b>	<b>11.05</b>	<b>11.02</b>	<b>11.03</b>	<b>11.02</b>	<b>11.06</b>	<b>10.92</b>
<b>Northeast</b>	<b>0.10</b>	<b>0.12</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.07</b>	<b>0.06</b>	<b>0.06</b>	<b>0.06</b>	<b>0.06</b>	<b>0.06</b>	<b>0.06</b>
Light Sweet	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Sour	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Medium Medium Sour	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Medium Sour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Sweet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Sour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ultra Light Sweet	0.03	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01
API 50+	0.03	0.04	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
<b>Gulf Coast</b>	<b>1.31</b>	<b>1.73</b>	<b>2.22</b>	<b>2.43</b>	<b>2.42</b>	<b>2.39</b>	<b>2.36</b>	<b>2.38</b>	<b>2.38</b>	<b>2.39</b>	<b>2.36</b>	<b>2.34</b>	<b>2.28</b>
Light Sweet	0.22	0.33	0.40	0.42	0.42	0.38	0.36	0.35	0.34	0.34	0.34	0.33	0.34
Light Sour	0.06	0.08	0.09	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.17	0.18	0.15
Medium Medium Sour	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.13
Medium Sour	0.02	0.03	0.04	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.04
Heavy Sweet	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Heavy Sour	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Ultra Light Sweet	0.24	0.50	0.80	0.96	0.94	1.02	1.04	1.07	1.09	1.11	1.11	1.12	1.13
API 50+	0.64	0.65	0.74	0.74	0.73	0.64	0.61	0.59	0.57	0.56	0.51	0.48	0.46
<b>Midcontinent</b>	<b>0.60</b>	<b>0.60</b>	<b>0.40</b>	<b>0.39</b>	<b>0.37</b>	<b>0.37</b>	<b>0.38</b>	<b>0.40</b>	<b>0.42</b>	<b>0.45</b>	<b>0.48</b>	<b>0.53</b>	<b>0.57</b>
Light Sweet	0.15	0.15	0.10	0.10	0.09	0.09	0.10	0.12	0.14	0.16	0.17	0.21	0.23
Light Sour	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Medium Medium Sour	0.07	0.08	0.05	0.05	0.06	0.06	0.06	0.07	0.08	0.09	0.10	0.11	0.11
Medium Sour	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Heavy Sweet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
Heavy Sour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ultra Light Sweet	0.21	0.20	0.13	0.12	0.12	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12
API 50+	0.12	0.13	0.09	0.08	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.07	0.07
<b>Southwest</b>	<b>1.65</b>	<b>1.88</b>	<b>2.07</b>	<b>2.18</b>	<b>2.24</b>	<b>2.31</b>	<b>2.35</b>	<b>2.38</b>	<b>2.41</b>	<b>2.45</b>	<b>2.49</b>	<b>2.52</b>	<b>2.53</b>
Light Sweet	0.33	0.36	0.38	0.39	0.39	0.40	0.40	0.40	0.40	0.41	0.42	0.42	0.41
Light Sour	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.18
Medium Medium Sour	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.09	0.09	0.10	0.10	0.10	0.10
Medium Sour	0.34	0.32	0.31	0.31	0.31	0.31	0.32	0.33	0.33	0.34	0.35	0.36	0.36
Heavy Sweet	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Heavy Sour	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
Ultra Light Sweet	0.65	0.77	0.89	0.96	0.99	1.02	1.02	1.05	1.05	1.05	1.05	1.05	1.04
API 50+	0.09	0.20	0.25	0.29	0.31	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.39
<b>Rocky Mountain</b>	<b>1.40</b>	<b>1.67</b>	<b>2.06</b>	<b>2.18</b>	<b>2.36</b>	<b>2.44</b>	<b>2.50</b>	<b>2.53</b>	<b>2.55</b>	<b>2.57</b>	<b>2.60</b>	<b>2.61</b>	<b>2.52</b>
Light Sweet	0.12	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.09	0.09	0.09	0.09
Light Sour	0.13	0.15	0.16	0.16	0.17	0.17	0.18	0.19	0.19	0.19	0.19	0.19	0.18
Medium Medium Sour	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.05	0.06
Medium Sour	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.06
Heavy Sweet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.06	0.06	0.06
Heavy Sour	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.05	0.04	0.05	0.05	0.05
Ultra Light Sweet	0.98	1.28	1.64	1.76	1.93	2.00	2.05	2.06	2.07	2.07	2.06	2.06	1.93
API 50+	0.05	0.05	0.05	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.09
<b>West Coast, California</b>	<b>0.51</b>	<b>0.52</b>	<b>0.53</b>	<b>0.54</b>	<b>0.55</b>	<b>0.57</b>	<b>0.58</b>	<b>0.59</b>	<b>0.60</b>	<b>0.61</b>	<b>0.61</b>	<b>0.62</b>	<b>0.63</b>
<b>Lower 48 Offshore</b>	<b>1.37</b>	<b>1.54</b>	<b>1.79</b>	<b>2.07</b>	<b>2.18</b>	<b>2.38</b>	<b>2.35</b>	<b>2.29</b>	<b>2.19</b>	<b>2.11</b>	<b>2.05</b>	<b>2.04</b>	<b>2.01</b>
Atlantic Medium Medium Sour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gulf of Mexico Medium Medium Sour	1.28	1.45	1.70	2.01	2.12	2.33	2.30	2.23	2.14	2.06	2.00	1.99	1.96
Pacific California	0.09	0.09	0.09	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05
<b>Alaska</b>	<b>0.52</b>	<b>0.49</b>	<b>0.45</b>	<b>0.43</b>	<b>0.44</b>	<b>0.45</b>	<b>0.43</b>	<b>0.42</b>	<b>0.40</b>	<b>0.38</b>	<b>0.35</b>	<b>0.34</b>	<b>0.32</b>
North Slope Offshore Medium Medium Sour	0.00	0.00	0.04	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.06	0.06
North Slope Onshore Medium Medium Sour	0.50	0.48	0.40	0.35	0.36	0.37	0.35	0.34	0.32	0.30	0.28	0.27	0.25
South Alaska Medium Medium Sour	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
<b>Other Crudes Not Listed</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

**Table I-2**  
**U.S. Crude Production Forecast - EIA High Production Case**  
(million barrels per day)

Production	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
<b>Domestic Crude Oil Production</b>	<b>7.46</b>	<b>8.57</b>	<b>9.80</b>	<b>10.84</b>	<b>11.33</b>	<b>12.26</b>	<b>12.79</b>	<b>13.29</b>	<b>13.64</b>	<b>13.85</b>	<b>14.19</b>	<b>14.55</b>	<b>14.70</b>
<b>Lower 48 Onshore</b>													
<b>Northeast</b>	<b>0.10</b>	<b>0.08</b>	<b>0.08</b>	<b>0.08</b>	<b>0.08</b>	<b>0.08</b>	<b>0.08</b>	<b>0.08</b>	<b>0.08</b>	<b>0.08</b>	<b>0.09</b>	<b>0.09</b>	<b>0.10</b>
Light Sweet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Sour	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Medium Medium Sour	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Medium Sour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Sweet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Sour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ultra Light Sweet	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
API 50+	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07
<b>Gulf Coast</b>	<b>1.31</b>	<b>1.91</b>	<b>2.26</b>	<b>2.53</b>	<b>2.55</b>	<b>2.84</b>	<b>2.99</b>	<b>3.12</b>	<b>3.22</b>	<b>3.22</b>	<b>3.23</b>	<b>3.20</b>	<b>3.23</b>
Light Sweet	0.22	0.31	0.35	0.39	0.42	0.48	0.50	0.51	0.52	0.53	0.54	0.49	0.48
Light Sour	0.06	0.10	0.11	0.11	0.11	0.14	0.18	0.22	0.24	0.25	0.26	0.28	0.30
Medium Medium Sour	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.12	0.12	0.13	0.14
Medium Sour	0.02	0.04	0.06	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.08	0.09	0.09
Heavy Sweet	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Heavy Sour	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Ultra Light Sweet	0.24	0.56	0.80	0.95	0.93	1.10	1.16	1.20	1.24	1.27	1.28	1.30	1.32
API 50+	0.64	0.76	0.80	0.87	0.89	0.92	0.94	0.97	0.98	0.93	0.90	0.88	0.87
<b>Midcontinent</b>	<b>0.60</b>	<b>0.38</b>	<b>0.39</b>	<b>0.38</b>	<b>0.37</b>	<b>0.38</b>	<b>0.43</b>	<b>0.48</b>	<b>0.53</b>	<b>0.57</b>	<b>0.62</b>	<b>0.66</b>	<b>0.70</b>
Light Sweet	0.16	0.09	0.10	0.10	0.09	0.09	0.10	0.11	0.13	0.14	0.16	0.18	0.20
Light Sour	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Medium Medium Sour	0.07	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.08	0.09	0.10	0.10	0.10
Medium Sour	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Heavy Sweet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Heavy Sour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ultra Light Sweet	0.21	0.13	0.13	0.12	0.12	0.12	0.13	0.14	0.14	0.14	0.15	0.16	0.17
API 50+	0.12	0.08	0.08	0.08	0.08	0.09	0.11	0.13	0.15	0.16	0.17	0.17	0.18
<b>Southwest</b>	<b>1.65</b>	<b>1.80</b>	<b>2.08</b>	<b>2.17</b>	<b>2.22</b>	<b>2.50</b>	<b>2.73</b>	<b>2.93</b>	<b>3.09</b>	<b>3.23</b>	<b>3.34</b>	<b>3.44</b>	<b>3.57</b>
Light Sweet	0.33	0.33	0.40	0.40	0.39	0.54	0.67	0.79	0.86	0.92	0.96	1.00	1.05
Light Sour	0.13	0.12	0.13	0.12	0.11	0.12	0.13	0.13	0.14	0.14	0.15	0.16	0.16
Medium Medium Sour	0.09	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.10	0.10
Medium Sour	0.34	0.27	0.29	0.28	0.28	0.29	0.30	0.31	0.31	0.32	0.33	0.34	0.34
Heavy Sweet	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Heavy Sour	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Ultra Light Sweet	0.65	0.78	0.89	0.97	1.01	1.09	1.13	1.18	1.23	1.27	1.30	1.33	1.37
API 50+	0.09	0.22	0.27	0.30	0.34	0.37	0.40	0.42	0.45	0.47	0.48	0.50	0.51
<b>Rocky Mountain</b>	<b>1.40</b>	<b>1.84</b>	<b>2.21</b>	<b>2.39</b>	<b>2.60</b>	<b>2.82</b>	<b>2.97</b>	<b>3.13</b>	<b>3.25</b>	<b>3.33</b>	<b>3.58</b>	<b>3.81</b>	<b>3.84</b>
Light Sweet	0.12	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.09	0.09	0.09	0.09
Light Sour	0.13	0.15	0.16	0.16	0.17	0.17	0.18	0.18	0.19	0.19	0.19	0.18	0.18
Medium Medium Sour	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.06	0.08	0.10
Medium Sour	0.02	0.01	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.04	0.06
Heavy Sweet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.30	0.21
Heavy Sour	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Ultra Light Sweet	0.98	1.45	1.78	1.96	2.17	2.37	2.52	2.66	2.77	2.85	2.91	2.97	3.04
API 50+	0.05	0.05	0.06	0.07	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.10	0.11
<b>West Coast, California</b>	<b>0.51</b>	<b>0.55</b>	<b>0.55</b>	<b>0.58</b>	<b>0.59</b>	<b>0.60</b>	<b>0.62</b>	<b>0.63</b>	<b>0.65</b>	<b>0.65</b>	<b>0.66</b>	<b>0.67</b>	<b>0.68</b>
<b>Lower 48 Offshore</b>	<b>1.37</b>	<b>1.54</b>	<b>1.79</b>	<b>2.28</b>	<b>2.48</b>	<b>2.58</b>	<b>2.54</b>	<b>2.49</b>	<b>2.44</b>	<b>2.39</b>	<b>2.33</b>	<b>2.34</b>	<b>2.28</b>
Atlantic Medium Medium Sour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gulf of Mexico Medium Medium Sour	1.28	1.45	1.70	2.22	2.42	2.53	2.48	2.44	2.39	2.34	2.28	2.29	2.23
Pacific California	0.09	0.09	0.09	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05
<b>Alaska</b>	<b>0.52</b>	<b>0.49</b>	<b>0.45</b>	<b>0.43</b>	<b>0.44</b>	<b>0.45</b>	<b>0.43</b>	<b>0.42</b>	<b>0.40</b>	<b>0.38</b>	<b>0.35</b>	<b>0.34</b>	<b>0.32</b>
North Slope Offshore Medium Medium Sour	0.00	0.00	0.04	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.06	0.06
North Slope Onshore Medium Medium Sour	0.50	0.48	0.40	0.35	0.36	0.37	0.35	0.34	0.32	0.30	0.28	0.27	0.25
South Alaska Medium Medium Sour	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
<b>Other Crudes Not Listed</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

Table I-3 Canadian Crude Production Forecast, MBPD				
	2013	2015	2020	2025

Western Canada

Production	3,190	3,537	4,090	4,755
Shipments	3,418	3,781	4,509	5,368

Eastern Canada

Production	232	227	263	175
Shipments	232	227	263	175

Total Canada

Production	3,422	3,764	4,353	4,930
Shipments	3,650	4,008	4,772	5,543



**Table I-4**  
**U.S. Refinery Capacities - 2013**

(Unit Capacities in Thousands of Barrels per Stream Day)

Company	Location	Crude
<b>PADD I</b>		
Monroe Energy	Trainer, PA	190
Philadelphia Energy	Philadelphia, PA	355
Phillips 66	Linden, NJ	251
Axeon Specialty Products	Paulsboro, NJ	75
PBF Energy	Delaware City, DE	190
PBF Energy	Paulsboro, NJ	166
American Refining Group	Bradford, PA	11
United	Warren, PA	70
Ergon	Newell, WV	<u>22</u>
		<b>1,330</b>
<b>PADD II</b>		
Marathon	Robinson, IL	225
Countrymark	Mt. Vernon, IN	28
Continental	Somerset, KY	6
Marathon	Catlettsburg, KY	261
Tesoro	Mandan, ND	70
Husky	Lima, OH	170
Marathon	Canton, OH	87
PBF Energy	Toledo, OH	175
Exxon	Joliet, IL	248
Citgo	Lemont, IL	180
WRB	Wood River, IL	350
BP	Whiting, IN	428
Marathon	Detroit, MI	126
Flint Hills	Rosemount, MN	320
Northern Tier	St. Paul, MN	85
BP-Husky	Toledo, OH	160
Calumet	Superior, WI	45
Valero	Memphis, TN	190
NCRA (CHS)	McPherson, KS	88
CVR Energy	Coffeyville, KS	125
Holly Frontier	El Dorado, KS	140
Holly Frontier	Tulsa, OK	166
Valero	Ardmore, OK	87
CVR Energy	Wynnewood, OK	75
Phillips 66	Ponca City, OK	<u>215</u>
		<b>4,049</b>

**Table I-4**  
**U.S. Refinery Capacities - 2013**

(Unit Capacities in Thousands of Barrels per Stream Day)

Company	Location	Crude
<b>PADD III</b>		
Martin Midstream	Smackover, AR	8
Calumet	Cotton Valley, LA	14
Calumet	Shreveport, LA	60
Calumet	Princeton, LA	9
Holly Frontier	Artesia, NM	115
Western	Gallup, NM	25
Alon	Big Spring, TX	70
Delek	Tyler, TX	65
Valero	Sunray, TX	160
Western	El Paso, TX	130
Delek	El Dorado, AR	85
Ergon	Vicksburg, MS	25
WRB	Borger, TX	154
Goodway	Atmore	5
Shell	Saraland, AL	85
Alon	Krotz Springs, LA	83
Exxon/PDVSA	Chalmette, LA	195
Motiva	Convent, LA	255
Motiva	Norco, LA	250
Phillips 66	Belle Chase, LA	260
Placid	Port Allen, LA	59
Valero	Meraux, LA	140
Hunt	Tuscaloosa, AL	40
Exxon	Baton Rouge, LA	523
Marathon	Garyville, LA	548
Citgo	Lake Charles	440
Phillips 66	Westlake, LA	252
Shell	St. Rose, LA	46
Valero	Norco, LA	210
Chevron	Pascagoula, MS	360
Hunt	Sandersville, MS	13
Marathon	Texas City, TX	475
Exxon	Beaumont, TX	359
Marathon	Texas City, TX	87
Petrobras	Pasadena, TX	107
Valero	Houston, TX	90
Lyondell	Houston, TX	302
Shell	Deer Park, TX	340
Exxon	Baytown, TX	584
Motiva	Port Arthur, TX	620
Phillips 66	Sweeny, TX	260
Total	Port Arthur, TX	245
Valero	Port Arthur, TX	415
Valero	Texas City, TX	233
Blue Dolphin Energy	Nixon, TX	12
Calumet	San Antonio, TX	15
Flint Hills	Corpus Christi, TX	293
Citgo	Corpus Christi, TX	165
Valero	Corpus Christi, TX	205
Valero	Three Rivers, TX	<u>95</u>
		<b>9,584</b>

**Table I-4**  
**U.S. Refinery Capacities - 2013**

(Unit Capacities in Thousands of Barrels per Stream Day)

Company	Location	Crude
<b>PADD IV</b>		
Suncor	Commerce City, CO	110
Chevron	Salt Lake City, UT	49
Big West	Salt Lake City, UT	30
Holly Frontier	Salt Lake City, UT	26
Silver Eagle	Salt Lake City, UT	6
Tesoro	Salt Lake City, UT	60
Black Elk	Newcastle	15
Silver Eagle	Salt Lake City, UT	3
Sinclair	Casper, WY	26
Montana Ref.	Great Falls, MT	11
CHS	Laurel, MT	61
Exxon	Billings, MT	62
Phillips 66	Billings, MT	63
Holly Frontier	Cheyenne, WY	52
Sinclair	Rawlins, WY	<u>85</u>
		<b>658</b>
<b>PADD V</b>		
Phillips 66	Ferndale, WA	108
Tesoro	Anacortes, WA	125
BP	Blaine, WA	234
Trailstone	Tacoma, WA	42
Shell	Anacortes, WA	149
Chevron	El Segundo, CA	291
Chevron	Richmond, CA	257
Exxon	Los Angeles, CA	156
Greka Energy	Santa Maria, CA	10
Kern	Bakersfield, CA	27
Phillips 66	Santa Maria/Rodeo, CA	128
Phillips 66	Carson/Wilmington, CA	147
Shell	Martinez, CA	158
San Joaquin Refining	Bakersfield, CA	25
Tesoro	Martinez, CA	170
Tesoro	Los Angeles, CA	107
Tesoro	Los Angeles, CA	276
Valero	Benicia, CA	135
Valero	Los Angeles, CA	87
Lunday-Thagard	Los Angeles, CA	10
Arctic Slope	North Pole, AK	23
Arctic Slope	Valdez, AK	60
BP	Prudhoe Bay, AK	13
ConocoPhillips	Prudhoe Bay, AK	16
Flint Hills	North Pole, AK	87
Tesoro	Kenai, AK	72
Chevron	Kapolei, HI	57
Par Petroleum	Kapolei, HI	<u>95</u>
		<b>3,063</b>

Table I-5

## Projected U.S. Refinery Projects Through 2019

## Crude Capacity Changes

(Unit Capacities in Thousands of Barrels per Stream Day)

State	Company	Location	Expected Compl'n	Change to Crude Capacity				Total
				Heavy	Medium	Lt. Sour	Lt. Swt.	
<b>PADD I</b>								
NJ	Axeon Specialty	Paulsboro	2014	(35)			35	0
				<b>(35)</b>	<b>0</b>	<b>0</b>	<b>35</b>	<b>0</b>
<b>PADD II</b>								
OH	Marathon	Canton	2014				25	25
ND	Calumet / MDU Resources	Dickinson	2014				20	20
KY	Marathon	Catlettsburg	2015				35	35
IL	Marathon	Robinson	2016				30	30
OH	Husky	Lima	2017	40			(40)	0
KS	NCRA	McPherson	2018	30			(15)	15
				<b>70</b>	<b>0</b>	<b>0</b>	<b>55</b>	<b>125</b>
<b>PADD III</b>								
TX	Calumet	San Antonio	2014				3	3
TX	Flint Hills	Corpus Christi	2014			(30)	30	0
LA	Marathon	Garyville	2014	10	5	5		20
TX	Delek	Tyler	2015				12	12
TX	Valero Energy	Corpus Christi	2015				70	70
TX	Valero Energy	Houston	2015				90	90
TX	Valero Energy	McKee	2015				25	25
TX	Marathon	Galveston Bay	2015		(25)		25	0
				<b>10</b>	<b>(20)</b>	<b>(25)</b>	<b>255</b>	<b>220</b>
<b>PADD IV</b>								
UT	Tesoro	Salt Lake City	2015				4	4
UT	HollyFrontier	Woods Cross	2015				14	14
MT	Calumet	Great Falls	2015	10				10
UT	HollyFrontier	Woods Cross	2017				15	15
MT	CHS	Laurel	2019				25	25
				<b>10</b>	<b>0</b>	<b>0</b>	<b>58</b>	<b>68</b>
<b>PADD V</b>								
CA	Chevron	Richmond	2017	20	(20)			0
AK	AIDEA	Mustang	2018		3			3
				<b>20</b>	<b>(17)</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>TOTAL</b>				<b>75</b>	<b>(37)</b>	<b>(25)</b>	<b>403</b>	<b>416</b>

<b>Table I-6</b>						
<b>2013 Charge and Yield Data by PADDs</b>						
Thousands of Barrel per Day						
	<u>PADD I</u>	<u>PADD II</u>	<u>PADD III</u>	<u>PADD IV</u>	<u>PADD V</u>	<u>U.S.</u>
<i><u>Feedstocks</u></i>						
Crude	1,022	3,353	7,829	569	2,303	15,076
Other Feedstocks <sup>1</sup>	<u>188</u>	<u>669</u>	<u>1,442</u>	<u>53</u>	<u>591</u>	<u>2,943</u>
	1,210	4,022	9,271	622	2,894	18,019
<i><u>Products</u></i>						
Propane/Propylene	34	107	369	9	45	564
Normal Butane	2	4	48	2	8	64
Isobutane	-1	-1	-1	-1	-1	-5
Gasoline	584	2,319	4,216	320	1,600	9,038
Jet/Kerosene	73	223	760	26	414	1,496
Distillate	361	1,013	2,721	194	568	4,857
Resid/Asphalt	116	195	351	44	130	836
Other <sup>2</sup>	<u>92</u>	<u>365</u>	<u>1,434</u>	<u>52</u>	<u>313</u>	<u>2,256</u>
	1,261	4,225	9,898	646	3,077	19,106

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.
2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table I-7**  
**U.S. Domestic Petroleum Product Demand - Low Production Case**  
(million barrels per day)

**TOTAL DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.70	0.72	0.70	0.69	0.68	0.68	0.67	0.66	0.65	0.65	0.64	0.63	0.62
02_Middle_Atlantic	1.80	1.81	1.80	1.79	1.76	1.73	1.72	1.70	1.68	1.66	1.64	1.62	1.60
03_East_North_Central	2.30	2.31	2.31	2.32	2.29	2.27	2.25	2.23	2.21	2.19	2.16	2.14	2.11
04_West_North_Central	1.39	1.40	1.40	1.41	1.41	1.40	1.40	1.39	1.38	1.37	1.36	1.35	1.34
05_South_Atlantic	2.81	2.83	2.83	2.84	2.83	2.83	2.81	2.80	2.79	2.79	2.78	2.76	2.75
06_East_South_Central	1.18	1.18	1.18	1.19	1.18	1.17	1.17	1.16	1.15	1.15	1.14	1.13	1.12
07_West_South_Central	4.98	4.91	5.01	5.09	5.20	5.35	5.42	5.49	5.53	5.60	5.68	5.72	5.75
08_Mountain	1.16	1.17	1.18	1.18	1.22	1.25	1.27	1.28	1.28	1.28	1.29	1.29	1.29
09_Pacific	2.52	2.51	2.51	2.52	2.50	2.51	2.53	2.52	2.52	2.51	2.50	2.49	2.48
US	18.83	18.85	18.91	19.04	19.08	19.18	19.24	19.24	19.20	19.19	19.19	19.14	19.06

**MOGAS DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.41	0.40	0.40	0.40	0.39	0.38	0.37	0.36	0.36	0.35	0.34	0.33	0.33
02_Middle_Atlantic	0.94	0.94	0.93	0.93	0.90	0.86	0.85	0.83	0.81	0.80	0.78	0.76	0.74
03_East_North_Central	1.26	1.26	1.26	1.25	1.21	1.17	1.16	1.13	1.11	1.09	1.07	1.04	1.02
04_West_North_Central	0.66	0.66	0.66	0.66	0.64	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55
05_South_Atlantic	1.80	1.79	1.79	1.78	1.77	1.75	1.73	1.71	1.69	1.67	1.64	1.62	1.59
06_East_South_Central	0.62	0.61	0.61	0.61	0.60	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51
07_West_South_Central	1.17	1.17	1.16	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.08	1.07	1.05
08_Mountain	0.61	0.61	0.61	0.60	0.60	0.60	0.60	0.59	0.59	0.58	0.58	0.57	0.57
09_Pacific	1.26	1.25	1.25	1.25	1.23	1.22	1.20	1.19	1.17	1.15	1.13	1.12	1.10
US	8.71	8.69	8.68	8.65	8.49	8.32	8.22	8.12	8.00	7.86	7.73	7.59	7.45

**DISTILLATE DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.20	0.21	0.20	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
02_Middle_Atlantic	0.43	0.46	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.43	0.43
03_East_North_Central	0.51	0.54	0.54	0.55	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
04_West_North_Central	0.42	0.44	0.44	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
05_South_Atlantic	0.55	0.58	0.58	0.60	0.60	0.61	0.61	0.61	0.61	0.61	0.62	0.62	0.62
06_East_South_Central	0.29	0.31	0.31	0.32	0.32	0.33	0.33	0.33	0.33	0.33	0.33	0.34	0.34
07_West_South_Central	0.70	0.74	0.75	0.76	0.78	0.80	0.81	0.81	0.81	0.81	0.82	0.82	0.82
08_Mountain	0.33	0.35	0.35	0.36	0.37	0.37	0.37	0.37	0.37	0.37	0.38	0.38	0.38
09_Pacific	0.43	0.44	0.44	0.45	0.46	0.47	0.47	0.47	0.47	0.47	0.48	0.48	0.48
US	3.88	4.06	4.07	4.13	4.19	4.23	4.25	4.25	4.25	4.26	4.27	4.27	4.27

**Table I-7**  
**U.S. Domestic Petroleum Product Demand - Low Production Case**  
(million barrels per day)

**K-JET DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
02_Middle_Atlantic	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
03_East_North_Central	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
04_West_North_Central	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
05_South_Atlantic	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
06_East_South_Central	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09
07_West_South_Central	0.25	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.27
08_Mountain	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
09_Pacific	0.41	0.42	0.42	0.42	0.42	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.44
US	1.42	1.44	1.43	1.44	1.44	1.45	1.45	1.45	1.46	1.46	1.46	1.47	1.47

**RESID DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
02_Middle_Atlantic	0.05	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04
03_East_North_Central	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
04_West_North_Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05_South_Atlantic	0.07	0.06	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05
06_East_South_Central	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
07_West_South_Central	0.11	0.09	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08
08_Mountain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09_Pacific	0.12	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
US	0.38	0.32	0.29	0.28	0.28	0.29	0.27	0.28	0.28	0.28	0.29	0.29	0.29

**ALL OTHER DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
02_Middle_Atlantic	0.20	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
03_East_North_Central	0.37	0.37	0.37	0.37	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
04_West_North_Central	0.25	0.25	0.24	0.25	0.27	0.28	0.28	0.28	0.28	0.28	0.29	0.29	0.29
05_South_Atlantic	0.20	0.20	0.21	0.21	0.21	0.22	0.23	0.23	0.24	0.26	0.27	0.27	0.28
06_East_South_Central	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18
07_West_South_Central	2.75	2.67	2.77	2.84	2.94	3.07	3.15	3.23	3.27	3.36	3.44	3.50	3.53
08_Mountain	0.14	0.13	0.13	0.14	0.17	0.20	0.22	0.23	0.24	0.24	0.25	0.25	0.26
09_Pacific	0.30	0.29	0.30	0.31	0.29	0.31	0.34	0.34	0.35	0.36	0.36	0.37	0.38
US	4.45	4.34	4.44	4.54	4.67	4.89	5.04	5.14	5.21	5.33	5.44	5.52	5.58

**Table I-8**  
**U.S. Domestic Petroleum Product Demand - High Production Case**  
(million barrels per day)

**TOTAL DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.70	0.72	0.70	0.70	0.69	0.68	0.67	0.67	0.66	0.66	0.65	0.65	0.64
02_Middle_Atlantic	1.80	1.81	1.78	1.78	1.77	1.74	1.73	1.71	1.69	1.67	1.66	1.64	1.63
03_East_North_Central	2.30	2.31	2.32	2.33	2.30	2.28	2.27	2.24	2.23	2.21	2.20	2.18	2.16
04_West_North_Central	1.39	1.40	1.41	1.43	1.42	1.41	1.41	1.41	1.40	1.40	1.39	1.39	1.38
05_South_Atlantic	2.81	2.83	2.83	2.83	2.84	2.84	2.83	2.82	2.82	2.81	2.81	2.80	2.79
06_East_South_Central	1.18	1.18	1.19	1.20	1.18	1.18	1.18	1.17	1.17	1.17	1.16	1.16	1.15
07_West_South_Central	4.98	4.91	5.09	5.19	5.27	5.43	5.52	5.60	5.65	5.74	5.82	5.88	5.92
08_Mountain	1.16	1.17	1.18	1.19	1.22	1.25	1.28	1.29	1.30	1.30	1.31	1.32	1.32
09_Pacific	2.52	2.51	2.48	2.49	2.51	2.53	2.54	2.55	2.54	2.54	2.54	2.54	2.54
US	18.83	18.85	18.99	19.14	19.19	19.33	19.43	19.46	19.46	19.50	19.54	19.56	19.52

**MOGAS DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.41	0.40	0.40	0.40	0.39	0.38	0.37	0.37	0.36	0.36	0.35	0.34	0.34
02_Middle_Atlantic	0.94	0.94	0.93	0.93	0.90	0.87	0.85	0.84	0.82	0.81	0.79	0.78	0.76
03_East_North_Central	1.26	1.26	1.26	1.25	1.22	1.18	1.16	1.14	1.13	1.11	1.09	1.07	1.05
04_West_North_Central	0.66	0.66	0.66	0.66	0.64	0.62	0.62	0.61	0.60	0.59	0.58	0.57	0.56
05_South_Atlantic	1.80	1.79	1.79	1.78	1.77	1.76	1.75	1.73	1.72	1.70	1.68	1.66	1.65
06_East_South_Central	0.62	0.61	0.61	0.61	0.60	0.58	0.58	0.57	0.56	0.55	0.55	0.54	0.53
07_West_South_Central	1.17	1.17	1.16	1.16	1.16	1.15	1.14	1.14	1.13	1.12	1.11	1.10	1.08
08_Mountain	0.61	0.61	0.61	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.59	0.59	0.58
09_Pacific	1.26	1.25	1.25	1.25	1.24	1.22	1.21	1.20	1.19	1.17	1.16	1.14	1.13
US	8.71	8.69	8.68	8.65	8.51	8.37	8.28	8.20	8.10	8.00	7.89	7.79	7.68

**DISTILLATE DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.20	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.21	0.21	0.21	0.21
02_Middle_Atlantic	0.43	0.46	0.44	0.44	0.44	0.44	0.45	0.45	0.44	0.44	0.44	0.44	0.44
03_East_North_Central	0.51	0.54	0.54	0.55	0.56	0.56	0.57	0.57	0.57	0.57	0.57	0.58	0.58
04_West_North_Central	0.42	0.43	0.44	0.45	0.45	0.45	0.46	0.46	0.46	0.46	0.47	0.47	0.47
05_South_Atlantic	0.55	0.58	0.58	0.60	0.60	0.61	0.61	0.61	0.61	0.62	0.62	0.62	0.63
06_East_South_Central	0.29	0.31	0.31	0.32	0.32	0.33	0.33	0.34	0.34	0.34	0.34	0.35	0.35
07_West_South_Central	0.70	0.74	0.75	0.77	0.78	0.81	0.82	0.83	0.84	0.85	0.85	0.86	0.87
08_Mountain	0.33	0.35	0.36	0.36	0.36	0.37	0.37	0.37	0.37	0.38	0.38	0.38	0.39
09_Pacific	0.43	0.44	0.44	0.45	0.46	0.47	0.48	0.48	0.48	0.48	0.49	0.49	0.50
US	3.88	4.06	4.07	4.14	4.18	4.25	4.29	4.31	4.33	4.35	4.38	4.41	4.42



**Table I-8**  
**U.S. Domestic Petroleum Product Demand - High Production Case**  
(million barrels per day)

**K-JET DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
02_Middle_Atlantic	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
03_East_North_Central	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
04_West_North_Central	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
05_South_Atlantic	0.19	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
06_East_South_Central	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09
07_West_South_Central	0.25	0.25	0.25	0.25	0.25	0.26	0.26	0.26	0.26	0.26	0.26	0.27	0.27
08_Mountain	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
09_Pacific	0.41	0.42	0.42	0.42	0.42	0.43	0.43	0.43	0.43	0.43	0.43	0.44	0.44
US	1.42	1.44	1.43	1.44	1.44	1.45	1.45	1.45	1.46	1.46	1.47	1.47	1.47

**RESID DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
02_Middle_Atlantic	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
03_East_North_Central	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
04_West_North_Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
05_South_Atlantic	0.07	0.06	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05
06_East_South_Central	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
07_West_South_Central	0.11	0.09	0.08	0.08	0.07	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07
08_Mountain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
09_Pacific	0.12	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
US	0.38	0.32	0.29	0.29	0.29	0.30	0.27	0.28	0.28	0.28	0.28	0.29	0.29

**ALL OTHER DEMAND**

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
01_New_England	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
02_Middle_Atlantic	0.20	0.19	0.17	0.17	0.20	0.20	0.21	0.20	0.20	0.19	0.20	0.19	0.20
03_East_North_Central	0.37	0.37	0.38	0.38	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
04_West_North_Central	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.29
05_South_Atlantic	0.20	0.20	0.20	0.21	0.21	0.22	0.23	0.23	0.24	0.25	0.26	0.26	0.27
06_East_South_Central	0.17	0.17	0.18	0.18	0.17	0.17	0.18	0.18	0.18	0.18	0.18	0.18	0.18
07_West_South_Central	2.75	2.67	2.84	2.93	3.00	3.13	3.22	3.30	3.35	3.44	3.52	3.59	3.62
08_Mountain	0.14	0.13	0.14	0.15	0.17	0.19	0.22	0.24	0.24	0.25	0.25	0.26	0.26
09_Pacific	0.30	0.29	0.27	0.28	0.29	0.32	0.33	0.34	0.35	0.36	0.37	0.37	0.38
US	4.45	4.34	4.51	4.62	4.76	4.97	5.13	5.23	5.29	5.41	5.52	5.60	5.66

Table I-9	
Census Regions to PADD Conversion	
	Percent of Region

**PADD I**

01_New_England	100.0%
02_Middle_Atlantic	100.0%
05_South_Atlantic	100.0%

**PADD II**

03_East_North_Central	100.0%
04_West_North_Central	100.0%
06_East_South_Central	58.2%
07_West_South_Central	10.2%

**PADD III**

06_East_South_Central	41.8%
07_West_South_Central	89.8%
08_Mountain	9.1%

**PADD IV**

08_Mountain	49.7%
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**PADD V**

08_Mountain	41.2%
09_Pacific	100.0%

**Table I-10**

**EIA Product Demand - Low Production Case**

**By PADDs - MBPD**

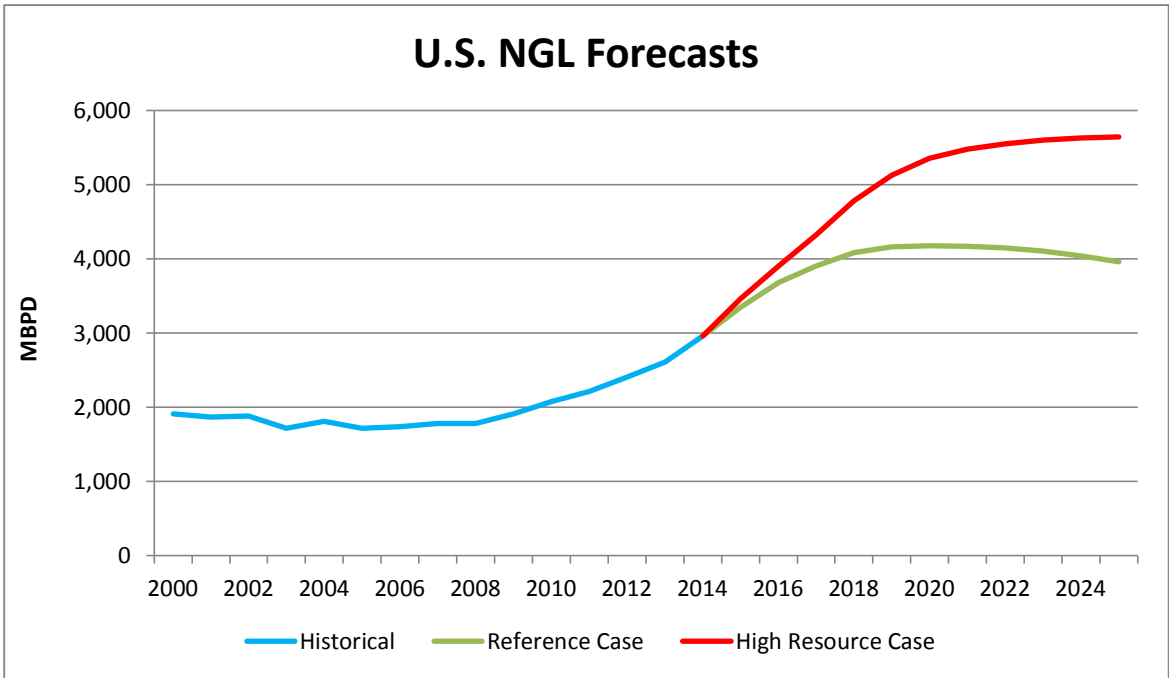
	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>
<b><i>Gasoline</i></b>													
PADD I	3,139	3,132	3,128	3,116	3,054	2,985	2,949	2,909	2,865	2,812	2,763	2,713	2,661
PADD II	2,402	2,396	2,393	2,383	2,318	2,250	2,216	2,179	2,140	2,101	2,059	2,016	1,971
PADD III	1,361	1,359	1,357	1,352	1,342	1,324	1,312	1,299	1,284	1,266	1,248	1,229	1,207
PADD IV	302	302	301	300	299	298	297	295	293	290	287	284	281
PADD V	<u>1,505</u>	<u>1,502</u>	<u>1,500</u>	<u>1,494</u>	<u>1,481</u>	<u>1,463</u>	<u>1,450</u>	<u>1,434</u>	<u>1,417</u>	<u>1,393</u>	<u>1,372</u>	<u>1,351</u>	<u>1,329</u>
U.S.	8,710	8,690	8,680	8,646	8,494	8,320	8,223	8,116	7,999	7,863	7,730	7,594	7,449
<b><i>Jet/Kero</i></b>													
PADD I	404	410	408	410	409	407	407	407	407	408	408	409	409
PADD II	267	271	270	271	270	270	270	270	269	269	269	269	269
PADD III	264	268	267	268	271	273	275	276	278	279	281	282	283
PADD IV	38	39	39	39	39	39	39	39	40	40	40	40	40
PADD V	<u>447</u>	<u>453</u>	<u>451</u>	<u>453</u>	<u>456</u>	<u>458</u>	<u>460</u>	<u>461</u>	<u>463</u>	<u>465</u>	<u>466</u>	<u>468</u>	<u>470</u>
U.S.	1,419	1,440	1,434	1,441	1,444	1,448	1,451	1,454	1,457	1,460	1,464	1,468	1,472
<b><i>Distillate</i></b>													
PADD I	1,187	1,251	1,226	1,230	1,242	1,252	1,256	1,253	1,251	1,250	1,250	1,249	1,246
PADD II	1,174	1,228	1,239	1,264	1,276	1,286	1,290	1,290	1,289	1,289	1,291	1,292	1,290
PADD III	786	824	835	853	874	893	900	902	902	905	908	911	911
PADD IV	167	174	176	180	182	183	184	185	185	186	187	188	188
PADD V	<u>565</u>	<u>584</u>	<u>590</u>	<u>602</u>	<u>612</u>	<u>620</u>	<u>623</u>	<u>624</u>	<u>625</u>	<u>627</u>	<u>631</u>	<u>634</u>	<u>636</u>
U.S.	3,878	4,061	4,066	4,129	4,185	4,234	4,253	4,254	4,252	4,257	4,268	4,275	4,272
<b><i>Resid</i></b>													
PADD I	120	118	106	104	108	113	100	102	103	105	105	106	107
PADD II	36	15	13	13	13	14	14	14	15	15	16	16	16
PADD III	102	82	72	70	66	69	62	64	66	68	69	70	71
PADD IV	2	2	2	2	2	2	2	2	2	2	2	2	2
PADD V	<u>120</u>	<u>105</u>	<u>95</u>	<u>93</u>	<u>92</u>	<u>92</u>	<u>93</u>	<u>93</u>	<u>93</u>	<u>94</u>	<u>94</u>	<u>94</u>	<u>95</u>
U.S.	380	321	288	281	280	290	270	275	280	284	286	288	291
<b><i>Other</i></b>													
PADD I	460	453	455	465	463	477	488	495	502	518	528	537	544
PADD II	1,003	990	994	1,010	1,043	1,073	1,090	1,103	1,110	1,121	1,131	1,138	1,143
PADD III	2,559	2,482	2,568	2,638	2,727	2,848	2,926	2,993	3,034	3,111	3,192	3,241	3,276
PADD IV	68	66	67	69	84	98	110	114	117	121	123	127	129
PADD V	<u>356</u>	<u>348</u>	<u>356</u>	<u>363</u>	<u>356</u>	<u>393</u>	<u>427</u>	<u>437</u>	<u>446</u>	<u>458</u>	<u>465</u>	<u>474</u>	<u>484</u>
U.S.	4,445	4,339	4,441	4,545	4,674	4,888	5,040	5,143	5,209	5,330	5,440	5,518	5,576
<b><i>Total</i></b>													
PADD I	5,309	5,363	5,324	5,325	5,276	5,234	5,200	5,166	5,128	5,092	5,054	5,014	4,967
PADD II	4,881	4,900	4,909	4,941	4,920	4,892	4,879	4,856	4,823	4,796	4,766	4,732	4,690
PADD III	5,072	5,014	5,099	5,181	5,278	5,408	5,474	5,534	5,564	5,630	5,698	5,733	5,749
PADD IV	577	582	585	589	606	619	632	635	637	638	640	641	640
PADD V	<u>2,993</u>	<u>2,992</u>	<u>2,992</u>	<u>3,006</u>	<u>2,997</u>	<u>3,026</u>	<u>3,052</u>	<u>3,050</u>	<u>3,045</u>	<u>3,038</u>	<u>3,028</u>	<u>3,022</u>	<u>3,013</u>
U.S.	18,833	18,851	18,909	19,042	19,077	19,180	19,237	19,241	19,196	19,193	19,187	19,142	19,060

**Table I-11**  
**EIA Product Demand - High Production Case**  
**By PADDs - MBPD**

	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>
<b><i>Gasoline</i></b>													
PADD I	3,139	3,132	3,128	3,117	3,060	3,003	2,972	2,938	2,902	2,860	2,822	2,783	2,742
PADD II	2,402	2,396	2,393	2,384	2,322	2,262	2,231	2,199	2,167	2,132	2,098	2,064	2,027
PADD III	1,361	1,359	1,358	1,353	1,344	1,332	1,323	1,313	1,303	1,290	1,278	1,264	1,249
PADD IV	302	302	301	300	300	300	299	299	297	296	295	293	291
PADD V	<u>1,505</u>	<u>1,502</u>	<u>1,500</u>	<u>1,494</u>	<u>1,484</u>	<u>1,472</u>	<u>1,460</u>	<u>1,448</u>	<u>1,434</u>	<u>1,417</u>	<u>1,402</u>	<u>1,387</u>	<u>1,371</u>
U.S.	8,710	8,690	8,680	8,649	8,509	8,369	8,285	8,196	8,103	7,996	7,894	7,791	7,679
<b><i>Jet/Kero</i></b>													
PADD I	404	410	408	410	409	408	408	407	408	408	408	409	410
PADD II	267	271	270	271	271	270	270	270	269	269	269	269	269
PADD III	264	268	267	268	271	273	275	276	278	279	281	282	283
PADD IV	38	39	39	39	39	39	39	39	40	40	40	40	40
PADD V	<u>447</u>	<u>453</u>	<u>451</u>	<u>453</u>	<u>456</u>	<u>459</u>	<u>460</u>	<u>462</u>	<u>463</u>	<u>465</u>	<u>467</u>	<u>468</u>	<u>470</u>
U.S.	1,419	1,440	1,434	1,441	1,445	1,449	1,452	1,455	1,458	1,461	1,465	1,469	1,473
<b><i>Distillate</i></b>													
PADD I	1,187	1,251	1,227	1,232	1,242	1,254	1,260	1,262	1,263	1,266	1,271	1,277	1,278
PADD II	1,174	1,228	1,239	1,265	1,275	1,293	1,302	1,308	1,312	1,317	1,325	1,333	1,335
PADD III	786	824	835	854	874	902	915	923	929	936	946	955	959
PADD IV	167	174	177	180	181	182	184	185	186	188	189	191	192
PADD V	<u>565</u>	<u>584</u>	<u>590</u>	<u>604</u>	<u>611</u>	<u>623</u>	<u>629</u>	<u>633</u>	<u>636</u>	<u>640</u>	<u>645</u>	<u>651</u>	<u>655</u>
U.S.	3,878	4,061	4,068	4,135	4,182	4,254	4,290	4,311	4,327	4,347	4,377	4,407	4,420
<b><i>Resid</i></b>													
PADD I	120	118	111	110	112	115	102	104	105	105	106	107	106
PADD II	36	15	14	14	14	15	14	14	15	15	15	15	15
PADD III	102	82	74	72	70	71	63	64	65	66	67	68	68
PADD IV	2	2	2	2	2	2	2	2	2	2	2	2	2
PADD V	<u>120</u>	<u>105</u>	<u>95</u>	<u>93</u>	<u>92</u>	<u>93</u>	<u>93</u>	<u>93</u>	<u>94</u>	<u>94</u>	<u>95</u>	<u>95</u>	<u>95</u>
U.S.	380	321	294	291	290	295	274	277	280	281	285	287	287
<b><i>Other</i></b>													
PADD I	460	453	433	435	472	483	491	489	492	502	511	517	527
PADD II	1,003	990	1,032	1,051	1,061	1,087	1,109	1,114	1,119	1,135	1,147	1,155	1,159
PADD III	2,559	2,482	2,643	2,725	2,779	2,902	2,989	3,063	3,107	3,188	3,264	3,320	3,357
PADD IV	68	66	71	73	84	97	111	117	120	122	125	129	132
PADD V	<u>356</u>	<u>348</u>	<u>331</u>	<u>336</u>	<u>363</u>	<u>396</u>	<u>426</u>	<u>442</u>	<u>449</u>	<u>464</u>	<u>474</u>	<u>480</u>	<u>489</u>
U.S.	4,445	4,339	4,510	4,620	4,759	4,966	5,126	5,225	5,289	5,413	5,521	5,601	5,663
<b><i>Total</i></b>													
PADD I	5,309	5,363	5,308	5,304	5,294	5,262	5,233	5,200	5,170	5,141	5,119	5,093	5,063
PADD II	4,881	4,899	4,948	4,985	4,943	4,926	4,926	4,905	4,883	4,869	4,855	4,837	4,806
PADD III	5,072	5,014	5,176	5,272	5,336	5,481	5,564	5,640	5,682	5,760	5,835	5,889	5,917
PADD IV	577	582	589	594	605	620	636	642	645	647	651	655	656
PADD V	<u>2,993</u>	<u>2,992</u>	<u>2,967</u>	<u>2,981</u>	<u>3,007</u>	<u>3,043</u>	<u>3,068</u>	<u>3,077</u>	<u>3,076</u>	<u>3,080</u>	<u>3,082</u>	<u>3,082</u>	<u>3,080</u>
U.S.	18,833	18,850	18,988	19,136	19,185	19,332	19,427	19,464	19,457	19,497	19,543	19,556	19,522

**Table I-12**  
**TM&C Natural Gas Liquids Forecast**  
**MBPD**

Year	Actual	Forecasts	
		<u>Reference</u>	<u>High Resource</u>
2000	1,911		
2001	1,868		
2002	1,880		
2003	1,719		
2004	1,809		
2005	1,717		
2006	1,739		
2007	1,783		
2008	1,784		
2009	1,910		
2010	2,074		
2011	2,216		
2012	2,408		
2013	2,606		
2014	2,962	2,962	2,962
2015		3,350	3,467
2016		3,680	3,900
2017		3,900	4,320
2018		4,080	4,780
2019		4,163	5,123
2020		4,177	5,357
2021		4,167	5,480
2022		4,146	5,550
2023		4,104	5,600
2024		4,043	5,630
2025		3,962	5,645



**Table I-13**

**Other Refining and Logistic Assumptions**

**Pipelines**

Major North American Pipeline Assumptions					
Company	Pipeline	From	To	Date	MBPD
<i>Lines Assumed to be in Service by 2025</i>					
Enbridge	Line 9 Reversal	North	Montreal, QC	4Q14	300
Enbridge	Alb. Clipper	Hardisty, AB	Superior, WI	4Q14	120
Enbridge	Alb. Clipper	Hardisty, AB	Superior, WI	3Q15	230

- Other logistic investments necessary to ensure crude flows will be identified in study.
- Sufficient exit pipeline capacities out of Bakken, Niobrara, and Permian fields.
- No new pipelines to PADD I or PADD V will be constructed.
- No pipeline constraints into or out of Cushing, OK.

**Canadian Production Forecast**

Canadian Crude Production Forecast, MBPD				
	2013	2015	2020	2025
<i>Western Canada</i>				
Production	3,190	3,537	4,090	4,755
Shipments	3,418	3,781	4,509	5,368
<i>Eastern Canada</i>				
Production	232	227	263	175
Shipments	232	227	263	175
<i>Total Canada</i>				
Production	3,422	3,764	4,353	4,930
Shipments	3,650	4,008	4,772	5,543

- Canadian rail load capacity and shipments as per CAPP forecast.

**Refining**

- All refineries currently operating in the U.S. and Canada will continue to operate. See Appendix Table 1 for a listing of all refineries.
- 17 refining expansions in the U.S. will be completed by 2019 which will add 416 MBPD of additional capacity.
- One refining expansion in Canada will be completed by 2019 which will add 50 MBPD of additional capacity.
- Condensate/crude splitter capacity at:
  - 2013 75 MBPD
  - 2015 175 MBPD
  - 2020 325 MBPD
  - 2025 575 MBPD
- PADD crude utilization rates as follows:

**Table I-13**  
**Other Refining and Logistic Assumptions**

	PADD Utilization Rates (Percent of Crude Capacity)						
	Actual	Low Production Case			High Product Export Case		
	2013	2015	2020	2025	2015	2020	2025
PADD I	76.9	81	82	82	79	79	79
PADD II	82.8	89	91	91	87	88	88
PADD III	81	85	86.3	86.5	83	84.5	84.7
PADD IV	86.5	90	91.5	91.5	88	89	89
PADD V	73.9	77.5	81	82	75.5	78	78

- New splitter capacity to be operated at 90% utilization.
- Investment in additional crude processing capacity or conversion of heavy crude refineries to light crude will be made as required and economic in High Production Base Case (Export Limited) to balance crude supply and demand.

**U.S. Crude Export Policy**

- U.S. crude exports to Canada in all cases fixed at:
  - 2013 134 MPBD
  - 2014 324
  - 2015 357
  - 2016 407
  - 2017 443
  - 2018 479
  - 2019 514
  - 2020 550
- Stabilized condensate ( $\geq 50^\circ$  API) exports to be allowed.
- No exports of stabilized crude ( $< 50^\circ$  API) to be allowed in Base Case.
- ANS exports to be allowed using U.S. flagged vessels.

**Other**

- Inter-PADD movements into PADDs I and V will be set by rail offloading limitations.
- No substantive change in Jones Act shipping regulations.
- California Low Carbon Fuel Standard (LCFS) will not restrict crude imports or other movements in the state.
- No minimum structural crude imports.

# Implications of Increasing U.S. Light Tight Oil Production

## Low Production Crude Slate for Base and Export Cases

<u>Number</u>	<u>Tab</u>	<u>Table Name</u>
II-1	<a href="#">2013</a>	Crude Oil Supply and Demand Balance - 2013
II-2	<a href="#">2015</a>	Crude Oil Supply and Demand Balance - 2015
II-3	<a href="#">2020</a>	Crude Oil Supply and Demand Balance - 2020
II-4	<a href="#">2025</a>	Crude Oil Supply and Demand Balance - 2025
II-5	<a href="#">Capacities</a>	U.S. and Canadian Distillation Capacities
II-6	<a href="#">Utilizations</a>	U.S. and Canadian Utilization Rates
II-7	<a href="#">PI Products</a>	Total PADD I Charge and Yield Data
II-8	<a href="#">PII Products</a>	Total PADD II Charge and Yield Data
II-9	<a href="#">PIII Products</a>	Total PADD III Charge and Yield Data
II-10	<a href="#">PIV Products</a>	Total PADD IV Charge and Yield Data
II-11	<a href="#">PV Products</a>	Total PADD V Charge and Yield Data
II-12	<a href="#">US Products</a>	Total U.S. Charge and Yield Data
II-13	<a href="#">PI Balance</a>	PADD I Refinery Product Supply and Demand Balance
II-14	<a href="#">PII Balance</a>	PADD II Refinery Product Supply and Demand Balance
II-15	<a href="#">PIII Balance</a>	PADD III Refinery Product Supply and Demand Balance
II-16	<a href="#">PIV Balance</a>	PADD IV Refinery Product Supply and Demand Balance
II-17	<a href="#">PV Balance</a>	PADD V Refinery Product Supply and Demand Balance
II-18	<a href="#">US Balance</a>	U.S. Product Supply and Demand Balance
II-19	<a href="#">Crude Flows</a>	Crude Oil Flows
II-20	<a href="#">Crude Logistics</a>	Required Crude Oil Logistic Improvements
II-21	<a href="#">Gasoline</a>	Gasoline Supply and Demand Balance
II-22	<a href="#">Jet-Kero</a>	Jet/Kerosene Supply and Demand Balance
II-23	<a href="#">Distillate</a>	Distillate Supply and Demand Balance
II-24	<a href="#">Resid</a>	Residual Fuel Supply and Demand Balance
II-25	<a href="#">Other</a>	Other Products Supply and Demand Balance
II-26	<a href="#">Total</a>	Total U.S. Refined Products Supply and Demand Balance
II-27	<a href="#">Crude Exports</a>	U.S. and Canadian Crude Oil Exports
II-28	<a href="#">Product Exports</a>	U.S. Product Exports
II-29	<a href="#">Prices</a>	Crude Price Forecast - Low Production Case



Table II-1													
EIA Low Production Crude Slate for Base and Export Cases - MPBD													
Crude Oil Supply and Demand Balance - 2013													
	Avail. Supply	U.S.								Canada			
		I	II	III	IV	V	Splitters	Stab.	Hydrosk.	Exports	Western	Eastern	Exports
<b>Northeast</b>													
Light Sweet (API 35 - <40)	5	5											
Light Sour (API 35 - <40)	11		11										
Medium Medium Sour (API 27 - <35)	26		26										
Medium Sour (API 27 - <35)	0												
Heavy Sweet (API <27)	0												
Heavy Sour (API <27)	0												
Ultra Light Sweet (API 40 - <50)	30	18	12										
Lease Condensate (API >=50)	28	15	13										
	101												
<b>Gulf Coast</b>													
Light Sweet (API 35 - <40)	223		223										
Light Sour (API 35 - <40)	64		64										
Medium Medium Sour (API 27 - <35)	98		98										
Medium Sour (API 27 - <35)	17		17										
Heavy Sweet (API <27)	14		14										
Heavy Sour (API <27)	18		18										
Ultra Light Sweet (API 40 - <50)	238	10	228										
Lease Condensate (API >=50)	639	15	532			68						25	
	1,312												
<b>Midcontinent</b>													
Light Sweet (API 35 - <40)	154		154										
Light Sour (API 35 - <40)	26		26										
Medium Medium Sour (API 27 - <35)	73		73										
Medium Sour (API 27 - <35)	13		13										
Heavy Sweet (API <27)	3		3										
Heavy Sour (API <27)	2		2										
Ultra Light Sweet (API 40 - <50)	205		205										
Lease Condensate (API >=50)	122		122										
	599												
<b>Southwest</b>													
Light Sweet (API 35 - <40)	332		225	107									
Light Sour (API 35 - <40)	124		75	49									
Medium Medium Sour (API 27 - <35)	93			93									
Medium Sour (API 27 - <35)	341		50	291									
Heavy Sweet (API <27)	3			3									
Heavy Sour (API <27)	14			14									
Ultra Light Sweet (API 40 - <50)	647			647									
Lease Condensate (API >=50)	91			91									
	1,646												
<b>Rocky Mountains</b>													
Light Sweet (API 35 - <40)	121		21	75	25								
Light Sour (API 35 - <40)	133		58	75									
Medium Medium Sour (API 27 - <35)	35				35								
Medium Sour (API 27 - <35)	16				16								
Heavy Sweet (API <27)	3				3								
Heavy Sour (API <27)	56				56								
Ultra Light Sweet (API 40 - <50)	980	168	438		176	90						108	
Lease Condensate (API >=50)	54		49		5								
	1,399												
<b>West Coast, California</b>													
West Coast, California	513					513							
<b>Lower 48 Offshore</b>													
Atlantic Medium Medium Sour	0												
Gulf of Mexico Medium Medium Sour	1,284			1,284									
Pacific California	90					90							
	1,374												
<b>Alaska</b>													
North Slope Offshore Medium Medium	0												
North Slope Onshore Medium Medium	500					500							
South Alaska Medium Medium Sour	15					15							
	515												
<b>Total U.S.</b>	<b>7,459</b>	<b>231</b>	<b>1,578</b>	<b>3,925</b>	<b>316</b>	<b>1,208</b>	<b>68</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>133</b>	<b>0</b>
<b>Western Canada</b>													
Condensate	0												
Super Light	52	16	3	0	0	11						21	
Light Sweet	766		382	8	48	57						29	243
Light Sour	245	4	78	3	8	52						101	
Medium	491	65	200	5	11	26						183	
Heavy	1,864	25	1,070	166	187	51						300	65
	3,418												
<b>Eastern Canada</b>													
Condensate	0												
Super Light	0												
Light Sweet	232	103										129	
Light Sour	0												
Medium	0												
Heavy	0												
	232												
<b>Foreign Imports</b>													
Condensate	7	5	0	3		0							
Super Light	68	39	0	19		10							
Light Sweet	942	329	1	166		100							347
Light Sour	1,030	87	32	604		262			1				45
Medium	1,393	49	8	964		327							45
Heavy	2,248	68	2	1,899		198							80
	5,689												
<b>Total Supply</b>	<b>16,798</b>	<b>1,022</b>	<b>3,354</b>	<b>7,761</b>	<b>569</b>	<b>2,303</b>	<b>68</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>613</b>	<b>1,108</b>	<b>0</b>

Table II-2													
EIA Low Production Crude Slate for Base and Export Cases - MPBD													
Crude Oil Supply and Demand Balance - 2015													
	Avail. Supply	U.S.								Canada			
		I	II	III	IV	V	Splitters	Stab.	Hydrosk.	Exports	Western	Eastern	Exports
<b>Northeast</b>													
Light Sweet (API 35 - <40)	3	3											
Light Sour (API 35 - <40)	9		9										
Medium Medium Sour (API 27 - <35)	16		16										
Medium Sour (API 27 - <35)	0												
Heavy Sweet (API <27)	0												
Heavy Sour (API <27)	0												
Ultra Light Sweet (API 40 - <50)	22	18	4										
Lease Condensate (API >=50)	24	15	9										
	74												
<b>Gulf Coast</b>													
Light Sweet (API 35 - <40)	402			402									
Light Sour (API 35 - <40)	94			94									
Medium Medium Sour (API 27 - <35)	111			111									
Medium Sour (API 27 - <35)	42			42									
Heavy Sweet (API <27)	16			16									
Heavy Sour (API <27)	20			20									
Ultra Light Sweet (API 40 - <50)	798	10	20	718				50					
Lease Condensate (API >=50)	736	15		589				108				25	
	2,221												
<b>Midcontinent</b>													
Light Sweet (API 35 - <40)	99		99										
Light Sour (API 35 - <40)	18		18										
Medium Medium Sour (API 27 - <35)	54		54										
Medium Sour (API 27 - <35)	9		9										
Heavy Sweet (API <27)	2		2										
Heavy Sour (API <27)	2		2										
Ultra Light Sweet (API 40 - <50)	128		128										
Lease Condensate (API >=50)	87		87										
	399												
<b>Southwest</b>													
Light Sweet (API 35 - <40)	381		381										
Light Sour (API 35 - <40)	130		130										
Medium Medium Sour (API 27 - <35)	88			88									
Medium Sour (API 27 - <35)	308		50	258									
Heavy Sweet (API <27)	6			6									
Heavy Sour (API <27)	12			12									
Ultra Light Sweet (API 40 - <50)	890		393	497									
Lease Condensate (API >=50)	253			253									
	2,068												
<b>Rocky Mountains</b>													
Light Sweet (API 35 - <40)	106		61	45									
Light Sour (API 35 - <40)	158		133	25									
Medium Medium Sour (API 27 - <35)	31			31									
Medium Sour (API 27 - <35)	13			13									
Heavy Sweet (API <27)	2			2									
Heavy Sour (API <27)	54			54									
Ultra Light Sweet (API 40 - <50)	1,641	458	465	176	210							332	
Lease Condensate (API >=50)	54		49	5									
	2,060												
<b>West Coast, California</b>													
West Coast, California	530					530							
<b>Lower 48 Offshore</b>													
Atlantic Medium Medium Sour	0												
Gulf of Mexico Medium Medium Sour	1,697		1,697										
Pacific California	90					90							
	1,787												
<b>Alaska</b>													
North Slope Offshore Medium Medium	44					44							
North Slope Onshore Medium Medium	397					397							
South Alaska Medium Medium Sour	9					9							
	450												
<b>Total U.S.</b>	<b>9,588</b>	<b>519</b>	<b>2,119</b>	<b>4,804</b>	<b>352</b>	<b>1,280</b>	<b>158</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>357</b>	<b>0</b>
<b>Western Canada</b>													
Condensate	0												
Super Light	54	16	5	0	0	11						21	
Light Sweet	800		210	0	59	57						29	445
Light Sour	255	4	90	0	8	52						101	
Medium	519	65	228	5	11	26						183	
Heavy	2,153	25	1,008	529	175	51						300	65
	3,781												
<b>Eastern Canada</b>													
Condensate	0												
Super Light	0												
Light Sweet	227	98										129	
Light Sour	0												
Medium	0												
Heavy	0												
	227												
<b>Foreign Imports</b>													
Condensate	0												
Super Light	0												
Light Sweet	257	186				71							
Light Sour	911	95		489		327							
Medium	1,385	49		964		327						45	
Heavy	1,696	20		1,459		171						46	
	4,249												
<b>Total Supply</b>	<b>17,845</b>	<b>1,077</b>	<b>3,659</b>	<b>8,250</b>	<b>605</b>	<b>2,374</b>	<b>158</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>613</b>	<b>1,108</b>	<b>0</b>

Table II-3													
EIA Low Production Crude Slate for Base and Export Cases - MPBD													
Crude Oil Supply and Demand Balance - 2020													
	Avail. Supply	U.S.									Canada		
		I	II	III	IV	V	Splitters	Stab.	Hydrosk.	Exports	Western	Eastern	Exports
<b>Northeast</b>													
Light Sweet (API 35 - <40)	1	1											
Light Sour (API 35 - <40)	8		8										
Medium Medium Sour (API 27 - <35)	7		7										
Medium Sour (API 27 - <35)	0												
Heavy Sweet (API <27)	0												
Heavy Sour (API <27)	0												
Ultra Light Sweet (API 40 - <50)	17	17											
Lease Condensate (API >=50)	30	15	15										
	64												
<b>Gulf Coast</b>													
Light Sweet (API 35 - <40)	351			351									
Light Sour (API 35 - <40)	151			151									
Medium Medium Sour (API 27 - <35)	118			118									
Medium Sour (API 27 - <35)	65			65									
Heavy Sweet (API <27)	14			14									
Heavy Sour (API <27)	20			20									
Ultra Light Sweet (API 40 - <50)	1,066	11	20	945				90					
Lease Condensate (API >=50)	593	15		381				172				25	
	2,376												
<b>Midcontinent</b>													
Light Sweet (API 35 - <40)	121		121										
Light Sour (API 35 - <40)	20		20										
Medium Medium Sour (API 27 - <35)	70		70										
Medium Sour (API 27 - <35)	9		9										
Heavy Sweet (API <27)	3		3										
Heavy Sour (API <27)	2		2										
Ultra Light Sweet (API 40 - <50)	110		110										
Lease Condensate (API >=50)	64		64										
	398												
<b>Southwest</b>													
Light Sweet (API 35 - <40)	397		150	247									
Light Sour (API 35 - <40)	149		149										
Medium Medium Sour (API 27 - <35)	92		92										
Medium Sour (API 27 - <35)	326		50	276									
Heavy Sweet (API <27)	12		12										
Heavy Sour (API <27)	14		14										
Ultra Light Sweet (API 40 - <50)	1,051		674	377									
Lease Condensate (API >=50)	348		348										
	2,387												
<b>Rocky Mountains</b>													
Light Sweet (API 35 - <40)	107		96	11									
Light Sour (API 35 - <40)	186		133	53									
Medium Medium Sour (API 27 - <35)	40		40										
Medium Sour (API 27 - <35)	15		15										
Heavy Sweet (API <27)	4		4										
Heavy Sour (API <27)	44		44										
Ultra Light Sweet (API 40 - <50)	2,061	691	315	225	305							525	
Lease Condensate (API >=50)	71		66	5									
	2,528												
<b>West Coast, California</b>													
West Coast, California	594					594							
<b>Lower 48 Offshore</b>													
Atlantic Medium Medium Sour	0												
Gulf of Mexico Medium Medium Sour	2,234		2,234										
Pacific California	54					54							
	2,288												
<b>Alaska</b>													
North Slope Offshore Medium Medium	72					72							
North Slope Onshore Medium Medium	340					340							
South Alaska Medium Medium Sour	6					6							
	418												
<b>Total U.S.</b>	<b>11,054</b>	<b>750</b>	<b>1,933</b>	<b>5,790</b>	<b>397</b>	<b>1,372</b>	<b>262</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>550</b>	<b>0</b>
<b>Western Canada</b>													
Condensate	0												
Super Light	54	16	5	0	0	11						21	
Light Sweet	788		432	8	75	57					22	195	
Light Sour	250	4	82	3	8	52					101		
Medium	546	65	200	60	11	26					183		
Heavy	2,871	60	1,064	1,014	162	51					353	167	
	4,509												
<b>Eastern Canada</b>													
Condensate	0												
Super Light	0												
Light Sweet	198	103										95	
Light Sour	0												
Medium	0												
Heavy	65	26										39	
	263												
<b>Foreign Imports</b>													
Condensate	0												
Super Light	10					10							
Light Sweet	150					150							
Light Sour	262					262							
Medium	360	33				327							
Heavy	1,781	19		1,556		165						41	
	2,563												
<b>Total Supply</b>	<b>18,389</b>	<b>1,077</b>	<b>3,715</b>	<b>8,432</b>	<b>653</b>	<b>2,483</b>	<b>262</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>659</b>	<b>1,108</b>	<b>0</b>

Table II-4													
EIA Low Production Crude Slate for Base and Export Cases - MPBD													
Crude Oil Supply and Demand Balance - 2025													
	Avail. Supply	U.S.								Canada			
		I	II	III	IV	V	Splitters	Stab.	Hydrosk.	Exports	Western	Eastern	Exports
<b>Northeast</b>													
Light Sweet (API 35 - <40)	1	1											
Light Sour (API 35 - <40)	9		9										
Medium Medium Sour (API 27 - <35)	3		3										
Medium Sour (API 27 - <35)	0												
Heavy Sweet (API <27)	0												
Heavy Sour (API <27)	0												
Ultra Light Sweet (API 40 - <50)	15	15											
Lease Condensate (API >=50)	30	15	15										
	58												
<b>Gulf Coast</b>													
Light Sweet (API 35 - <40)	335			335									
Light Sour (API 35 - <40)	148			148									
Medium Medium Sour (API 27 - <35)	126			126									
Medium Sour (API 27 - <35)	43			43									
Heavy Sweet (API <27)	15			15									
Heavy Sour (API <27)	20			20									
Ultra Light Sweet (API 40 - <50)	1,131	13	20	978					120				
Lease Condensate (API >=50)	459	15		177					242			25	
	2,275												
<b>Midcontinent</b>													
Light Sweet (API 35 - <40)	232		232										
Light Sour (API 35 - <40)	24		24										
Medium Medium Sour (API 27 - <35)	111		111										
Medium Sour (API 27 - <35)	10		10										
Heavy Sweet (API <27)	8		8										
Heavy Sour (API <27)	3		3										
Ultra Light Sweet (API 40 - <50)	117		117										
Lease Condensate (API >=50)	67		67										
	573												
<b>Southwest</b>													
Light Sweet (API 35 - <40)	411			411									
Light Sour (API 35 - <40)	182			182									
Medium Medium Sour (API 27 - <35)	101			101									
Medium Sour (API 27 - <35)	364		50	314									
Heavy Sweet (API <27)	22			22									
Heavy Sour (API <27)	19			19									
Ultra Light Sweet (API 40 - <50)	1,039		732	307									
Lease Condensate (API >=50)	395			395									
	2,533												
<b>Rocky Mountains</b>													
Light Sweet (API 35 - <40)	91		86		5								
Light Sour (API 35 - <40)	182		182										
Medium Medium Sour (API 27 - <35)	58				58								
Medium Sour (API 27 - <35)	57				57								
Heavy Sweet (API <27)	62				62								
Heavy Sour (API <27)	48				48								
Ultra Light Sweet (API 40 - <50)	1,934	730	165		162		352					525	
Lease Condensate (API >=50)	89		84		5								
	2,521												
<b>West Coast, California</b>													
West Coast, California	634						634						
<b>Lower 48 Offshore</b>													
Atlantic Medium Medium Sour	0												
Gulf of Mexico Medium Medium Sour	1,959			1,959									
Pacific California	47						47						
	2,006												
<b>Alaska</b>													
North Slope Offshore Medium Medium	60						60						
North Slope Onshore Medium Medium	253						253						
South Alaska Medium Medium Sour	5						5						
	317												
<b>Total U.S.</b>	<b>10,917</b>	<b>789</b>	<b>1,919</b>	<b>5,550</b>	<b>397</b>	<b>1,350</b>	<b>362</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>550</b>	<b>0</b>
<b>Western Canada</b>													
Condensate	0												
Super Light	57	16	8	0	0	11						21	
Light Sweet	884		406	8	184	57					22	207	
Light Sour	258	4	91	3	8	52					101		
Medium	567	65	200	81	11	26					183		
Heavy	3,602	105	1,049	1,826	53	58					353	158	
	5,368												
<b>Eastern Canada</b>													
Condensate	0												
Super Light	0												
Light Sweet	145	53										92	
Light Sour	0												
Medium	0												
Heavy	30	15										15	
	175												
<b>Foreign Imports</b>													
Condensate	0					0							
Super Light	10					10							
Light Sweet	156					156							
Light Sour	262					262							
Medium	327					327							
Heavy	1,183	30		915		173						65	
	1,938												
<b>Total Supply</b>	<b>18,398</b>	<b>1,077</b>	<b>3,673</b>	<b>8,383</b>	<b>653</b>	<b>2,483</b>	<b>362</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>659</b>	<b>1,108</b>	<b>0</b>

<b>Table II-5</b>				
<b>U.S. and Canadian Distillation Capacities</b>				
	MBPSD			
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>
<i>Refining Capacity</i>				
PADD I	1,330	1,330	1,330	1,330
PADD II	4,049	4,112	4,174	4,174
PADD III	9,584	9,706	9,804	9,804
PADD IV	658	672	726	726
PADD V	<u>3,063</u>	<u>3,063</u>	<u>3,066</u>	<u>3,066</u>
	18,684	18,883	19,100	19,100
<i>Splitter Capacity</i>	75	175	325	575
<i>Hydroskimming Capacity</i>	0	0	0	0
<b>Total U.S. Capacity</b>	<b>18,759</b>	<b>19,058</b>	<b>19,425</b>	<b>19,675</b>
<i>Canadian Refineries</i>				
Western Canada	666	666	716	716
Eastern Canada	<u>1,206</u>	<u>1,206</u>	<u>1,206</u>	<u>1,206</u>
	<b>1,872</b>	<b>1,872</b>	<b>1,922</b>	<b>1,922</b>
<b>Total U.S. and Canadian Capacity</b>	<b>20,631</b>	<b>20,930</b>	<b>21,347</b>	<b>21,597</b>

<b>Table II-6</b>				
<b>U.S. and Canadian Utilization Rates</b>				
	MBPD			
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>
<i>Refineries</i>				
PADD I	76.9	81.0	81.0	81.0
PADD II	82.8	89.0	89.0	88.0
PADD III	81.0	85.0	86.0	85.5
PADD IV	86.5	90.0	90.0	90.0
PADD V	<u>75.2</u>	<u>77.5</u>	<u>81.0</u>	<u>81.0</u>
	<b>80.3</b>	<b>84.6</b>	<b>85.7</b>	<b>85.2</b>
<i>Splitters</i>	90.0	90.0	80.6	63.0
<i>Hydroskimmers</i>	--	--	--	--
<i>Canadian Refineries</i>				
Western Canada	92.0	92.0	92.0	92.0
Eastern Canada	<u>92.0</u>	<u>92.0</u>	<u>92.0</u>	<u>92.0</u>
	<b>92.0</b>	<b>92.0</b>	<b>92.0</b>	<b>92.0</b>

Table II-7								
PADD I Charge and Yield Data								
	Yearly Volumes, MBPD				Change from 2013, MBPD			
	2013	2015	2020	2025	2015	2020	2025	
<i>Feedstocks</i>								
Crude to Refineries	1,022	1,077	1,077	1,077	56	55	55	
Crude to Splitters	0	0	0	0	0	0	0	
Other Feedstocks <sup>1</sup>	<u>188</u>	<u>193</u>	<u>195</u>	<u>195</u>	<u>5</u>	<u>7</u>	<u>7</u>	
	1,210	1,270	1,272	1,272	61	62	62	
<i>Products</i>								
Propane/Propylene	34	38	40	41	4	6	7	
Normal Butane	2	5	8	9	3	6	7	
Isobutane	-1	-1	0	0	0	1	1	
Gasoline	584	635	656	655	51	72	71	
Jet/Kerosene	73	90	86	83	17	13	10	
Distillate	361	357	332	331	-4	-29	-30	
Resid/Asphalt	116	105	104	106	-11	-12	-10	
Other <sup>2</sup>	<u>92</u>	<u>91</u>	<u>92</u>	<u>94</u>	<u>-1</u>	<u>0</u>	<u>2</u>	
	1,261	1,320	1,318	1,318	59	57	57	
<i>Splitter Products</i>								
LPG	0	0	0	0	0	0	0	
Light Naphtha	0	0	0	0	0	0	0	
Naphtha	0	0	0	0	0	0	0	
Unfinished Distillate	0	0	0	0	0	0	0	
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	
	0	0	0	0	0	0	0	

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

Table II-8							
PADD II Charge and Yield Data							
	Yearly Volumes, MBPD				Change from 2013, MBPD		
	2013	2015	2020	2025	2015	2020	2025
<i><u>Feedstocks</u></i>							
Crude to Refineries	3,353	3,659	3,715	3,673	306	362	319
Crude to Splitters	0	0	0	0	0	0	0
Other Feedstocks <sup>1</sup>	<u>669</u>	<u>686</u>	<u>686</u>	<u>683</u>	<u>17</u>	<u>17</u>	<u>14</u>
	4,022	4,345	4,401	4,356	323	379	333
<i><u>Products</u></i>							
Propane/Propylene	107	116	117	115	9	10	8
Normal Butane	4	6	12	12	2	8	8
Isobutane	-1	-3	1	2	-2	2	3
Gasoline	2,319	2,498	2,501	2,463	180	183	145
Jet/Kerosene	223	273	289	282	50	66	59
Distillate	1,013	1,069	1,091	1,080	56	78	67
Resid/Asphalt	195	203	168	165	8	-27	-30
Other <sup>2</sup>	<u>365</u>	<u>381</u>	<u>420</u>	<u>433</u>	<u>16</u>	<u>55</u>	<u>68</u>
	4,225	4,545	4,600	4,554	320	376	329
<i><u>Splitter Products</u></i>							
LPG	0	0	0	0	0	0	0
Light Naphtha	0	0	0	0	0	0	0
Naphtha	0	0	0	0	0	0	0
Unfinished Distillate	0	0	0	0	0	0	0
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	0	0	0	0	0	0	0

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.



Table II-9							
PADD III Charge and Yield Data							
	Yearly Volumes, MBPD				Change from 2013, MBPD		
	2013	2015	2020	2025	2015	2020	2025
<i><u>Feedstocks</u></i>							
Crude to Refineries	7,761	8,250	8,432	8,383	489	670	622
Crude to Splitters	68	158	262	362	90	194	294
Other Feedstocks <sup>1</sup>	<u>1,442</u>	<u>1,448</u>	<u>1,452</u>	<u>1,460</u>	<u>6</u>	<u>10</u>	<u>18</u>
	9,271	9,856	10,146	10,205	585	875	934
<i><u>Refinery Products</u></i>							
Propane/Propylene	369	382	385	392	13	16	23
Normal Butane	48	72	86	87	24	38	39
Isobutane	-1	3	12	7	4	13	8
Gasoline	4,216	4,282	4,323	4,409	66	106	193
Jet/Kerosene	760	825	834	770	65	74	10
Distillate	2,721	2,793	2,866	2,871	72	145	150
Resid/Asphalt	351	372	378	404	21	27	53
Other <sup>2</sup>	<u>1,366</u>	<u>1,609</u>	<u>1,666</u>	<u>1,572</u>	<u>243</u>	<u>300</u>	<u>206</u>
	9,830	10,339	10,549	10,513	509	719	683
<i><u>Splitter Products</u></i>							
LPG	4	9	15	20	5	10	16
Light Naphtha	17	35	58	80	18	41	63
Naphtha	22	46	77	106	25	55	84
Unfinished Distillate	18	44	73	101	26	55	83
Gas Oil	<u>6</u>	<u>23</u>	<u>40</u>	<u>54</u>	<u>17</u>	<u>34</u>	<u>48</u>
	68	158	262	362	90	195	295

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

Table II-10							
PADD IV Charge and Yield Data							
	Yearly Volumes, MBPD				Change from 2013, MBPD		
	2013	2015	2020	2025	2015	2020	2025
<i><u>Feedstocks</u></i>							
Crude to Refineries	569	605	653	653	36	84	84
Crude to Splitters	0	0	0	0	0	0	0
Other Feedstocks <sup>1</sup>	<u>53</u>	<u>55</u>	<u>55</u>	<u>55</u>	<u>2</u>	<u>2</u>	<u>2</u>
	622	660	708	708	38	86	86
<i><u>Products</u></i>							
Propane/Propylene	9	10	11	10	1	2	1
Normal Butane	2	3	4	5	1	2	3
Isobutane	-1	0	1	1	1	2	2
Gasoline	320	340	337	342	20	18	22
Jet/Kerosene	26	35	46	58	9	20	32
Distillate	194	200	211	215	6	17	21
Resid/Asphalt	44	46	49	33	2	5	-11
Other <sup>2</sup>	<u>52</u>	<u>52</u>	<u>77</u>	<u>78</u>	<u>0</u>	<u>25</u>	<u>26</u>
	646	685	737	741	40	92	96
<i><u>Splitter Products</u></i>							
LPG	0	0	0	0	0	0	0
Light Naphtha	0	0	0	0	0	0	0
Naphtha	0	0	0	0	0	0	0
Unfinished Distillate	0	0	0	0	0	0	0
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	0	0	0	0	0	0	0

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

Table II-11							
PADD V Charge and Yield Data							
	Yearly Volumes, MBPD				Change from 2013, MBPD		
	2013	2015	2020	2025	2015	2020	2025
<i><u>Feedstocks</u></i>							
Crude to Refineries	2,303	2,374	2,483	2,483	71	181	181
Crude to Splitters	0	0	0	0	0	0	0
Other Feedstocks <sup>1</sup>	<u>591</u>	<u>589</u>	<u>595</u>	<u>595</u>	<u>-2</u>	<u>4</u>	<u>4</u>
	2,894	2,963	3,077	3,078	69	184	185
<i><u>Products</u></i>							
Propane/Propylene	45	47	51	51	2	6	6
Normal Butane	8	11	12	12	3	4	4
Isobutane	-1	-3	-8	-8	-2	-7	-7
Gasoline	1,600	1,579	1,637	1,639	-21	38	40
Jet/Kerosene	414	429	445	445	15	31	31
Distillate	568	583	621	621	15	53	53
Resid/Asphalt	130	131	133	133	1	3	3
Other <sup>2</sup>	<u>313</u>	<u>369</u>	<u>372</u>	<u>370</u>	<u>56</u>	<u>59</u>	<u>57</u>
	3,077	3,145	3,263	3,263	68	187	186
<i><u>Splitter Products</u></i>							
LPG	0	0	0	0	0	0	0
Light Naphtha	0	0	0	0	0	0	0
Naphtha	0	0	0	0	0	0	0
Unfinished Distillate	0	0	0	0	0	0	0
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	0	0	0	0	0	0	0

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

Table II-12							
U.S. Charge and Yield Data							
	Yearly Volumes, MBPD				Change from 2013, MBPD		
	2013	2015	2020	2025	2015	2020	2025
<i>Feedstocks</i>							
Crude to Refineries	15,008	15,965	16,360	16,269	959	1,352	1,261
Crude to Splitters	68	158	262	362	90	194	294
Other Feedstocks <sup>1</sup>	<u>2,943</u>	<u>2,971</u>	<u>2,983</u>	<u>2,988</u>	<u>28</u>	<u>40</u>	<u>45</u>
	18,019	19,094	19,605	19,619	1,076	1,586	1,600
<i>Products</i>							
Propane/Propylene	564	593	603	609	29	39	45
Normal Butane	64	97	122	125	33	58	61
Isobutane	-5	-4	7	3	1	12	8
Gasoline	9,038	9,334	9,454	9,509	296	416	471
Jet/Kerosene	1,496	1,652	1,701	1,638	156	205	142
Distillate	4,857	5,002	5,121	5,119	145	264	262
Resid/Asphalt	836	856	832	841	20	-4	5
Other <sup>2</sup>	<u>2,188</u>	<u>2,503</u>	<u>2,627</u>	<u>2,547</u>	<u>315</u>	<u>439</u>	<u>359</u>
	19,038	20,034	20,468	20,389	996	1,430	1,351
<i>Splitter Products</i>							
LPG	4	9	15	20	5	10	16
Light Naphtha	17	35	58	80	18	41	63
Naphtha	22	46	77	106	25	55	84
Unfinished Distillate	18	44	73	101	26	55	83
Gas Oil	<u>6</u>	<u>23</u>	<u>40</u>	<u>54</u>	<u>17</u>	<u>34</u>	<u>48</u>
	68	158	262	362	90	195	295

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table II-13**

**PADD I Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	<u>Supply</u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply</u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply</u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply</u>	<u>Demand</u>	<u>Surplus</u>
Gasoline	584	3,139	-2,555	635	3,128	-2,493	656	2,909	-2,253	655	2,661	-2,006
Jet/Kerosene	73	404	-331	90	408	-318	86	407	-321	83	409	-326
Distillate	361	1,187	-826	357	1,226	-869	332	1,253	-922	331	1,246	-916
Residual Fuel	66	120	-54	55	106	-52	54	102	-48	56	107	-51
Other <sup>1</sup>	<u>177</u>	<u>460</u>	<u>-283</u>	<u>183</u>	<u>455</u>	<u>-272</u>	<u>190</u>	<u>495</u>	<u>-305</u>	<u>193</u>	<u>544</u>	<u>-351</u>
	1,261	5,309	-4,048	1,320	5,324	-4,004	1,318	5,166	-3,848	1,318	4,967	-3,650

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table II-14**

**PADD II Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus
Gasoline	2,319	2,402	-83	2,498	2,393	105	2,501	2,179	322	2,463	1,971	492
Jet/Kerosene	223	267	-44	273	270	3	289	270	20	282	269	13
Distillate	1,013	1,174	-161	1,069	1,239	-170	1,091	1,290	-199	1,080	1,290	-210
Residual Fuel	48	36	12	56	13	43	21	14	7	18	16	2
Other <sup>1</sup>	<u>622</u>	<u>1,003</u>	<u>-381</u>	<u>648</u>	<u>994</u>	<u>-346</u>	<u>697</u>	<u>1,103</u>	<u>-406</u>	<u>710</u>	<u>1,143</u>	<u>-433</u>
	4,225	4,881	-657	4,545	4,909	-364	4,600	4,856	-256	4,554	4,690	-135

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table II-15**

**PADD III Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>
Gasoline	4,216	1,361	2,855	4,282	1,357	2,925	4,323	1,299	3,023	4,409	1,207	3,202
Jet/Kerosene	760	264	496	825	267	559	834	276	558	770	283	487
Distillate	2,721	786	1,935	2,793	835	1,958	2,866	902	1,964	2,871	911	1,959
Residual Fuel	281	102	179	302	72	230	308	64	244	334	71	263
Other <sup>2</sup>	<u>1,920</u>	<u>2,559</u>	<u>-639</u>	<u>2,294</u>	<u>2,568</u>	<u>-274</u>	<u>2,481</u>	<u>2,993</u>	<u>-512</u>	<u>2,491</u>	<u>3,276</u>	<u>-785</u>
	9,898	5,072	4,826	10,496	5,099	5,397	10,811	5,534	5,277	10,875	5,749	5,126

1. Supply includes production from splitters and hydroskimmers.

2. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table II-16**

**PADD IV Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus
Gasoline	320	302	17	340	301	39	337	295	42	342	281	61
Jet/Kerosene	26	38	-12	35	39	-3	46	39	7	58	40	17
Distillate	194	167	27	200	176	23	211	185	27	215	188	27
Resid/Asphalt	11	2	9	13	2	11	16	2	14	0	2	-2
Other <sup>1</sup>	<u>95</u>	<u>68</u>	<u>27</u>	<u>98</u>	<u>67</u>	<u>31</u>	<u>127</u>	<u>114</u>	<u>12</u>	<u>126</u>	<u>129</u>	<u>-3</u>
	646	577	69	685	585	100	737	635	102	741	640	101

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.



**Table II-17**

**PADD V Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus
Gasoline	1,600	1,505	94	1,579	1,500	79	1,637	1,434	203	1,639	1,329	310
Jet/Kerosene	414	447	-33	429	451	-23	445	461	-16	445	470	-25
Distillate	568	565	3	583	590	-7	621	624	-3	621	636	-14
Residual Fuel	111	120	-9	112	95	17	114	93	21	114	95	19
Other <sup>1</sup>	<u>384</u>	<u>356</u>	<u>28</u>	<u>443</u>	<u>356</u>	<u>87</u>	<u>446</u>	<u>437</u>	<u>9</u>	<u>444</u>	<u>484</u>	<u>-40</u>
	3,077	2,993	83	3,145	2,992	153	3,263	3,050	213	3,263	3,013	250

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table II-18**

**U.S. Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>
Gasoline	9,038	8,710	328	9,334	8,680	655	9,454	8,116	1,339	9,509	7,449	2,060
Jet/Kerosene	1,496	1,419	77	1,652	1,434	217	1,701	1,454	247	1,638	1,472	166
Distillate	4,857	3,878	979	5,002	4,066	936	5,121	4,254	867	5,119	4,272	847
Residual Fuel	517	380	137	537	288	249	513	275	238	522	291	232
Other <sup>2</sup>	<u>1,677</u>	<u>2,125</u>	<u>-449</u>	<u>2,145</u>	<u>2,123</u>	<u>22</u>	<u>2,419</u>	<u>2,459</u>	<u>-39</u>	<u>2,443</u>	<u>2,666</u>	<u>-223</u>
	17,585	16,513	1,072	18,670	16,591	2,079	19,209	16,557	2,652	19,230	16,150	3,081
NGLs	<u>2,606</u>	<u>2,320</u>	<u>286</u>	<u>3,350</u>	<u>2,318</u>	<u>1,032</u>	<u>4,177</u>	<u>2,684</u>	<u>1,493</u>	<u>3,962</u>	<u>2,910</u>	<u>1,052</u>
Total Products	20,191	18,833	1,358	22,020	18,909	3,112	23,386	19,241	4,145	23,192	19,060	4,133

1. Supply includes production from splitters and hydroskimmers.

2. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.



Table II-20

Required Crude Oil Logistic Improvements, MBPD

Rail Movements into PADD I

	Planned Movements by Rail	Rail Capacity	Required Rail Cap. Additions
2013	278	555	- -
2015	568	1,320	- -
2020	836	- -	0 - 352
2025	920	- -	0 - 520

Comments

- Movements by rail into PADD I are expected to rise by nearly 650 MBPD from 2013 to 2025.
- Existing rail off-loading capacity exceeds short term rail capacity requirements.
- **Projected rail expansion plans appear to be on track to keep pace with desired movements into PADD I.**
- See Appendix 1 for existing and planned PADD I rail offloading facilities.

Crude Movements into PADD II

- **Current pipeline and rail delivery systems from the Gulf Coast, the Southwest and Canada are sufficient to meet crude demand requirements through 2025.**

Pipeline Movements from Southwest to the Gulf Coast

	Southwest Production	Local/PADD II Demand	Movements to Gulf Coast	Pipelines from the Permian Basin with access the USGC			
				Direct	Indirect (via Cushing)	Total	Surplus
2013	1,646	792	854	363	525	888	33
2015	2,068	1,419	649	925	525	1450	801
2020	2,387	1,339	1,049	1225	525	1750	701
2025	2,533	1,247	1,287	1225	525	1750	463

Comments

- The Permian Basin largely became debottlenecked with the startup of the Magellan Longhorn pipeline in 2013.
- Permian Basin volumes will shift into PADD II in 2015 to replace declining Midcontinent production.
- Movements to the Gulf Coast will peak in 2025 at nearly 1.3 million BPD.
- Pipeline capacity from the Permian Basin to the Gulf Coast is projected to exceed these movement requirements.
- **No bottlenecks are expected in moving crude from the Southwest to the Gulf Coast in the Low Production Case.**
- See Appendix 2 for existing and planned Permian Basin exit pipelines.

## Table II-20

### Required Crude Oil Logistic Improvements, MBPD

#### Pipeline Movements from Western Canada and the Rocky Mountains to the Gulf Coast

	Movements to the Gulf Coast			Pipeline Capacity, South of Cushing, OK and Patoka, IL	
	Western Canada	Rocky Mountains	Total	Capacity	Surplus
2013	182	150	332	550	218
2015	535	0	535	1,550	1,015
2020	1,085	0	1,085	2,210	1,125
2025	1,918	0	1,918	2,210	292

#### Comments

- Crude movements to the Gulf Coast will rise from 332 MBD in 2013 to 1.9 million BPD by 2025.
- Existing pipeline capacity out of Cushing/Patoka is 1.55 million BPD and will rise to 2.21 million BPD by 2017.
- **The Enbridge/Energy Transfer Trunkline (or similar capacity pipeline) from Patoka, IL to St. James, LA may be required to flow the necessary volumes from Western Canada to the Gulf Coast around 2025.**
- See Appendix 3 for existing and planned pipelines from Cushing, OK and Patoka, IL to the Gulf Coast.

#### Crude Movements into PADD IV

- **Current pipeline delivery systems from the Rocky Mountains and Western Canada are sufficient to meet crude demand requirements through 2025.**

#### Rail Movements into PADD V

	Planned Movements by Rail	Rail Capacity	Required Rail Cap. Additions
2013	90	148	- -
2015	210	370	- -
2020	305	- -	0 - 240
2025	352	- -	0 - 334

#### Comments

- Movements by rail into PADD V are expected to rise from 90 MBPD in 2013 to 352 MBPD in 2025.
- Existing rail off-loading capacity exceeds short term rail capacity requirements.
- **Projected rail expansion plans appear to be on track to keep pace with desired movements into PADD V provided permits are not unduly constrained.**
- See Appendix 4 for existing and planned PADD V rail offloading facilities.

Table II-20

## Required Crude Oil Logistic Improvements, MBPD

## Crude Movements out of Western Canada

	<u>Crude Movements out of Western Canada</u>			<u>Existing Exit Capacity with the Alberta Clipper</u>			
	<u>to the</u>	<u>to Eastern</u>	<u>Total</u>	<u>Pipelines</u>	<u>Rail</u>		<u>Surplus</u>
	<u>U.S.</u>	<u>Canada</u>			<u>Movements</u>	<u>Total</u>	
2013	2,476	329	2,805	3,568	120	3,688	883
2015	2,636	531	3,167	3,656	593	4,249	1,081
2020	3,466	383	3,849	3,918	750	4,668	819
2025	4,323	386	4,709	3,918	750	4,668	-41

Comments

- Movements out of Western Canada are expected to rise from 2.8 million BPD in 2013 to 4.7 million BPD in 2025.
- Existing exit pipeline capacity out of Western Canada is 3.6 million BPD.
- The Enbridge Alberta Clipper pipeline is viewed as highly likely with a capacity of 350 MBPD and a startup date in 3Q2015.
- Four other major exit pipelines are being discussed (see Appendix 5).
- **At least one of these four new pipelines will need to be in place by 2025 to achieve the Canadian production forecast.**
- Incremental movements to the U.S. between 2013 and 2025 are 1.85 million BPD.
- The Alberta Clipper (350 MBPD) and rail (630 MBPD) will absorb 980 MBPD of these movements leaving nearly 900 MBPD of required capacity additions.
- **Construction of additional pipelines by 2025 will be required to meet U.S. requirements.**

**Table II-21**

**Gasoline Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-2,555	-2,493	-2,253	-2,006	- Reduced utilization of Colonial/Plantation systems.
PADD II	-83	105	322	492	- Increased movements into PADD I from Ohio and into PADD III for export via Mississippi River.
PADD III	2,855	2,925	3,023	3,202	- Likely origin of PADD I-IV exports (increase of 1.5 million BPD).
PADD IV	17	39	42	61	- Surplus volumes to be moved into PADDs II and V.
PADD V	<u>94</u>	<u>79</u>	<u>203</u>	<u>310</u>	- Incremental 216 MBPD to be exported.
Total U.S.	328	655	1,339	2,060	

Conclusions

- No incremental requirements for Colonial/Plantation systems.
- Modest pipeline upgrades to be made in moving PADD II volumes from Ohio into western Pennsylvania.
- The most significant logistic improvements to be focused on product exports (which are increasing by 1.7 million BPD).
- Exports will be primarily from PADD III but also from PADD V beginning in 2020.

**Table II-22**

**Jet/Kerosene Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-331	-318	-321	-326	
PADD II	-44	3	20	13	- Increased movements into PADD I from Ohio and into PADD III for export via Mississippi.
PADD III	496	559	558	487	
PADD IV	-12	-3	7	17	- Surplus volumes to be moved into PADDs II and V.
PADD V	<u>-33</u>	<u>-23</u>	<u>-16</u>	<u>-25</u>	
Total U.S.	77	217	247	166	

Conclusions

- No incremental requirements for Colonial/Plantation systems.
- Modest pipeline upgrades to be made in moving PADD II volumes from Ohio into western Pennsylvania.
- No significant logistics improvements required for Jet/Kerosene movements.



**Table II-23**

**Distillate Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-826	-869	-922	-916	- Increased usage of Colonial/Plantation systems.
PADD II	-161	-170	-199	-210	- Shortfall grows slightly, requires greater receipts from PADD III.
PADD III	1,935	1,958	1,964	1,959	- Surplus remains constant. Movements to PADDs I and II and exports.
PADD IV	27	23	27	27	- Surplus volumes to be moved into PADDs II and V.
PADD V	<u>3</u>	<u>-7</u>	<u>-3</u>	<u>-14</u>	
Total U.S.	979	936	867	847	

Conclusions

- Movements from PADD III to Padd I increase by 90 MBPD from 2013 to 2025. Surplus capacity will exist on Colonial/Plantation systems due to reduction of gasoline movements by 549 MBPD.
- Movements from PADD III to PADD II will increase slightly (Explorer Pipeline).
- Exports will decline by 132 MBPD as internal demand grows faster than production.
- No significant logistics improvements required for Distillate movements.

**Table II-24**

**Residual Fuel Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-54	-52	-48	-51	
PADD II	12	43	7	2	
PADD III	179	230	244	263	- Incremental 84 MBPD to be exported.
PADD IV	9	11	14	-2	
PADD V	<u>-9</u>	<u>17</u>	<u>21</u>	<u>19</u>	
Total U.S.	137	249	238	232	

Conclusions

- No significant logistics improvements required for Residual Fuel movements.

**Table II-25**

**Other Products<sup>1</sup> Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-283	-272	-305	-351	
PADD II	-381	-346	-406	-433	
PADD III	-639	-274	-512	-785	- Predominantly NGL growth.
PADD IV	27	31	12	-3	
PADD V	<u>28</u>	<u>87</u>	<u>9</u>	<u>-40</u>	
Total Refining	-1,248	-774	-1,202	-1,612	
Adjustments	-1521	-1521	-1521	-1521	
NGL Demand	<u>2,320</u>	<u>2,318</u>	<u>2,684</u>	<u>2,910</u>	
Total U.S.	-449	22	-39	-223	

Conclusions

- Increase in Other shortfall is predominantly the result of increased Natural Gas Liquids (NGLs) production.
- NGL logistics are being developed in conjunction with increased natural gas drilling.
- Logistic requirements for Other refining products (non-NGLs) are not viewed to be significant.

1. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table II-26**

**Total U.S. Refined Products Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-4,048	-4,004	-3,848	-3,650	- PADD I product shortfall to decline by nearly 400 MBPD.
PADD II	-657	-364	-256	-135	- PADD II product shortfall to decline by 522 MBPD.
PADD III	4,826	5,397	5,277	5,126	- PADD III exports to rise by around 1.8 million BPD.
PADD IV	69	100	102	101	- PADD IV movements generally flat.
PADD V	<u>83</u>	<u>153</u>	<u>213</u>	<u>250</u>	- PADD V exports to rise by 167 MBPD.
Total Refining	273	1,283	1,489	1,692	
Adjustments	-1521	-1521	-1521	-1521	
NGL Demand	<u>2,320</u>	<u>2,318</u>	<u>2,684</u>	<u>2,910</u>	
Total U.S.	1,072	2,079	2,652	3,081	

Conclusions

- No major product infrastructure improvements are necessary for movements between PADDs.
- **Logistic improvements will be necessary for the incremental export of 2.0 million BPD between 2013 and 2025.**

<b>Table II-27</b>					
<b>U.S. and Canadian Crude Oil Exports - MBPD</b>					
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Likely Destinations</u>

**Crude Exports from the U.S.**

Gulf Coast

Condensate	25	25	25	25	Canada
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Rocky Mountains

Ultra Light Sweet	108	332	525	525	Canada
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<b>Total U.S.</b>	<b>133</b>	<b>357</b>	<b>550</b>	<b>550</b>	
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**Crude Exports from Canada\***

<b>Total Canada</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
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<b>Total U.S. and Canada</b>	<b>133</b>	<b>357</b>	<b>550</b>	<b>550</b>	
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\* Excluding movements to the U.S.

<b>Table II-28</b>					
<b>U.S. Product Exports - MBPD</b>					
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Likely Destinations</u>

*Refined Products*

Gasoline	328	655	1,339	2,060	Mexico, other Latin America
Jet/Kerosene	77	217	247	166	Canada, Mexico, other Latin America
Distillate	979	936	867	847	Mexico, other Latin America, Europe
Residual Fuel	137	249	238	232	East Asia, Latin America, Europe
Other <sup>1</sup>	<u>-449</u>	<u>22</u>	<u>-39</u>	<u>-223</u>	Latin America, Europe, East Asia
	1,072	2,079	2,652	3,081	
<i>NGLs</i>	286	1,032	1,493	1,052	Canada, Mexico, Latin America
<b>Total Exports</b>	<b>1,358</b>	<b>3,112</b>	<b>4,145</b>	<b>4,133</b>	

1. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table II-29**  
**Crude Price Forecast**  
**Low Production Case**

(current dollars per barrel)

	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>
<b><u>BENCHMARKS</u></b>											
Brent (Sullom Voe)	103.01	99.92	98.89	97.37	99.18	104.51	109.97	115.59	121.37	127.28	133.38
LLS (St. James)	100.78	97.99	97.32	96.03	97.82	103.09	108.45	113.93	119.65	125.36	131.30
WTI (Cushing)	95.90	93.08	92.38	91.05	92.80	98.03	103.35	108.79	114.44	120.09	125.96
Bakken (Clearbrook)	91.47	88.72	88.03	86.76	88.51	93.76	99.10	104.54	110.17	115.67	121.30
Maya (FOB)	89.47	86.89	85.21	83.35	84.72	89.60	94.44	98.70	103.66	108.76	114.16
Canadian WCS (Hardisty)	82.42	79.67	77.98	76.00	77.50	82.15	87.02	91.18	96.04	101.05	106.36
<b><u>DIFFERENTIALS</u></b>											
Brent - LLS	2.23	1.93	1.57	1.34	1.36	1.42	1.52	1.66	1.72	1.91	2.08
LLS - WTI	4.87	4.91	4.94	4.98	5.02	5.06	5.10	5.15	5.21	5.27	5.34
WTI - Bakken	4.43	4.36	4.35	4.29	4.29	4.27	4.25	4.25	4.27	4.42	4.66
LLS - Maya	11.31	11.10	12.12	12.68	13.10	13.49	14.01	15.24	15.99	16.60	17.14
Maya - WCS	7.05	7.22	7.23	7.35	7.22	7.45	7.41	7.52	7.63	7.71	7.80

# Implications of Increasing U.S. Light Tight Oil Production

## High Production Base Case

<u>Number</u>	<u>Tab</u>	<u>Table Name</u>
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III-2	<a href="#">2015</a>	Crude Oil Supply and Demand Balance - 2015
III-3	<a href="#">2020</a>	Crude Oil Supply and Demand Balance - 2020
III-4	<a href="#">2025</a>	Crude Oil Supply and Demand Balance - 2025
III-5	<a href="#">Capacities</a>	U.S. and Canadian Distillation Capacities
III-6	<a href="#">Utilizations</a>	U.S. and Canadian Utilization Rates
III-7	<a href="#">PI Products</a>	Total PADD I Charge and Yield Data
III-8	<a href="#">PII Products</a>	Total PADD II Charge and Yield Data
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III-13	<a href="#">PI Balance</a>	PADD I Refinery Product Supply and Demand Balance
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III-15	<a href="#">PIII Balance</a>	PADD III Refinery Product Supply and Demand Balance
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III-18	<a href="#">US Balance</a>	U.S. Product Supply and Demand Balance
III-19	<a href="#">Crude Flows</a>	Crude Oil Flows
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III-26	<a href="#">Total</a>	Total U.S. Refined Products Supply and Demand Balance
III-27	<a href="#">Crude Exports</a>	U.S. and Canadian Crude Oil Exports
III-28	<a href="#">Product Exports</a>	U.S. Product Exports
III-29	<a href="#">Prices</a>	Crude Price Forecast - High Resource Exports Restricted

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**Table III-1  
EIA High Production Base Case - MPBD  
Crude Oil Supply and Demand Balance - 2013**

	Avail. Supply	U.S.								Canada			
		I	II	III	IV	V	Splitters	Stab.	Hydrosk.	Exports	Western	Eastern	Exports
<b>Northeast</b>													
Light Sweet (API 35 - <40)	5	5											
Light Sour (API 35 - <40)	11		11										
Medium Medium Sour (API 27 - <35)	26		26										
Medium Sour (API 27 - <35)	0												
Heavy Sweet (API <27)	0												
Heavy Sour (API <27)	0												
Ultra Light Sweet (API 40 - <50)	30	18	12										
Lease Condensate (API >=50)	<u>28</u>	15	13										
	101												
<b>Gulf Coast</b>													
Light Sweet (API 35 - <40)	223			223									
Light Sour (API 35 - <40)	64			64									
Medium Medium Sour (API 27 - <35)	98			98									
Medium Sour (API 27 - <35)	17			17									
Heavy Sweet (API <27)	14			14									
Heavy Sour (API <27)	18			18									
Ultra Light Sweet (API 40 - <50)	238	10	228										
Lease Condensate (API >=50)	<u>639</u>	15	532				68					25	
	1,312												
<b>Midcontinent</b>													
Light Sweet (API 35 - <40)	154		154										
Light Sour (API 35 - <40)	26		26										
Medium Medium Sour (API 27 - <35)	73		73										
Medium Sour (API 27 - <35)	13		13										
Heavy Sweet (API <27)	3		3										
Heavy Sour (API <27)	2		2										
Ultra Light Sweet (API 40 - <50)	205		205										
Lease Condensate (API >=50)	<u>122</u>		122										
	599												
<b>Southwest</b>													
Light Sweet (API 35 - <40)	332		225	107									
Light Sour (API 35 - <40)	124		75	49									
Medium Medium Sour (API 27 - <35)	93			93									
Medium Sour (API 27 - <35)	341		50	291									
Heavy Sweet (API <27)	3			3									
Heavy Sour (API <27)	14			14									
Ultra Light Sweet (API 40 - <50)	647			647									
Lease Condensate (API >=50)	<u>91</u>			91									
	1,646												
<b>Rocky Mountains</b>													
Light Sweet (API 35 - <40)	121		21	75	25								
Light Sour (API 35 - <40)	133		58	75									
Medium Medium Sour (API 27 - <35)	35				35								
Medium Sour (API 27 - <35)	16				16								
Heavy Sweet (API <27)	3				3								
Heavy Sour (API <27)	56				56								
Ultra Light Sweet (API 40 - <50)	980	168	438	176	90							108	
Lease Condensate (API >=50)	<u>54</u>		49	5									
	1,399												
<b>West Coast, California</b>													
West Coast, California	513					513							
<b>Lower 48 Offshore</b>													
Atlantic Medium Medium Sour	0												
Gulf of Mexico Medium Medium Sour	1,284			1,284									
Pacific California	<u>90</u>					90							
	1,374												
<b>Alaska</b>													
North Slope Offshore Medium Medium	0												
North Slope Onshore Medium Medium	500					500							
South Alaska Medium Medium Sour	<u>15</u>					15							
	515												
<b>Total U.S.</b>	<b>7,459</b>	<b>231</b>	<b>1,578</b>	<b>3,925</b>	<b>316</b>	<b>1,208</b>	<b>68</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>133</b>	<b>0</b>
<b>Western Canada</b>													
Condensate	0												
Super Light	52	16	3	0	0	11						21	
Light Sweet	766		382	8	48	57					29	243	
Light Sour	245	4	78	3	8	52					101		
Medium	491	65	200	5	11	26					183		
Heavy	<u>1,864</u>	25	1,070	166	187	51					300	65	
	3,418												
<b>Eastern Canada</b>													
Condensate	0												
Super Light	0												
Light Sweet	232	103										129	
Light Sour	0												
Medium	0												
Heavy	<u>0</u>												
	232												
<b>Foreign Imports</b>													
Condensate	7	5	0	3		0							
Super Light	68	39	0	19		10							
Light Sweet	942	329	1	166		100						347	
Light Sour	1,030	87	32	604		262				1		45	
Medium	1,393	49	8	964		327						45	
Heavy	<u>2,248</u>	68	2	1,899		198						80	
	5,689												
<b>Total Supply</b>	<b>16,798</b>	<b>1,022</b>	<b>3,354</b>	<b>7,761</b>	<b>569</b>	<b>2,303</b>	<b>68</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>613</b>	<b>1,108</b>	<b>0</b>

**Table III-2  
EIA High Production Base Case - MPBD  
Crude Oil Supply and Demand Balance - 2015**

	Avail. Supply	U.S.								Canada			
		I	II	III	IV	V	Splitters	Stab.	Hydrosk.	Exports	Western	Eastern	Exports
<b>Northeast</b>													
Light Sweet (API 35 - <40)	3	3											
Light Sour (API 35 - <40)	9		9										
Medium Medium Sour (API 27 - <35)	15		15										
Medium Sour (API 27 - <35)	0												
Heavy Sweet (API <27)	0												
Heavy Sour (API <27)	0												
Ultra Light Sweet (API 40 - <50)	22	18	4										
Lease Condensate (API >=50)	31	15	16										
	80												
<b>Gulf Coast</b>													
Light Sweet (API 35 - <40)	349			349									
Light Sour (API 35 - <40)	106			106									
Medium Medium Sour (API 27 - <35)	109			109									
Medium Sour (API 27 - <35)	58			58									
Heavy Sweet (API <27)	16			16									
Heavy Sour (API <27)	22			22									
Ultra Light Sweet (API 40 - <50)	800	10	20	720			50						
Lease Condensate (API >=50)	803	15		655			108					25	
	2,262												
<b>Midcontinent</b>													
Light Sweet (API 35 - <40)	103		103										
Light Sour (API 35 - <40)	17		17										
Medium Medium Sour (API 27 - <35)	53		53										
Medium Sour (API 27 - <35)	9		9										
Heavy Sweet (API <27)	2		2										
Heavy Sour (API <27)	1		1										
Ultra Light Sweet (API 40 - <50)	128		128										
Lease Condensate (API >=50)	76		76										
	389												
<b>Southwest</b>													
Light Sweet (API 35 - <40)	399		399										
Light Sour (API 35 - <40)	126		126										
Medium Medium Sour (API 27 - <35)	82			82									
Medium Sour (API 27 - <35)	287		50	237									
Heavy Sweet (API <27)	4			4									
Heavy Sour (API <27)	11			11									
Ultra Light Sweet (API 40 - <50)	894		393	501									
Lease Condensate (API >=50)	272			272									
	2,077												
<b>Rocky Mountains</b>													
Light Sweet (API 35 - <40)	105		61	44									
Light Sour (API 35 - <40)	157		133	24									
Medium Medium Sour (API 27 - <35)	28			28									
Medium Sour (API 27 - <35)	19			19									
Heavy Sweet (API <27)	2			2									
Heavy Sour (API <27)	54			54									
Ultra Light Sweet (API 40 - <50)	1,782	546	452	177	275							332	
Lease Condensate (API >=50)	58		53	5									
	2,206												
<b>West Coast, California</b>													
West Coast, California	554					554							
<b>Lower 48 Offshore</b>													
Atlantic Medium Medium Sour	0												
Gulf of Mexico Medium Medium Sour	1,697		1,697										
Pacific California	90					90							
	1,787												
<b>Alaska</b>													
North Slope Offshore Medium Medium	44					44							
North Slope Onshore Medium Medium	397					397							
South Alaska Medium Medium Sour	9					9							
	450												
<b>Total U.S.</b>	<b>9,805</b>	<b>607</b>	<b>2,120</b>	<b>4,841</b>	<b>353</b>	<b>1,369</b>	<b>158</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>357</b>	<b>0</b>
<b>Western Canada</b>													
Condensate	0												
Super Light	54	16	4	0	0	13						21	
Light Sweet	800		209	0	60	57					29	445	
Light Sour	255	4	91	0	7	52					101		
Medium	519	64	228	5	12	26					183		
Heavy	2,153	26	1,007	531	173	51					300	65	
	3,781												
<b>Eastern Canada</b>													
Condensate	0												
Super Light	0												
Light Sweet	227	98										129	
Light Sour	0												
Medium	0												
Heavy	0												
	227												
<b>Foreign Imports</b>													
Condensate	0												
Super Light	0												
Light Sweet	97	97											
Light Sour	805	95		386		324							
Medium	1,385	48		964		328						45	
Heavy	1,745	22		1,523		154						46	
	4,032												
<b>Total Supply</b>	<b>17,845</b>	<b>1,077</b>	<b>3,659</b>	<b>8,250</b>	<b>605</b>	<b>2,374</b>	<b>158</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>613</b>	<b>1,108</b>	<b>0</b>

**Table III-3  
EIA High Production Base Case - MPBD  
Crude Oil Supply and Demand Balance - 2020**

	Avail. Supply	U.S.									Canada			
		I	II	III	IV	V	Splitters	Stab.	Hydrosk.	Exports	Western	Eastern	Exports	
<b>Northeast</b>														
Light Sweet (API 35 - <40)	1	1												
Light Sour (API 35 - <40)	7		7											
Medium Medium Sour (API 27 - <35)	7		7											
Medium Sour (API 27 - <35)	0													
Heavy Sweet (API <27)	0													
Heavy Sour (API <27)	0													
Ultra Light Sweet (API 40 - <50)	17	17												
Lease Condensate (API >=50)	44	15	29											
	76													
<b>Gulf Coast</b>														
Light Sweet (API 35 - <40)	513			513										
Light Sour (API 35 - <40)	218			218										
Medium Medium Sour (API 27 - <35)	114			114										
Medium Sour (API 27 - <35)	75			75										
Heavy Sweet (API <27)	13			13										
Heavy Sour (API <27)	20			20										
Ultra Light Sweet (API 40 - <50)	1,205	435		670			100							
Lease Condensate (API >=50)	966	22		193			193	534					25	
	3,124													
<b>Midcontinent</b>														
Light Sweet (API 35 - <40)	110		110											
Light Sour (API 35 - <40)	18		18											
Medium Medium Sour (API 27 - <35)	70		70											
Medium Sour (API 27 - <35)	8		8											
Heavy Sweet (API <27)	3		3											
Heavy Sour (API <27)	3		3											
Ultra Light Sweet (API 40 - <50)	136		136											
Lease Condensate (API >=50)	132		132											
	480													
<b>Southwest</b>														
Light Sweet (API 35 - <40)	786		349	307					130					
Light Sour (API 35 - <40)	135		52	83										
Medium Medium Sour (API 27 - <35)	81			81										
Medium Sour (API 27 - <35)	305		50	57		198								
Heavy Sweet (API <27)	9			9										
Heavy Sour (API <27)	14			14										
Ultra Light Sweet (API 40 - <50)	1,182		496	686										
Lease Condensate (API >=50)	422			422										
	2,933													
<b>Rocky Mountains</b>														
Light Sweet (API 35 - <40)	106		96	10										
Light Sour (API 35 - <40)	181		133	48										
Medium Medium Sour (API 27 - <35)	38			38										
Medium Sour (API 27 - <35)	15			15										
Heavy Sweet (API <27)	5			5										
Heavy Sour (API <27)	39			39										
Ultra Light Sweet (API 40 - <50)	2,665	304	713	245	878								525	
Lease Condensate (API >=50)	82		66	11	5									
	3,131													
<b>West Coast, California</b>														
West Coast, California	634					634								
<b>Lower 48 Offshore</b>														
Atlantic Medium Medium Sour	0													
Gulf of Mexico Medium Medium Sour	2,437			2,437										
Pacific California	54					54								
	2,491													
<b>Alaska</b>														
North Slope Offshore Medium Medium	72									72				
North Slope Onshore Medium Medium	340							54			286			
South Alaska Medium Medium Sour	6							6						
	418													
<b>Total U.S.</b>	<b>13,287</b>	<b>794</b>	<b>2,478</b>	<b>5,921</b>	<b>405</b>	<b>1,825</b>	<b>293</b>	<b>534</b>	<b>130</b>	<b>358</b>	<b>0</b>	<b>550</b>	<b>0</b>	<b>0</b>
<b>Western Canada</b>														
Condensate	0													
Super Light	54											21	33	
Light Sweet	788			73							22	195	498	
Light Sour	250			8	52						101	89	89	
Medium	546	65		13	26						183	259		
Heavy	2,871	60	1,320	754	166	51					353	167		
	4,509													
<b>Eastern Canada</b>														
Condensate	0													
Super Light	0													
Light Sweet	198	103										95		
Light Sour	0													
Medium	0													
Heavy	65	26										39		
	263													
<b>Foreign Imports</b>														
Condensate	0													
Super Light	0													
Light Sweet	0													
Light Sour	0													
Medium	0													
Heavy	2,400	42		1,787		530							41	
	2,400													
<b>Total Supply</b>	<b>20,459</b>	<b>1,090</b>	<b>3,798</b>	<b>8,462</b>	<b>664</b>	<b>2,484</b>	<b>293</b>	<b>534</b>	<b>130</b>	<b>358</b>	<b>659</b>	<b>1,108</b>	<b>879</b>	<b>0</b>

**Table III-4  
EIA High Production Base Case - MPBD  
Crude Oil Supply and Demand Balance - 2025**

	Avail. Supply	U.S.									Canada			
		I	II	III	IV	V	Splitters	Stab.	Hydrosk.	Exports	Western	Eastern	Exports	
<b>Northeast</b>														
Light Sweet (API 35 - <40)	1	1												
Light Sour (API 35 - <40)	9		9											
Medium Medium Sour (API 27 - <35)	3		3											
Medium Sour (API 27 - <35)	0													
Heavy Sweet (API <27)	0													
Heavy Sour (API <27)	0													
Ultra Light Sweet (API 40 - <50)	16	16												
Lease Condensate (API >=50)	69	15	54											
	97													
<b>Gulf Coast</b>														
Light Sweet (API 35 - <40)	480			480										
Light Sour (API 35 - <40)	296			170										
Medium Medium Sour (API 27 - <35)	142			142					126					
Medium Sour (API 27 - <35)	88			88										
Heavy Sweet (API <27)	14			14										
Heavy Sour (API <27)	19			19										
Ultra Light Sweet (API 40 - <50)	1,318	379	10					175		754				
Lease Condensate (API >=50)	868	15		200				343	285				25	
	3,225													
<b>Midcontinent</b>														
Light Sweet (API 35 - <40)	205		205											
Light Sour (API 35 - <40)	24		24											
Medium Medium Sour (API 27 - <35)	103		103											
Medium Sour (API 27 - <35)	11		11											
Heavy Sweet (API <27)	8		8											
Heavy Sour (API <27)	4		4											
Ultra Light Sweet (API 40 - <50)	165		165											
Lease Condensate (API >=50)	177		177											
	697													
<b>Southwest</b>														
Light Sweet (API 35 - <40)	1,054		200	247		127				480				
Light Sour (API 35 - <40)	165		115	0						50				
Medium Medium Sour (API 27 - <35)	98			98										
Medium Sour (API 27 - <35)	343			193		150								
Heavy Sweet (API <27)	17			17										
Heavy Sour (API <27)	19			19										
Ultra Light Sweet (API 40 - <50)	1,366		67	1,299										
Lease Condensate (API >=50)	509			509										
	3,570													
<b>Rocky Mountains</b>														
Light Sweet (API 35 - <40)	92		74		18									
Light Sour (API 35 - <40)	180		91		89									
Medium Medium Sour (API 27 - <35)	104				104									
Medium Sour (API 27 - <35)	63				63									
Heavy Sweet (API <27)	205			101	104									
Heavy Sour (API <27)	44				44									
Ultra Light Sweet (API 40 - <50)	3,036	462	1,026		155	868							525	
Lease Condensate (API >=50)	112		107		5									
	3,837													
<b>West Coast, California</b>														
West Coast, California	677					677								
<b>Lower 48 Offshore</b>														
Atlantic Medium Medium Sour	0													
Gulf of Mexico Medium Medium Sour	2,228			2,228										
Pacific California	47					47								
	2,276													
<b>Alaska</b>														
North Slope Offshore Medium Medium	60									60				
North Slope Onshore Medium Medium	253					55				198				
South Alaska Medium Medium Sour	5					5								
	317													
<b>Total U.S.</b>	<b>14,696</b>	<b>887</b>	<b>2,443</b>	<b>5,834</b>	<b>582</b>	<b>1,930</b>	<b>518</b>	<b>285</b>	<b>1,410</b>	<b>258</b>	<b>0</b>	<b>550</b>	<b>0</b>	<b>0</b>
<b>Western Canada</b>														
Condensate	0													
Super Light	57											21	36	
Light Sweet	884				75						22	207	580	
Light Sour	258				8						101	150	150	
Medium	567										183	384	384	
Heavy	3,602	103	1,356	1,530		102					353	158		
	5,368													
<b>Eastern Canada</b>														
Condensate	0													
Super Light	0													
Light Sweet	145											92	53	
Light Sour	0													
Medium	0													
Heavy	30	15										15		
	175													
<b>Foreign Imports</b>														
Condensate	0													
Super Light	0													
Light Sweet	0													
Light Sour	0													
Medium	0													
Heavy	1,748	85		1,116		482							65	
	1,748													
<b>Total Supply</b>	<b>21,987</b>	<b>1,090</b>	<b>3,799</b>	<b>8,480</b>	<b>665</b>	<b>2,514</b>	<b>518</b>	<b>285</b>	<b>1,410</b>	<b>258</b>	<b>659</b>	<b>1,108</b>	<b>1,203</b>	<b>0</b>

<b>Table III-5</b>				
<b>U.S. and Canadian Distillation Capacities</b>				
	MBPSD			
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>
<i>Refining Capacity</i>				
PADD I	1,330	1,330	1,330	1,330
PADD II	4,049	4,112	4,174	4,174
PADD III	9,584	9,706	9,804	9,804
PADD IV	658	672	726	726
PADD V	<u>3,063</u>	<u>3,063</u>	<u>3,066</u>	<u>3,066</u>
	18,684	18,883	19,100	19,100
<i>Splitter Capacity</i>				
	75	175	325	575
<i>Hydroskimming Capacity</i>				
	0	0	144	1,567
<b>Total U.S. Capacity</b>	<b>18,759</b>	<b>19,058</b>	<b>19,569</b>	<b>21,242</b>
<i>Canadian Refineries</i>				
Western Canada	666	666	716	716
Eastern Canada	<u>1,206</u>	<u>1,206</u>	<u>1,206</u>	<u>1,206</u>
	<b>1,872</b>	<b>1,872</b>	<b>1,922</b>	<b>1,922</b>
<b>Total U.S. and Canadian Capacity</b>	<b>20,631</b>	<b>20,930</b>	<b>21,491</b>	<b>23,164</b>

<b>Table III-6</b>				
<b>U.S. and Canadian Utilization Rates</b>				
	MBPD			
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>
<i>Refineries</i>				
PADD I	76.9	81.0	82.0	82.0
PADD II	82.8	89.0	91.0	91.0
PADD III	81.0	85.0	86.3	86.5
PADD IV	86.5	90.0	91.5	91.5
PADD V	<u>75.2</u>	<u>77.5</u>	<u>81.0</u>	<u>82.0</u>
	<b>80.3</b>	<b>84.6</b>	<b>86.4</b>	<b>86.6</b>
<i>Splitters</i>				
	90.0	90.0	90.0	90.0
<i>Hydroskimmers</i>				
	--	--	90.0	90.0
<i>Canadian Refineries</i>				
Western Canada	92.0	92.0	92.0	92.0
Eastern Canada	<u>92.0</u>	<u>92.0</u>	<u>92.0</u>	<u>92.0</u>
	<b>92.0</b>	<b>92.0</b>	<b>92.0</b>	<b>92.0</b>

Table III-7							
PADD I Charge and Yield Data							
	Yearly Volumes, MBPD				Change from 2013, MBPD		
	2013	2015	2020	2025	2015	2020	2025
<i>Feedstocks</i>							
Crude to Refineries	1,022	1,077	1,090	1,090	55	69	69
Crude to Splitters	0	0	0	0	0	0	0
Crude to Hydroskimmers	0	0	0	0	0	0	0
Other Feedstocks <sup>1</sup>	<u>188</u>	<u>194</u>	<u>192</u>	<u>192</u>	<u>6</u>	<u>4</u>	<u>4</u>
	1,210	1,271	1,282	1,282	61	72	73
<i>Products</i>							
Propane/Propylene	34	39	38	39	5	4	5
Normal Butane	2	6	12	12	4	10	10
Isobutane	-1	0	3	4	1	4	5
Gasoline	584	643	623	627	59	39	43
Jet/Kerosene	73	91	86	84	18	13	11
Distillate	361	345	325	321	-16	-36	-40
Resid/Asphalt	116	104	101	102	-12	-15	-14
Other <sup>2</sup>	<u>92</u>	<u>92</u>	<u>141</u>	<u>138</u>	<u>0</u>	<u>49</u>	<u>46</u>
	1,261	1,319	1,329	1,327	58	68	66
<i>Splitter/Hydroskimmer Products</i>							
LPG	0	0	0	0	0	0	0
Light Naphtha	0	0	0	0	0	0	0
Naphtha	0	0	0	0	0	0	0
Unfinished Distillate	0	0	0	0	0	0	0
Distillate	0	0	0	0	0	0	0
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	0	0	0	0	0	0	0

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

Table III-8							
PADD II Charge and Yield Data							
	Yearly Volumes, MBPD				Change from 2013, MBPD		
	2013	2015	2020	2025	2015	2020	2025
<i>Feedstocks</i>							
Crude to Refineries	3,353	3,659	3,798	3,799	306	445	445
Crude to Splitters	0	0	0	0	0	0	0
Crude to Hydroskimmers	0	0	0	0	0	0	0
Other Feedstocks <sup>1</sup>	<u>669</u>	<u>686</u>	<u>687</u>	<u>688</u>	<u>17</u>	<u>18</u>	<u>19</u>
	4,022	4,345	4,485	4,488	323	463	465
<i>Products</i>							
Propane/Propylene	107	116	122	124	9	15	17
Normal Butane	4	6	16	16	2	12	12
Isobutane	-1	-3	6	5	-2	7	6
Gasoline	2,319	2,498	2,511	2,520	180	192	202
Jet/Kerosene	223	273	293	294	50	70	71
Distillate	1,013	1,069	1,091	1,092	56	78	79
Resid/Asphalt	195	203	173	174	8	-22	-21
Other <sup>2</sup>	<u>365</u>	<u>381</u>	<u>463</u>	<u>449</u>	<u>16</u>	<u>98</u>	<u>84</u>
	4,225	4,544	4,674	4,674	320	449	450
<i>Splitter/Hydroskimmer Products</i>							
LPG	0	0	0	0	0	0	0
Light Naphtha	0	0	0	0	0	0	0
Naphtha	0	0	0	0	0	0	0
Unfinished Distillate	0	0	0	0	0	0	0
Distillate	0	0	0	0	0	0	0
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	0	0	0	0	0	0	0

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.



Table III-9							
PADD III Charge and Yield Data							
	Yearly Volumes, MBPD				Change from 2013, MBPD		
	2013	2015	2020	2025	2015	2020	2025
<i>Feedstocks</i>							
Crude to Refineries	7,761	8,250	8,462	8,480	489	700	719
Crude to Splitters	68	158	293	518	90	225	450
Crude to Hydroskimmers	0	0	130	1,410	0	130	1,410
Other Feedstocks <sup>1</sup>	<u>1,442</u>	<u>1,446</u>	<u>1,452</u>	<u>1,456</u>	<u>5</u>	<u>10</u>	<u>15</u>
	9,271	9,854	10,337	11,864	583	1,065	2,593
<i>Refinery Products</i>							
Propane/Propylene	369	380	385	390	11	16	21
Normal Butane	48	75	83	93	27	35	45
Isobutane	-1	6	12	11	7	13	12
Gasoline	4,216	4,264	4,324	4,370	48	108	154
Jet/Kerosene	760	824	857	818	64	97	58
Distillate	2,721	2,786	2,874	2,880	65	153	159
Resid/Asphalt	351	368	370	383	17	19	32
Other <sup>2</sup>	<u>1,366</u>	<u>1,632</u>	<u>1,678</u>	<u>1,662</u>	<u>266</u>	<u>312</u>	<u>296</u>
	9,830	10,335	10,584	10,606	505	753	776
<i>Splitter/Hydroskimmer Products</i>							
LPG	4	9	21	76	5	16	72
Light Naphtha	17	35	75	284	18	58	266
Naphtha	22	46	111	453	25	89	431
Unfinished Distillate	18	44	82	145	26	63	126
Distillate	0	0	42	434	0	42	434
Gas Oil	<u>6</u>	<u>23</u>	<u>92</u>	<u>535</u>	<u>17</u>	<u>86</u>	<u>530</u>
	68	158	423	1,928	90	355	1,860

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

Table III-10								
PADD IV Charge and Yield Data								
	Yearly Volumes, MBPD				Change from 2013, MBPD			
	2013	2015	2020	2025	2015	2020	2025	
<i>Feedstocks</i>								
Crude to Refineries	569	605	664	665	36	95	96	
Crude to Splitters	0	0	0	0	0	0	0	
Crude to Hydroskimmers	0	0	0	0	0	0	0	
Other Feedstocks <sup>1</sup>	<u>53</u>	<u>55</u>	<u>55</u>	<u>55</u>	<u>2</u>	<u>2</u>	<u>2</u>	
	622	660	719	720	38	97	98	
<i>Products</i>								
Propane/Propylene	9	10	11	11	1	2	2	
Normal Butane	2	3	4	5	1	2	3	
Isobutane	-1	0	1	0	1	2	1	
Gasoline	320	340	340	345	21	21	25	
Jet/Kerosene	26	35	48	63	9	22	37	
Distillate	194	200	213	218	6	19	24	
Resid/Asphalt	44	46	50	26	2	6	-18	
Other <sup>2</sup>	<u>52</u>	<u>52</u>	<u>81</u>	<u>86</u>	<u>0</u>	<u>29</u>	<u>34</u>	
	646	686	748	754	40	103	108	
<i>Splitter/Hydroskimmer Products</i>								
LPG	0	0	0	0	0	0	0	
Light Naphtha	0	0	0	0	0	0	0	
Naphtha	0	0	0	0	0	0	0	
Unfinished Distillate	0	0	0	0	0	0	0	
Distillate	0	0	0	0	0	0	0	
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	
	0	0	0	0	0	0	0	

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

Table III-11							
PADD V Charge and Yield Data							
	Yearly Volumes, MBPD				Change from 2013, MBPD		
	2013	2015	2020	2025	2015	2020	2025
<i>Feedstocks</i>							
Crude to Refineries	2,303	2,374	2,484	2,514	72	181	211
Crude to Splitters	0	0	0	0	0	0	0
Crude to Hydroskimmers	0	0	0	0	0	0	0
Other Feedstocks <sup>1</sup>	<u>591</u>	<u>596</u>	<u>603</u>	<u>605</u>	<u>5</u>	<u>12</u>	<u>14</u>
	2,894	2,969	3,087	3,119	76	193	225
<i>Products</i>							
Propane/Propylene	45	48	55	56	3	10	11
Normal Butane	8	10	13	14	2	5	6
Isobutane	-1	-3	-2	-3	-2	-1	-2
Gasoline	1,600	1,647	1,725	1,742	47	125	142
Jet/Kerosene	414	428	443	445	14	29	31
Distillate	568	575	586	594	7	18	26
Resid/Asphalt	130	131	132	132	1	2	2
Other <sup>2</sup>	<u>313</u>	<u>315</u>	<u>314</u>	<u>318</u>	<u>2</u>	<u>1</u>	<u>5</u>
	3,077	3,151	3,266	3,298	75	190	221
<i>Splitter/Hydroskimmer Products</i>							
LPG	0	0	0	0	0	0	0
Light Naphtha	0	0	0	0	0	0	0
Naphtha	0	0	0	0	0	0	0
Unfinished Distillate	0	0	0	0	0	0	0
Distillate	0	0	0	0	0	0	0
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	0	0	0	0	0	0	0

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

Table III-12							
U.S. Charge and Yield Data							
	Yearly Volumes, MBPD				Change from 2013, MBPD		
	2013	2015	2020	2025	2015	2020	2025
<i>Feedstocks</i>							
Crude to Refineries	15,008	15,965	16,498	16,548	958	1,490	1,540
Crude to Splitters	68	158	293	518	90	225	450
Crude to Hydroskimmers	0	0	130	1,410	0	130	1,410
Other Feedstocks <sup>1</sup>	<u>2,943</u>	<u>2,977</u>	<u>2,989</u>	<u>2,997</u>	<u>34</u>	<u>46</u>	<u>54</u>
	18,019	19,100	19,910	21,473	1,082	1,891	3,454
<i>Products</i>							
Propane/Propylene	564	593	612	620	29	48	56
Normal Butane	64	100	128	140	36	64	76
Isobutane	-5	0	20	18	5	25	23
Gasoline	9,038	9,392	9,523	9,603	354	485	565
Jet/Kerosene	1,496	1,651	1,726	1,704	155	230	208
Distillate	4,857	4,976	5,089	5,105	119	232	248
Resid/Asphalt	836	851	826	817	15	-10	-19
Other <sup>2</sup>	<u>2,188</u>	<u>2,472</u>	<u>2,678</u>	<u>2,653</u>	<u>284</u>	<u>490</u>	<u>465</u>
	19,038	20,035	20,601	20,659	997	1,563	1,621
<i>Splitter/Hydroskimmer Products</i>							
LPG	4	9	21	76	5	16	72
Light Naphtha	17	35	75	284	18	58	266
Naphtha	22	46	111	453	25	89	431
Unfinished Distillate	18	44	82	145	26	63	126
Distillate	0	0	42	434	0	42	434
Gas Oil	<u>6</u>	<u>23</u>	<u>92</u>	<u>535</u>	<u>17</u>	<u>86</u>	<u>530</u>
	68	158	423	1,928	90	355	1,860

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table III-13**

**PADD I Refinery Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus
Gasoline	584	3,139	-2,555	643	3,128	-2,486	623	2,938	-2,315	627	2,742	-2,115
Jet/Kerosene	73	404	-331	91	408	-317	86	407	-322	84	410	-325
Distillate	361	1,187	-826	345	1,227	-882	325	1,262	-937	321	1,278	-957
Residual Fuel	66	120	-54	54	111	-57	51	104	-52	52	106	-55
Other <sup>1</sup>	<u>177</u>	<u>460</u>	<u>-283</u>	<u>187</u>	<u>433</u>	<u>-247</u>	<u>244</u>	<u>489</u>	<u>-245</u>	<u>243</u>	<u>527</u>	<u>-284</u>
	1,261	5,309	-4,048	1,319	5,308	-3,989	1,329	5,200	-3,871	1,327	5,063	-3,736

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table III-14**

**PADD II Refinery Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus
Gasoline	2,319	2,402	-83	2,498	2,393	105	2,511	2,199	312	2,520	2,027	493
Jet/Kerosene	223	267	-44	273	270	3	293	270	23	294	269	25
Distillate	1,013	1,174	-161	1,069	1,239	-170	1,091	1,308	-217	1,092	1,335	-244
Residual Fuel	48	36	12	56	14	42	26	14	12	27	15	12
Other <sup>1</sup>	<u>622</u>	<u>1,003</u>	<u>-381</u>	<u>648</u>	<u>1,032</u>	<u>-383</u>	<u>753</u>	<u>1,114</u>	<u>-360</u>	<u>741</u>	<u>1,159</u>	<u>-418</u>
	4,225	4,881	-657	4,544	4,948	-403	4,674	4,905	-231	4,674	4,806	-132

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table III-15**

**PADD III Refinery Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>
Gasoline	4,216	1,361	2,855	4,264	1,358	2,906	4,324	1,313	3,011	4,370	1,249	3,121
Jet/Kerosene	760	264	496	824	267	558	857	276	580	818	283	534
Distillate	2,721	786	1,935	2,786	835	1,951	2,874	923	1,951	2,880	959	1,920
Residual Fuel	281	102	179	298	74	224	300	64	236	313	68	244
Other <sup>2</sup>	<u>1,920</u>	<u>2,559</u>	<u>-639</u>	<u>2,320</u>	<u>2,643</u>	<u>-323</u>	<u>2,651</u>	<u>3,063</u>	<u>-413</u>	<u>4,154</u>	<u>3,357</u>	<u>797</u>
	9,898	5,072	4,826	10,493	5,176	5,317	11,006	5,640	5,366	12,533	5,917	6,617

1. Supply includes production from splitters and hydroskimmers.

2. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table III-16**

**PADD IV Refinery Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus
Gasoline	320	302	17	340	301	39	340	299	42	345	291	54
Jet/Kerosene	26	38	-12	35	39	-3	48	39	8	63	40	23
Distillate	194	167	27	200	177	23	213	185	28	218	192	26
Residual Fuel	11	2	9	13	2	11	17	2	15	-7	2	-8
Other <sup>1</sup>	<u>95</u>	<u>68</u>	<u>27</u>	<u>98</u>	<u>71</u>	<u>27</u>	<u>130</u>	<u>117</u>	<u>13</u>	<u>135</u>	<u>132</u>	<u>3</u>
	646	577	69	686	589	97	748	642	106	754	656	97

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.



**Table III-17**

**PADD V Refinery Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus
Gasoline	1,600	1,505	94	1,647	1,500	147	1,725	1,448	277	1,742	1,371	371
Jet/Kerosene	414	447	-33	428	451	-24	443	462	-18	445	470	-25
Distillate	568	565	3	575	590	-15	586	633	-47	594	655	-61
Residual Fuel	111	120	-9	112	95	17	113	93	19	113	95	18
Other <sup>1</sup>	<u>384</u>	<u>356</u>	<u>28</u>	<u>389</u>	<u>331</u>	<u>58</u>	<u>400</u>	<u>442</u>	<u>-42</u>	<u>404</u>	<u>489</u>	<u>-85</u>
	3,077	2,993	83	3,151	2,967	184	3,266	3,077	189	3,298	3,080	218

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table III-18**

**U.S. Refined Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>
Gasoline	9,038	8,710	328	9,392	8,680	712	9,523	8,196	1,327	9,603	7,679	1,925
Jet/Kerosene	1,496	1,419	77	1,651	1,434	217	1,726	1,455	271	1,704	1,473	231
Distillate	4,857	3,878	979	4,976	4,068	907	5,089	4,311	778	5,105	4,420	685
Residual Fuel	517	380	137	532	294	237	507	277	230	498	287	211
Other <sup>2</sup>	<u>1,677</u>	<u>2,125</u>	<u>-449</u>	<u>2,121</u>	<u>2,192</u>	<u>-71</u>	<u>2,657</u>	<u>2,541</u>	<u>116</u>	<u>4,156</u>	<u>2,753</u>	<u>1,403</u>
	17,585	16,513	1,072	18,672	16,670	2,002	19,503	16,780	2,723	21,066	16,612	4,453
NGLs	<u>2,606</u>	<u>2,320</u>	<u>286</u>	<u>3,467</u>	<u>2,318</u>	<u>1,149</u>	<u>5,357</u>	<u>2,684</u>	<u>2,673</u>	<u>5,645</u>	<u>2,910</u>	<u>2,735</u>
Total Products	20,191	18,833	1,358	22,139	18,988	3,151	24,860	19,464	5,396	26,711	19,522	7,188

1. Supply includes production from splitters and hydroskimmers.

2. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.



## Table III-20

### Required Crude Oil Logistic Improvements, MBPD

#### Rail Movements into PADD I

	Planned Movements <u>by Rail</u>	Rail <u>Capacity</u>	Required Rail Cap. <u>Additions</u>
2013	278	555	- -
2015	656	1,320	- -
2020	429	- -	- -
2025	565	- -	- -

#### Comments

- Movements by rail into PADD I are expected to rise by nearly 378 MBPD from 2013 to 2015.
- Existing rail off-loading capacity exceeds forecast rail capacity requirements.
- **Projected rail expansion plans appear to be on track to keep pace with desired movements into PADD I.**
- See Appendix 1 for existing and planned PADD I rail offloading facilities.

#### Vessel Movements into PADD I

	Planned Movements <u>by Water</u>
2013	25
2015	25
2020	457
2025	394

#### Comments

- Movements by vessel into PADD I are expected to rise by over 430 MBPD from 2013 to 2020.
- Forecast waterborne movements exceed current Jones Act vessel capabilities.
- **Substantial coastwise compliant vessel additions will be necessary to achieve forecast movement requirements.**

#### Crude Movements into PADD II

- Current pipeline and rail delivery systems from the Gulf Coast, the Southwest and Canada are sufficient to meet crude demand requirements through 2025.

**Table III-20**

**Required Crude Oil Logistic Improvements, MBPD**

**Pipeline Movements from Southwest to the Gulf Coast**

	Southwest <u>Production</u>	Local/P II/P V <u>Demand</u>	Movements to <u>Gulf Coast</u>	Pipelines from the Permian Basin with access the USGC			
				<u>Direct</u>	<u>Indirect (via Cushing)</u>	<u>Total</u>	<u>Surplus</u>
2013	1,646	792	854	363	525	888	33
2015	2,077	1,433	645	925	525	1450	805
2020	2,933	1,610	1,323	1225	525	1750	427
2025	3,570	1,124	2,447	1225	525	1750	-697

Comments

- The Permian Basin largely became debottlenecked with the startup of the Magellan Longhorn pipeline in 2013.
- Permian Basin volumes will shift into PADD II in 2015 to replace declining Midcontinent production.
- Movements to the Gulf Coast will peak in 2025 at slightly over 2.4 million BPD.
- Pipeline capacity from the Permian Basin to the Gulf Coast is projected to exceed movements through 2020.
- **A pipeline shortfall of 0.7 million BPD of capacity will develop by 2025.**
- See Appendix 2 for existing and planned Permian Basin exit pipelines.

**Pipeline Movements from Western Canada and the Rocky Mountains to the Gulf Coast**

	Movements to the Gulf Coast			Pipeline Capacity, South of Cushing, OK and Patoka, IL	
	<u>Western Canada</u>	<u>Rocky Mountains</u>	<u>Total</u>	<u>Capacity</u>	<u>Surplus</u>
2013	182	150	332	550	218
2015	536	0	536	1,550	1,014
2020	754	11	765	2,210	1,445
2025	1,530	101	1,631	2,210	579

Comments

- Crude movements to the Gulf Coast will rise from 332 MBD in 2013 to 1.6 million BPD by 2025.
- Existing pipeline capacity out of Cushing/Patoka is 1.55 million BPD and will rise to 2.21 million BPD by 2017.
- See Appendix 3 for existing and planned pipelines from Cushing, OK and Patoka, IL to the Gulf Coast.

**Crude Movements into PADD IV**

- **Current pipeline delivery systems from the Rocky Mountains and Western Canada are sufficient to meet crude demand requirements through 2025.**

**Table III-20**

**Required Crude Oil Logistic Improvements, MBPD**

**Rail Movements into PADD V**

	Planned Movements by Rail	Rail Capacity	Required Rail Cap. Additions
2013	90	148	- -
2015	275	370	- -
2020	1,076	- -	706 - 1,782
2025	1,145	- -	775 - 1,920

Comments

- Movements by rail into PADD V are expected to rise from 90 MBPD in 2013 to over 1.1 million BPD in 2025.
- Existing rail off-loading capacity exceeds short term rail capacity requirements.
- **Projected rail expansion plans appear to be insufficient to meet required movements in 2020 - 2025.**
- See Appendix 4 for existing and planned PADD V rail offloading facilities.

**Crude Movements out of Western Canada**

	<u>Crude Movements out of Western Canada</u>			<u>Existing Exit Capacity with the Alberta Clipper</u>			
	to the U.S.	to Eastern Can./Exports	Total	Pipelines	Rail Movements	Total	Surplus
2013	2,476	329	2,805	3,568	120	3,688	883
2015	2,637	531	3,168	3,656	593	4,249	1,081
2020	2,587	1,262	3,849	3,918	750	4,668	819
2025	3,174	1,536	4,710	3,918	750	4,668	-42

Comments

- Movements out of Western Canada are expected to rise from 2.8 million BPD in 2013 to 4.7 million BPD in 2025.
- Existing exit pipeline capacity out of Western Canada is 3.6 million BPD.
- The Enbridge Alberta Clipper pipeline is viewed as highly likely with a capacity of 350 MBPD and a startup date in 3Q2015.
- Four other major exit pipelines are being discussed (see Appendix 5).
- **At least one of these four new pipelines will need to be in place by 2025 to achieve the Canadian production forecast.**
- Incremental movements to the U.S. between 2013 and 2025 are 698 MBPD.
- The Alberta Clipper (350 MBPD) and rail (630 MBPD) will add 980 MBPD of capacity.
- **Construction of the Energy East or Northern Gateway pipelines by 2025 will be required to meet Canadian export requirements.**

Table III-21					
Gasoline Supply and Demand Balance - MBPD					
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>

PADD I	-2,555	-2,486	-2,315	-2,115	- Reduced utilization of Colonial/Plantation systems.
PADD II	-83	105	312	493	- Increased movements into PADD I from Ohio and into PADD III for export via Mississippi River.
PADD III	2,855	2,906	3,011	3,121	- Likely origin of PADD I-IV exports (increase of 1.3 million BPD).
PADD IV	17	39	42	54	- Surplus volumes to be moved into PADDs II and V.
PADD V	<u>94</u>	<u>147</u>	<u>277</u>	<u>371</u>	- Incremental 277 MBPD to be exported.
Total U.S.	328	712	1,327	1,925	

Conclusions

- No incremental requirements for Colonial/Plantation systems.
- Modest pipeline upgrades to be made in moving PADD II volumes from Ohio into western Pennsylvania.
- The most significant logistic improvements to be focused on product exports (which are increasing by 1.6 million BPD).
- Exports will be primarily from PADD III but also from PADD V.

Table III-22					
Jet/Kerosene Supply and Demand Balance - MBPD					
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>

PADD I	-331	-317	-322	-325	
PADD II	-44	3	23	25	- Increased movements into PADD I from Ohio and into PADD III for export via Mississippi.
PADD III	496	558	580	534	
PADD IV	-12	-3	8	23	- Surplus volumes to be moved into PADDs II and V.
PADD V	<u>-33</u>	<u>-24</u>	<u>-18</u>	<u>-25</u>	
Total U.S.	77	217	271	231	

Conclusions

- No incremental requirements for Colonial/Plantation systems.
- Modest pipeline upgrades to be made in moving PADD II volumes from Ohio into western Pennsylvania.
- No significant logistics improvements required for Jet/Kerosene movements.



<b>Table III-23</b>					
<b>Distillate Supply and Demand Balance - MBPD</b>					
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-826	-882	-937	-957	- Increased usage of Colonial/Plantation systems.
PADD II	-161	-170	-217	-244	- Shortfall grows slightly, requires greater receipts from PADD III.
PADD III	1,935	1,951	1,951	1,920	- Surplus remains constant. Movements to PADDs I and II and exports.
PADD IV	27	23	28	26	- Surplus volumes to be moved into PADDs II and V.
PADD V	<u>3</u>	<u>-15</u>	<u>-47</u>	<u>-61</u>	- Modest shortfall developing in PADD V.
Total U.S.	979	907	778	685	

Conclusions

- Movements from PADD III to Padd I increase by 131 MBPD from 2013 to 2025. Surplus capacity will exist on Colonial/Plantation systems due to reduction of gasoline movements by 540 MBPD.
- Movements from PADD III to PADD II will increase slightly (Explorer Pipeline).
- Exports will decline by 294 MBPD as internal demand grows faster than production.
- No significant logistics improvements required for Distillate movements.

<b>Table III-24</b>					
<b>Residual Fuel Supply and Demand Balance - MBPD</b>					
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-54	-57	-52	-55	
PADD II	12	42	12	12	
PADD III	179	224	236	244	- Incremental 65 MBPD to be exported.
PADD IV	9	11	15	-8	
PADD V	<u>-9</u>	<u>17</u>	<u>19</u>	<u>18</u>	
Total U.S.	137	237	230	211	

Conclusions

- No significant logistics improvements required for Residual Fuel movements.

Table III-25

Other Products<sup>1</sup> Supply and Demand Balance - MBPD

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-283	-247	-245	-284	
PADD II	-381	-383	-360	-418	
PADD III	-639	-323	-413	797	- Predominantly splitter and hydroskipper products partially offset by NGL growth.
PADD IV	27	27	13	3	
PADD V	<u>28</u>	<u>58</u>	<u>-42</u>	<u>-85</u>	
Total Refining	-1,248	-868	-1,047	14	
Adjustments	-1521	-1521	-1521	-1521	
NGL Demand	<u>2,320</u>	<u>2,318</u>	<u>2,684</u>	<u>2,910</u>	
Total U.S.	-449	-71	116	1,403	

Conclusions

- Decrease in Other shortfall is predominantly the result of increased splitter and hydroskimmer yields, partially offset by NGL growth.
- NGL logistics are being developed in conjunction with increased natural gas drilling.
- **Substantial logistic improvements for the export of Other products will be necessary. Many of these will be built in coordination with the splitter and hydroskimmer projects.**

1. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table III-26**

**Total U.S. Products Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-4,048	-3,989	-3,871	-3,736	- PADD I product shortfall to decline by over 300 MBPD.
PADD II	-657	-403	-231	-132	- PADD II product shortfall to decline by 525 MBPD.
PADD III	4,826	5,317	5,366	6,617	- PADD III exports to rise by around 3.2 million BPD.
PADD IV	69	97	106	97	- PADD IV movements generally flat.
PADD V	<u>83</u>	<u>184</u>	<u>189</u>	<u>218</u>	- PADD V exports to rise by 135 MBPD.
Total Refining	273	1,205	1,560	3,064	
Adjustments	-1521	-1521	-1521	-1521	
NGL Demand	<u>2,320</u>	<u>2,318</u>	<u>2,684</u>	<u>2,910</u>	
Total U.S.	1,072	2,002	2,723	4,453	

Conclusions

- No major product infrastructure improvements are necessary for movements between PADDs.
- **Substantial logistic improvements will be necessary for the incremental export of 3.4 million BPD between 2013 and 2025.**

Table III-27					
U.S. and Canadian Crude Oil Exports - MBPD					
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Likely Destinations</u>
<b><u>Crude Exports from the U.S.</u></b>					
<i><u>Gulf Coast</u></i>					
Condensate	25	25	25	25	Canada
<i><u>Rocky Mountains</u></i>					
Ultra Light Sweet	108	332	525	525	Canada
<i><u>Alaska</u></i>					
Medium			358	258	Far East
<b>Total U.S.</b>	<b>133</b>	<b>357</b>	<b>908</b>	<b>808</b>	
<b><u>Crude Exports from Canada*</u></b>					
<i><u>Western Canada</u></i>					
Super Light			33	36	} Dependent on export pipeline: Far East if TransMountain or Northern Gateway. Europe/ Latin America if Energy East.
Light Sweet			498	580	
Light Sour			89	150	
Medium			<u>259</u>	<u>384</u>	
			879	1,150	
<i><u>Eastern Canada</u></i>					
Light Sweet				53	Europe
<b>Total Canada</b>			<b>879</b>	<b>1,203</b>	
<b>Total U.S. and Canada</b>	<b>133</b>	<b>357</b>	<b>1,787</b>	<b>2,011</b>	

\* Excluding movements to the U.S.

<b>Table III-28</b>					
<b>U.S. Product Exports - MBPD</b>					
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Likely Destinations</u>
<i><u>Refined Products</u></i>					
Gasoline	328	712	1,327	1,925	Mexico, other Latin America
Jet/Kerosene	77	217	271	231	Canada, Mexico, other Latin America
Distillate	979	907	778	685	Mexico, other Latin America, Europe
Residual Fuel	137	237	230	211	East Asia, Latin America, Europe
Other <sup>1</sup>	<u>-449</u>	<u>-71</u>	<u>116</u>	<u>1,403</u>	Latin America, Europe, East Asia
	1,072	2,002	2,723	4,453	
<i>NGLs</i>	286	1,149	2,673	2,735	Canada, Mexico, Latin America
<b>Total Exports</b>	<b>1,358</b>	<b>3,151</b>	<b>5,396</b>	<b>7,188</b>	

1. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table III-29**

**Crude Price Forecast  
High Production Base Case**

(current dollars per barrel)

	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>
<b><u>BENCHMARKS</u></b>											
Brent (Sullom Voe)	102.78	98.84	97.49	94.14	94.41	97.82	101.47	105.61	109.74	114.03	119.52
LLS (St. James)	99.58	92.10	87.55	80.84	81.61	86.76	92.31	98.16	102.54	106.68	112.02
WTI (Cushing)	94.71	87.19	82.61	75.85	76.59	81.70	87.21	93.01	97.33	101.41	106.68
Bakken (Clearbrook)	90.28	82.83	78.25	71.57	72.30	77.43	82.96	88.77	93.06	96.99	102.02
Maya (FOB)	88.43	83.80	80.16	73.92	74.66	78.71	82.48	86.70	90.44	94.08	98.62
Canadian WCS (Hardisty)	81.38	76.58	72.93	66.58	67.44	71.26	75.06	79.18	82.81	86.37	90.82
<b><u>DIFFERENTIALS</u></b>											
Brent - LLS	3.20	6.74	9.94	13.30	12.80	11.06	9.16	7.45	7.20	7.35	7.50
LLS - WTI	4.87	4.91	4.94	4.98	5.02	5.06	5.10	5.15	5.21	5.27	5.34
WTI - Bakken	4.43	4.36	4.35	4.29	4.29	4.27	4.25	4.25	4.27	4.42	4.66
LLS - Maya	11.15	8.30	7.38	6.91	6.95	8.05	9.84	11.46	12.10	12.60	13.40
Maya - WCS	7.05	7.22	7.23	7.35	7.22	7.45	7.41	7.52	7.63	7.71	7.80

# Implications of Increasing U.S. Light Tight Oil Production

## High Production Export Case

<u>Number</u>	<u>Tab</u>	<u>Table Name</u>
IV-1	<a href="#">2013</a>	Crude Oil Supply and Demand Balance - 2013
IV-2	<a href="#">2015</a>	Crude Oil Supply and Demand Balance - 2015
IV-3	<a href="#">2020</a>	Crude Oil Supply and Demand Balance - 2020
IV-4	<a href="#">2025</a>	Crude Oil Supply and Demand Balance - 2025
IV-5	<a href="#">Capacities</a>	U.S. and Canadian Distillation Capacities
IV-6	<a href="#">Utilizations</a>	U.S. and Canadian Utilization Rates
IV-7	<a href="#">PI Products</a>	Total PADD I Charge and Yield Data
IV-8	<a href="#">PII Products</a>	Total PADD II Charge and Yield Data
IV-9	<a href="#">PIII Products</a>	Total PADD III Charge and Yield Data
IV-10	<a href="#">PIV Products</a>	Total PADD IV Charge and Yield Data
IV-11	<a href="#">PV Products</a>	Total PADD V Charge and Yield Data
IV-12	<a href="#">US Products</a>	Total U.S. Charge and Yield Data
IV-13	<a href="#">PI Balance</a>	PADD I Refinery Product Supply and Demand Balance
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Table IV-1												
EIA High Production Export Case - MPBD												
Crude Oil Supply and Demand Balance - 2013												
	Avail. Supply	U.S.								Canada		
		I	II	III	IV	V	Splitters	Stab.	Hvdrosk.	Exports	Western	Eastern
<b>Northeast</b>												
Light Sweet (API 35 - <40)	5	5										
Light Sour (API 35 - <40)	11		11									
Medium Medium Sour (API 27 - <35)	26		26									
Medium Sour (API 27 - <35)	0											
Heavy Sweet (API <27)	0											
Heavy Sour (API <27)	0											
Ultra Light Sweet (API 40 - <50)	30	18	12									
Lease Condensate (API >=50)	28	15	13									
	101											
<b>Gulf Coast</b>												
Light Sweet (API 35 - <40)	223			223								
Light Sour (API 35 - <40)	64			64								
Medium Medium Sour (API 27 - <35)	98			98								
Medium Sour (API 27 - <35)	17			17								
Heavy Sweet (API <27)	14			14								
Heavy Sour (API <27)	18			18								
Ultra Light Sweet (API 40 - <50)	238	10		228								
Lease Condensate (API >=50)	639	15		532			68				25	
	1,312											
<b>Midcontinent</b>												
Light Sweet (API 35 - <40)	154		154									
Light Sour (API 35 - <40)	26		26									
Medium Medium Sour (API 27 - <35)	73		73									
Medium Sour (API 27 - <35)	13		13									
Heavy Sweet (API <27)	3		3									
Heavy Sour (API <27)	2		2									
Ultra Light Sweet (API 40 - <50)	205		205									
Lease Condensate (API >=50)	122		122									
	599											
<b>Southwest</b>												
Light Sweet (API 35 - <40)	332		225	107								
Light Sour (API 35 - <40)	124		75	49								
Medium Medium Sour (API 27 - <35)	93			93								
Medium Sour (API 27 - <35)	341		50	291								
Heavy Sweet (API <27)	3			3								
Heavy Sour (API <27)	14			14								
Ultra Light Sweet (API 40 - <50)	647			647								
Lease Condensate (API >=50)	91			91								
	1,646											
<b>Rocky Mountains</b>												
Light Sweet (API 35 - <40)	121		21	75	25							
Light Sour (API 35 - <40)	133		58	75								
Medium Medium Sour (API 27 - <35)	35				35							
Medium Sour (API 27 - <35)	16				16							
Heavy Sweet (API <27)	3				3							
Heavy Sour (API <27)	56				56							
Ultra Light Sweet (API 40 - <50)	980	168	438	176	90						108	
Lease Condensate (API >=50)	54		49		5							
	1,399											
<b>West Coast, California</b>												
West Coast, California	513					513						
<b>Lower 48 Offshore</b>												
Atlantic Medium Medium Sour	0											
Gulf of Mexico Medium Medium Sour	1,284			1,284								
Pacific California	90					90						
	1,374											
<b>Alaska</b>												
North Slope Offshore Medium Medium	0											
North Slope Onshore Medium Medium	500					500						
South Alaska Medium Medium Sour	15					15						
	515											
<b>Total U.S.</b>	<b>7,459</b>	<b>231</b>	<b>1,578</b>	<b>3,925</b>	<b>316</b>	<b>1,208</b>	<b>68</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>133</b>
<b>Western Canada</b>												
Condensate	0											
Super Light	52	16	3	0	0	11					21	
Light Sweet	766		382	8	48	57					29	243
Light Sour	245	4	78	3	8	52					101	
Medium	491	65	200	5	11	26					183	
Heavy	1,864	25	1,070	166	187	51					300	65
	3,418											
<b>Eastern Canada</b>												
Condensate	0											
Super Light	0											
Light Sweet	232	103										129
Light Sour	0											
Medium	0											
Heavy	0											
	232											
<b>Foreign Imports</b>												
Condensate	7	5	0	3		0						
Super Light	68	39	0	19		10						
Light Sweet	942	329	1	166		100						347
Light Sour	1,030	87	32	604		262			1			45
Medium	1,393	49	8	964		327						45
Heavy	2,248	68	2	1,899		198						80
	5,689											
<b>Total Supply</b>	<b>16,798</b>	<b>1,022</b>	<b>3,354</b>	<b>7,761</b>	<b>569</b>	<b>2,303</b>	<b>68</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>613</b>	<b>1,108</b>

Table IV-2												
EIA High Production Export Case - MPBD												
Crude Oil Supply and Demand Balance - 2015												
	Avail. Supply	U.S.								Canada		
		I	II	III	IV	V	Splitters	Stab.	Hvdrosk.	Exports	Western	Eastern
<b>Northeast</b>												
Light Sweet (API 35 - <40)	3	3										
Light Sour (API 35 - <40)	9		9									
Medium Medium Sour (API 27 - <35)	15		15									
Medium Sour (API 27 - <35)	0											
Heavy Sweet (API <27)	0											
Heavy Sour (API <27)	0											
Ultra Light Sweet (API 40 - <50)	22	18	4									
Lease Condensate (API >=50)	31	15	16									
	80											
<b>Gulf Coast</b>												
Light Sweet (API 35 - <40)	349			349								
Light Sour (API 35 - <40)	106			106								
Medium Medium Sour (API 27 - <35)	109			109								
Medium Sour (API 27 - <35)	58			58								
Heavy Sweet (API <27)	16			16								
Heavy Sour (API <27)	22			22								
Ultra Light Sweet (API 40 - <50)	800	10	20	720		50						
Lease Condensate (API >=50)	803	15		655		108					25	
	2,262											
<b>Midcontinent</b>												
Light Sweet (API 35 - <40)	103		103									
Light Sour (API 35 - <40)	17		17									
Medium Medium Sour (API 27 - <35)	53		53									
Medium Sour (API 27 - <35)	9		9									
Heavy Sweet (API <27)	2		2									
Heavy Sour (API <27)	1		1									
Ultra Light Sweet (API 40 - <50)	128		128									
Lease Condensate (API >=50)	76		76									
	389											
<b>Southwest</b>												
Light Sweet (API 35 - <40)	399		399									
Light Sour (API 35 - <40)	126		126									
Medium Medium Sour (API 27 - <35)	82			82								
Medium Sour (API 27 - <35)	287		50	237								
Heavy Sweet (API <27)	4			4								
Heavy Sour (API <27)	11			11								
Ultra Light Sweet (API 40 - <50)	894		393	501								
Lease Condensate (API >=50)	272			272								
	2,077											
<b>Rocky Mountains</b>												
Light Sweet (API 35 - <40)	105		61		44							
Light Sour (API 35 - <40)	157		133		24							
Medium Medium Sour (API 27 - <35)	28				28							
Medium Sour (API 27 - <35)	19				19							
Heavy Sweet (API <27)	2				2							
Heavy Sour (API <27)	54				54							
Ultra Light Sweet (API 40 - <50)	1,782	546	452		177	275					332	
Lease Condensate (API >=50)	58		53		5							
	2,206											
<b>West Coast, California</b>												
West Coast, California	554					554						
<b>Lower 48 Offshore</b>												
Atlantic Medium Medium Sour	0											
Gulf of Mexico Medium Medium Sour	1,697			1,697								
Pacific California	90					90						
	1,787											
<b>Alaska</b>												
North Slope Offshore Medium Medium	44					44						
North Slope Onshore Medium Medium	397					397						
South Alaska Medium Medium Sour	9					9						
	450											
<b>Total U.S.</b>	<b>9,805</b>	<b>607</b>	<b>2,120</b>	<b>4,841</b>	<b>353</b>	<b>1,369</b>	<b>158</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>357</b>
<b>Western Canada</b>												
Condensate	0											
Super Light	54	16	4	0	0	13					21	
Light Sweet	800		209	0	60	57				29	445	
Light Sour	255	4	91	0	7	52				101		
Medium	519	64	228	5	12	26				183		
Heavy	2,153	26	1,007	531	173	51				300	65	
	3,781											
<b>Eastern Canada</b>												
Condensate	0											
Super Light	0											
Light Sweet	227	98									129	
Light Sour	0											
Medium	0											
Heavy	0											
	227											
<b>Foreign Imports</b>												
Condensate	0											
Super Light	0											
Light Sweet	97	97										
Light Sour	805	95		386		324						
Medium	1,385	48		964		328					45	
Heavy	1,745	22		1,523		154					46	
	4,032											
<b>Total Supply</b>	<b>17,845</b>	<b>1,077</b>	<b>3,659</b>	<b>8,250</b>	<b>605</b>	<b>2,374</b>	<b>158</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>613</b>	<b>1,108</b>

Table IV-3														
EIA High Production Export Case - MPBD														
Crude Oil Supply and Demand Balance - 2020														
	Avail. Supply	U.S.								Canada				
		I	II	III	IV	V	Splitters	Stab.	Hvdrosk.	Exports	Western	Eastern	Exports	
<b>Northeast</b>														
Light Sweet (API 35 - <40)	1	1												
Light Sour (API 35 - <40)	7		7											
Medium Medium Sour (API 27 - <35)	7		7											
Medium Sour (API 27 - <35)	0													
Heavy Sweet (API <27)	0													
Heavy Sour (API <27)	0													
Ultra Light Sweet (API 40 - <50)	17	17												
Lease Condensate (API >=50)	44	15	29											
	76													
<b>Gulf Coast</b>														
Light Sweet (API 35 - <40)	513			258						255				
Light Sour (API 35 - <40)	218			218										
Medium Medium Sour (API 27 - <35)	114			114										
Medium Sour (API 27 - <35)	75			75										
Heavy Sweet (API <27)	13			13										
Heavy Sour (API <27)	20			20										
Ultra Light Sweet (API 40 - <50)	1,205	426		679		100						25		
Lease Condensate (API >=50)	966	22		193		193	534							
	3,124													
<b>Midcontinent</b>														
Light Sweet (API 35 - <40)	110		110											
Light Sour (API 35 - <40)	18		18											
Medium Medium Sour (API 27 - <35)	70		70											
Medium Sour (API 27 - <35)	8		8											
Heavy Sweet (API <27)	3		3											
Heavy Sour (API <27)	3		3											
Ultra Light Sweet (API 40 - <50)	136		136											
Lease Condensate (API >=50)	132		132											
	480													
<b>Southwest</b>														
Light Sweet (API 35 - <40)	786		317	469										
Light Sour (API 35 - <40)	135		52	83										
Medium Medium Sour (API 27 - <35)	81			81										
Medium Sour (API 27 - <35)	305		50	57		198								
Heavy Sweet (API <27)	9			9										
Heavy Sour (API <27)	14			14										
Ultra Light Sweet (API 40 - <50)	1,182		496	686										
Lease Condensate (API >=50)	422			422										
	2,933													
<b>Rocky Mountains</b>														
Light Sweet (API 35 - <40)	106		34	62	10									
Light Sour (API 35 - <40)	181		133		48									
Medium Medium Sour (API 27 - <35)	38				38									
Medium Sour (API 27 - <35)	15				15									
Heavy Sweet (API <27)	5				5									
Heavy Sour (API <27)	39				39									
Ultra Light Sweet (API 40 - <50)	2,665	304	713		245	878						525		
Lease Condensate (API >=50)	82		66	16										
	3,131													
<b>West Coast, California</b>														
West Coast, California	634					634								
<b>Lower 48 Offshore</b>														
Atlantic Medium Medium Sour	0													
Gulf of Mexico Medium Medium Sour	2,437			2,437										
Pacific California	54					54								
	2,491													
<b>Alaska</b>														
North Slope Offshore Medium Medium	72									72				
North Slope Onshore Medium Medium	340					54				286				
South Alaska Medium Medium Sour	6					6								
	418													
<b>Total U.S.</b>	<b>13,287</b>	<b>785</b>	<b>2,384</b>	<b>5,904</b>	<b>400</b>	<b>1,825</b>	<b>293</b>	<b>534</b>	<b>0</b>	<b>613</b>	<b>0</b>	<b>550</b>	<b>0</b>	
<b>Western Canada</b>														
Condensate	0													
Super Light	54										21	33		
Light Sweet	788				73					22	195	498		
Light Sour	250				8	52				101		89		
Medium	546	66			12	26				183		259		
Heavy	2,871	59	1,352	722	167	51				353	167			
	4,509													
<b>Eastern Canada</b>														
Condensate	0													
Super Light	0													
Light Sweet	198	103									95			
Light Sour	0													
Medium	0													
Heavy	65	26									39			
	263													
<b>Foreign Imports</b>														
Condensate	0													
Super Light	0													
Light Sweet	0													
Light Sour	0													
Medium	0													
Heavy	2,436	44		1,821		530						41		
	2,436													
<b>Total Supply</b>	<b>20,495</b>	<b>1,083</b>	<b>3,736</b>	<b>8,447</b>	<b>659</b>	<b>2,484</b>	<b>293</b>	<b>534</b>	<b>0</b>	<b>613</b>	<b>0</b>	<b>659</b>	<b>1,108</b>	<b>879</b>

Table IV-4													
EIA High Production Export Case - MPBD													
Crude Oil Supply and Demand Balance - 2025													
	Avail. Supply	U.S.								Canada			
		I	II	III	IV	V	Splitters	Stab.	Hvdrosk.	Exports	Western	Eastern	Exports
<b>Northeast</b>													
Light Sweet (API 35 - <40)	1	1											
Light Sour (API 35 - <40)	9		9										
Medium Medium Sour (API 27 - <35)	3		3										
Medium Sour (API 27 - <35)	0												
Heavy Sweet (API <27)	0												
Heavy Sour (API <27)	0												
Ultra Light Sweet (API 40 - <50)	16	16											
Lease Condensate (API >=50)	69	15	54										
	97												
<b>Gulf Coast</b>													
Light Sweet (API 35 - <40)	480									480			
Light Sour (API 35 - <40)	296			119						177			
Medium Medium Sour (API 27 - <35)	142			142									
Medium Sour (API 27 - <35)	88			88									
Heavy Sweet (API <27)	14			14									
Heavy Sour (API <27)	19			19									
Ultra Light Sweet (API 40 - <50)	1,318	371		18			175			754			
Lease Condensate (API >=50)	868	15		200			343	285				25	
	3,225												
<b>Midcontinent</b>													
Light Sweet (API 35 - <40)	205		205										
Light Sour (API 35 - <40)	24		24										
Medium Medium Sour (API 27 - <35)	103		103										
Medium Sour (API 27 - <35)	11		11										
Heavy Sweet (API <27)	8		8										
Heavy Sour (API <27)	4		4										
Ultra Light Sweet (API 40 - <50)	165		165										
Lease Condensate (API >=50)	177		177										
	697												
<b>Southwest</b>													
Light Sweet (API 35 - <40)	1,054		200	539		120				195			
Light Sour (API 35 - <40)	165		100	65									
Medium Medium Sour (API 27 - <35)	98			98									
Medium Sour (API 27 - <35)	343			233		110							
Heavy Sweet (API <27)	17			17									
Heavy Sour (API <27)	19			19									
Ultra Light Sweet (API 40 - <50)	1,366			1,366									
Lease Condensate (API >=50)	509			509									
	3,570												
<b>Rocky Mountains</b>													
Light Sweet (API 35 - <40)	92		74		18								
Light Sour (API 35 - <40)	180		91		89								
Medium Medium Sour (API 27 - <35)	104				104								
Medium Sour (API 27 - <35)	63				63								
Heavy Sweet (API <27)	205			99	106								
Heavy Sour (API <27)	44				44								
Ultra Light Sweet (API 40 - <50)	3,036	462	1,027		146	876						525	
Lease Condensate (API >=50)	112		106		6								
	3,837												
<b>West Coast, California</b>													
West Coast, California	677					677							
<b>Lower 48 Offshore</b>													
Atlantic Medium Medium Sour	0												
Gulf of Mexico Medium Medium Sour	2,228			2,228									
Pacific California	47					47							
	2,276												
<b>Alaska</b>													
North Slope Offshore Medium Medium	60									60			
North Slope Onshore Medium Medium	253					55				198			
South Alaska Medium Medium Sour	5					5							
	317												
<b>Total U.S.</b>	<b>14,696</b>	<b>879</b>	<b>2,361</b>	<b>5,774</b>	<b>576</b>	<b>1,891</b>	<b>518</b>	<b>285</b>	<b>0</b>	<b>1,864</b>	<b>0</b>	<b>550</b>	<b>0</b>
<b>Western Canada</b>													
Condensate	0												
Super Light	57										21	36	
Light Sweet	884				75						22	207	580
Light Sour	258				8						101	150	150
Medium	567										183	384	384
Heavy	3,602	103	1,375	1,511		102					353	158	
	5,368												
<b>Eastern Canada</b>													
Condensate	0												
Super Light	0												
Light Sweet	145											92	53
Light Sour	0												
Medium	0												
Heavy	30	15										15	
	175												
<b>Foreign Imports</b>													
Condensate	0												
Super Light	0												
Light Sweet	0												
Light Sour	0												
Medium	0												
Heavy	1,804	86		1,147		506						65	
	1,804												
<b>Total Supply</b>	<b>22,045</b>	<b>1,083</b>	<b>3,736</b>	<b>8,432</b>	<b>659</b>	<b>2,499</b>	<b>518</b>	<b>285</b>	<b>0</b>	<b>1,864</b>	<b>659</b>	<b>1,108</b>	<b>1,203</b>

<b>Table IV-5</b>				
<b>U.S. and Canadian Distillation Capacities</b>				
	MBPSD			
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>
<i>Refining Capacity</i>				
PADD I	1,330	1,330	1,330	1,330
PADD II	4,049	4,112	4,174	4,174
PADD III	9,584	9,706	9,804	9,804
PADD IV	658	672	726	726
PADD V	<u>3,063</u>	<u>3,063</u>	<u>3,066</u>	<u>3,066</u>
	18,684	18,883	19,100	19,100
<i>Splitter Capacity</i>				
	75	175	325	575
<i>Hydroskimming Capacity</i>				
	0	0	0	0
<b>Total U.S. Capacity</b>	<b>18,759</b>	<b>19,058</b>	<b>19,425</b>	<b>19,675</b>
<i>Canadian Refineries</i>				
Western Canada	666	666	716	716
Eastern Canada	<u>1,206</u>	<u>1,206</u>	<u>1,206</u>	<u>1,206</u>
	<b>1,872</b>	<b>1,872</b>	<b>1,922</b>	<b>1,922</b>
<b>Total U.S. and Canadian Capacity</b>	<b>20,631</b>	<b>20,930</b>	<b>21,347</b>	<b>21,597</b>

<b>Table IV-6</b>				
<b>U.S. and Canadian Utilization Rates</b>				
	MBPD			
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>
<i>Refineries</i>				
PADD I	76.9	81.0	81.5	81.5
PADD II	82.8	89.0	89.5	89.5
PADD III	81.0	85.0	86.2	86.0
PADD IV	86.5	90.0	90.8	90.8
PADD V	<u>75.2</u>	<u>77.5</u>	<u>81.0</u>	<u>81.5</u>
	<b>80.3</b>	<b>84.6</b>	<b>85.9</b>	<b>85.9</b>
<i>Splitters</i>	90.0	90.0	90.0	63.0
<i>Hydroskimmers</i>	--	--	--	--
<i>Canadian Refineries</i>				
Western Canada	92.0	92.0	92.0	92.0
Eastern Canada	<u>92.0</u>	<u>92.0</u>	<u>92.0</u>	<u>92.0</u>
	<b>92.0</b>	<b>92.0</b>	<b>92.0</b>	<b>92.0</b>

Table IV-7								
PADD I Charge and Yield Data								
	Yearly Volumes, MBPD				Change from 2013, MBPD			
	2013	2015	2020	2025	2015	2020	2025	
<i><u>Feedstocks</u></i>								
Crude to Refineries	1,022	1,077	1,083	1,083	55	62	62	
Crude to Splitters	0	0	0	0	0	0	0	
Other Feedstocks <sup>1</sup>	<u>188</u>	<u>194</u>	<u>192</u>	<u>192</u>	<u>6</u>	<u>3</u>	<u>4</u>	
	1,210	1,271	1,274	1,275	61	65	66	
<i><u>Products</u></i>								
Propane/Propylene	34	39	38	39	5	4	5	
Normal Butane	2	6	12	12	4	10	10	
Isobutane	-1	0	3	4	1	4	5	
Gasoline	584	643	620	624	59	36	40	
Jet/Kerosene	73	91	84	83	18	11	10	
Distillate	361	345	323	320	-16	-38	-41	
Resid/Asphalt	116	104	101	102	-12	-15	-14	
Other <sup>2</sup>	<u>92</u>	<u>92</u>	<u>140</u>	<u>137</u>	<u>0</u>	<u>48</u>	<u>45</u>	
	1,261	1,319	1,322	1,320	58	61	59	
<i><u>Splitter/Hydroskimmer Products</u></i>								
LPG	0	0	0	0	0	0	0	
Light Naphtha	0	0	0	0	0	0	0	
Naphtha	0	0	0	0	0	0	0	
Unfinished Distillate	0	0	0	0	0	0	0	
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	
	0	0	0	0	0	0	0	

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

Table IV-8								
PADD II Charge and Yield Data								
	Yearly Volumes, MBPD				Change from 2013, MBPD			
	2013	2015	2020	2025	2015	2020	2025	
<i><u>Feedstocks</u></i>								
Crude to Refineries	3,353	3,659	3,736	3,736	306	383	382	
Crude to Splitters	0	0	0	0	0	0	0	
Other Feedstocks <sup>1</sup>	<u>669</u>	<u>686</u>	<u>686</u>	<u>687</u>	<u>17</u>	<u>17</u>	<u>18</u>	
	4,022	4,345	4,422	4,424	323	400	401	
<i><u>Products</u></i>								
Propane/Propylene	107	116	121	122	9	14	15	
Normal Butane	4	6	16	15	2	12	11	
Isobutane	-1	-3	7	6	-2	8	7	
Gasoline	2,319	2,498	2,501	2,511	180	183	192	
Jet/Kerosene	223	273	279	283	50	56	60	
Distillate	1,013	1,069	1,079	1,080	56	66	67	
Resid/Asphalt	195	203	172	173	8	-23	-22	
Other <sup>2</sup>	<u>365</u>	<u>381</u>	<u>433</u>	<u>419</u>	<u>16</u>	<u>68</u>	<u>54</u>	
	4,225	4,544	4,609	4,609	320	384	384	
<i><u>Splitter/Hydroskimmer Products</u></i>								
LPG	0	0	0	0	0	0	0	
Light Naphtha	0	0	0	0	0	0	0	
Naphtha	0	0	0	0	0	0	0	
Unfinished Distillate	0	0	0	0	0	0	0	
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	
	0	0	0	0	0	0	0	

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.



Table IV-9								
PADD III Charge and Yield Data								
	Yearly Volumes, MBPD				Change from 2013, MBPD			
	2013	2015	2020	2025	2015	2020	2025	
<i><u>Feedstocks</u></i>								
Crude to Refineries	7,761	8,250	8,447	8,432	489	685	670	
Crude to Splitters	68	158	293	518	90	225	450	
Other Feedstocks <sup>1</sup>	<u>1,442</u>	<u>1,446</u>	<u>1,451</u>	<u>1,455</u>	<u>5</u>	<u>10</u>	<u>13</u>	
	9,271	9,854	10,191	10,405	583	919	1,133	
<i><u>Refinery Products</u></i>								
Propane/Propylene	369	380	384	388	11	15	19	
Normal Butane	48	75	82	92	27	34	44	
Isobutane	-1	6	12	12	7	13	13	
Gasoline	4,216	4,264	4,316	4,351	48	100	134	
Jet/Kerosene	760	824	856	809	64	96	49	
Distillate	2,721	2,786	2,870	2,869	65	149	148	
Resid/Asphalt	351	368	368	381	17	17	30	
Other <sup>2</sup>	<u>1,366</u>	<u>1,632</u>	<u>1,677</u>	<u>1,653</u>	<u>266</u>	<u>311</u>	<u>287</u>	
	9,830	10,335	10,565	10,554	505	735	724	
<i><u>Splitter/Hydroskimmer Products</u></i>								
LPG	4	9	16	29	5	10	16	
Light Naphtha	17	35	64	114	18	41	63	
Naphtha	22	46	85	151	25	55	84	
Unfinished Distillate	18	44	82	145	26	55	83	
Gas Oil	<u>6</u>	<u>23</u>	<u>44</u>	<u>78</u>	<u>17</u>	<u>34</u>	<u>48</u>	
	68	158	293	518	90	195	295	

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

Table IV-10							
PADD IV Charge and Yield Data							
	Yearly Volumes, MBPD				Change from 2013, MBPD		
	2013	2015	2020	2025	2015	2020	2025
<i><u>Feedstocks</u></i>							
Crude to Refineries	569	605	659	659	36	90	90
Crude to Splitters	0	0	0	0	0	0	0
Other Feedstocks <sup>1</sup>	<u>53</u>	<u>55</u>	<u>55</u>	<u>55</u>	<u>2</u>	<u>2</u>	<u>2</u>
	622	660	714	714	38	92	92
<i><u>Products</u></i>							
Propane/Propylene	9	10	11	11	1	2	2
Normal Butane	2	3	4	5	1	2	3
Isobutane	-1	0	1	1	1	2	2
Gasoline	320	340	341	343	21	21	23
Jet/Kerosene	26	35	47	62	9	21	36
Distillate	194	200	213	217	6	19	23
Resid/Asphalt	44	46	50	26	2	6	-18
Other <sup>2</sup>	<u>52</u>	<u>52</u>	<u>77</u>	<u>84</u>	<u>0</u>	<u>25</u>	<u>32</u>
	646	686	743	747	40	98	102
<i><u>Splitter/Hydroskimmer Products</u></i>							
LPG	0	0	0	0	0	0	0
Light Naphtha	0	0	0	0	0	0	0
Naphtha	0	0	0	0	0	0	0
Unfinished Distillate	0	0	0	0	0	0	0
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
	0	0	0	0	0	0	0

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

Table IV-11								
PADD V Charge and Yield Data								
	Yearly Volumes, MBPD				Change from 2013, MBPD			
	2013	2015	2020	2025	2015	2020	2025	
<i>Feedstocks</i>								
Crude to Refineries	2,303	2,374	2,484	2,499	72	181	196	
Crude to Splitters	0	0	0	0	0	0	0	
Other Feedstocks <sup>1</sup>	<u>591</u>	<u>596</u>	<u>603</u>	<u>604</u>	<u>5</u>	<u>12</u>	<u>13</u>	
	2,894	2,969	3,087	3,103	76	193	209	
<i>Products</i>								
Propane/Propylene	45	48	55	56	3	10	11	
Normal Butane	8	10	13	13	2	5	5	
Isobutane	-1	-3	-2	-2	-2	-1	-1	
Gasoline	1,600	1,647	1,725	1,737	47	125	137	
Jet/Kerosene	414	428	443	443	14	29	29	
Distillate	568	575	586	590	7	18	22	
Resid/Asphalt	130	131	132	132	1	2	2	
Other <sup>2</sup>	<u>313</u>	<u>315</u>	<u>314</u>	<u>314</u>	<u>2</u>	<u>1</u>	<u>1</u>	
	3,077	3,151	3,266	3,282	75	190	206	
<i>Splitter/Hydroskimmer Products</i>								
LPG	0	0	0	0	0	0	0	
Light Naphtha	0	0	0	0	0	0	0	
Naphtha	0	0	0	0	0	0	0	
Unfinished Distillate	0	0	0	0	0	0	0	
Gas Oil	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	
	0	0	0	0	0	0	0	

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table IV-12**  
**U.S. Charge and Yield Data**

	Yearly Volumes, MBPD				Change from 2013, MBPD		
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>
<i><u>Feedstocks</u></i>							
Crude to Refineries	15,008	15,965	16,409	16,409	958	1,401	1,400
Crude to Splitters	68	158	293	518	90	225	450
Other Feedstocks <sup>1</sup>	<u>2,943</u>	<u>2,977</u>	<u>2,987</u>	<u>2,993</u>	<u>34</u>	<u>44</u>	<u>50</u>
	18,019	19,100	19,689	19,920	1,082	1,670	1,900
<i><u>Products</u></i>							
Propane/Propylene	564	593	609	616	29	45	52
Normal Butane	64	100	127	137	36	63	73
Isobutane	-5	0	21	20	5	26	25
Gasoline	9,038	9,392	9,503	9,565	354	465	527
Jet/Kerosene	1,496	1,651	1,710	1,680	155	214	184
Distillate	4,857	4,976	5,070	5,075	119	213	218
Resid/Asphalt	836	851	824	813	15	-12	-23
Other <sup>2</sup>	<u>2,188</u>	<u>2,472</u>	<u>2,642</u>	<u>2,607</u>	<u>284</u>	<u>454</u>	<u>419</u>
	19,038	20,035	20,505	20,512	997	1,467	1,474
<i><u>Splitter Products</u></i>							
LPG	4	9	16	29	5	10	16
Light Naphtha	17	35	64	114	18	41	63
Naphtha	22	46	85	151	25	55	84
Unfinished Distillate	18	44	82	145	26	55	83
Gas Oil	<u>6</u>	<u>23</u>	<u>44</u>	<u>78</u>	<u>17</u>	<u>34</u>	<u>48</u>
	68	158	293	518	90	195	295

1. Includes butane, isobutane, naphtha, gas oil, fuel oil, ethanol, hydrogen, and other finished and unfinished intermediate products.

2. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table IV-13**

**PADD I Refinery Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	<u>Supply</u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply</u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply</u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply</u>	<u>Demand</u>	<u>Surplus</u>
Gasoline	584	3,139	-2,555	643	3,128	-2,486	620	2,938	-2,318	624	2,742	-2,118
Jet/Kerosene	73	404	-331	91	408	-317	84	407	-323	83	410	-327
Distillate	361	1,187	-826	345	1,227	-882	323	1,262	-938	320	1,278	-959
Residual Fuel	66	120	-54	54	111	-57	51	104	-52	52	106	-55
Other <sup>1</sup>	<u>177</u>	<u>460</u>	<u>-283</u>	<u>187</u>	<u>433</u>	<u>-247</u>	<u>243</u>	<u>489</u>	<u>-246</u>	<u>242</u>	<u>527</u>	<u>-285</u>
	1,261	5,309	-4,048	1,319	5,308	-3,989	1,322	5,200	-3,878	1,320	5,063	-3,743

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table IV-14**

**PADD II Refinery Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus
Gasoline	2,319	2,402	-83	2,498	2,393	105	2,501	2,199	302	2,511	2,027	484
Jet/Kerosene	223	267	-44	273	270	3	279	270	10	283	269	13
Distillate	1,013	1,174	-161	1,069	1,239	-170	1,079	1,308	-229	1,080	1,335	-256
Residual Fuel	48	36	12	56	14	42	25	14	11	26	15	10
Other <sup>1</sup>	<u>622</u>	<u>1,003</u>	<u>-381</u>	<u>648</u>	<u>1,032</u>	<u>-383</u>	<u>724</u>	<u>1,114</u>	<u>-390</u>	<u>709</u>	<u>1,159</u>	<u>-449</u>
	4,225	4,881	-657	4,544	4,948	-403	4,609	4,905	-296	4,609	4,806	-198

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table IV-15**

**PADD III Refinery Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>
Gasoline	4,216	1,361	2,855	4,264	1,358	2,906	4,316	1,313	3,003	4,351	1,249	3,102
Jet/Kerosene	760	264	496	824	267	558	856	276	580	809	283	525
Distillate	2,721	786	1,935	2,786	835	1,951	2,870	923	1,947	2,869	959	1,910
Residual Fuel	281	102	179	298	74	224	298	64	234	311	68	242
Other <sup>2</sup>	<u>1,920</u>	<u>2,559</u>	<u>-639</u>	<u>2,320</u>	<u>2,643</u>	<u>-323</u>	<u>2,518</u>	<u>3,063</u>	<u>-546</u>	<u>2,732</u>	<u>3,357</u>	<u>-625</u>
	9,898	5,072	4,826	10,493	5,176	5,317	10,858	5,640	5,218	11,071	5,917	5,155

1. Supply includes production from splitters and hydroskimmers.

2. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table IV-16**

**PADD IV Refinery Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus
Gasoline	320	302	17	340	301	39	341	299	42	343	291	52
Jet/Kerosene	26	38	-12	35	39	-3	47	39	7	62	40	22
Distillate	194	167	27	200	177	23	213	185	27	217	192	25
Residual Fuel	11	2	9	13	2	11	17	2	15	-7	2	-9
Other <sup>1</sup>	<u>95</u>	<u>68</u>	<u>27</u>	<u>98</u>	<u>71</u>	<u>27</u>	<u>127</u>	<u>117</u>	<u>9</u>	<u>133</u>	<u>132</u>	<u>1</u>
	646	577	69	686	589	97	743	642	101	747	656	91

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.



**Table IV-17**

**PADD V Refinery Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus	Supply	Demand	Surplus
Gasoline	1,600	1,505	94	1,647	1,500	147	1,725	1,448	277	1,737	1,371	366
Jet/Kerosene	414	447	-33	428	451	-24	443	462	-18	443	470	-27
Distillate	568	565	3	575	590	-15	586	633	-47	590	655	-65
Residual Fuel	111	120	-9	112	95	17	113	93	19	113	95	18
Other <sup>1</sup>	<u>384</u>	<u>356</u>	<u>28</u>	<u>389</u>	<u>331</u>	<u>58</u>	<u>400</u>	<u>442</u>	<u>-42</u>	<u>400</u>	<u>489</u>	<u>-88</u>
	3,077	2,993	83	3,151	2,967	184	3,266	3,077	189	3,282	3,080	202

1. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table IV-18**

**U.S. Product Supply and Demand Balance - MBPD**

	2013			2015			2020			2025		
	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>	<u>Supply<sup>1</sup></u>	<u>Demand</u>	<u>Surplus</u>
Gasoline	9,038	8,710	328	9,392	8,680	712	9,503	8,196	1,306	9,565	7,679	1,886
Jet/Kerosene	1,496	1,419	77	1,651	1,434	217	1,710	1,455	255	1,680	1,473	206
Distillate	4,857	3,878	979	4,976	4,068	907	5,070	4,311	760	5,075	4,420	655
Residual Fuel	517	380	137	532	294	237	505	277	227	494	287	206
Other <sup>2</sup>	<u>1,677</u>	<u>2,125</u>	<u>-449</u>	<u>2,121</u>	<u>2,192</u>	<u>-71</u>	<u>2,490</u>	<u>2,541</u>	<u>-51</u>	<u>2,696</u>	<u>2,753</u>	<u>-57</u>
	17,585	16,513	1,072	18,672	16,670	2,002	19,277	16,780	2,497	19,509	16,612	2,897
NGLs	<u>2,606</u>	<u>2,320</u>	<u>286</u>	<u>3,467</u>	<u>2,318</u>	<u>1,149</u>	<u>5,357</u>	<u>2,684</u>	<u>2,673</u>	<u>5,645</u>	<u>2,910</u>	<u>2,735</u>
Total Products	20,191	18,833	1,358	22,139	18,988	3,151	24,634	19,464	5,170	25,154	19,522	5,631

1. Supply includes production from splitters and hydroskimmers.

2. Includes aviation gasoline, gasoline blending components, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.



Table IV-20

Required Crude Oil Logistic Improvements, MBPD

Rail Movements into PADD I

	Planned Movements <u>by Rail</u>	Rail <u>Capacity</u>	Required Rail Cap. <u>Additions</u>
2013	278	555	- -
2015	656	1,320	- -
2020	429	- -	- -
2025	565	- -	- -

Comments

- Movements by rail into PADD I are expected to rise by nearly 378 MBPD from 2013 to 2015.
- Existing rail off-loading capacity exceeds forecast rail capacity requirements.
- **Projected rail expansion plans appear to be on track to keep pace with desired movements into PADD I.**
- See Appendix 1 for existing and planned PADD I rail offloading facilities.

Vessel Movements into PADD I

	Planned Movements <u>by Water</u>
2013	25
2015	25
2020	448
2025	386

Comments

- Movements by vessel into PADD I are expected to rise by over 420 MBPD from 2013 to 2020.
- Forecast waterborne movements exceed current Jones Act vessel capabilities.
- **Substantial coastwise compliant vessel additions will be necessary to achieve forecast movement requirements.**

Crude Movements into PADD II

- Current pipeline and rail delivery systems from the Gulf Coast, the Southwest and Canada are sufficient to meet crude demand requirements through 2025.

**Table IV-20**

**Required Crude Oil Logistic Improvements, MBPD**

**Pipeline Movements from Southwest to the Gulf Coast**

	Southwest <u>Production</u>	Local/P II/P V <u>Demand</u>	Movements to <u>Gulf Coast</u>	Pipelines from the Permian Basin with access the USGC			
				<u>Direct</u>	<u>Indirect</u> <u>(via Cushing)</u>	<u>Total</u>	<u>Surplus</u>
2013	1,646	792	854	363	525	888	33
2015	2,077	1,433	645	925	525	1450	805
2020	2,933	1,578	1,355	1225	525	1750	395
2025	3,570	995	2,576	1225	525	1750	-826

Comments

- The Permian Basin largely became debottlenecked with the startup of the Magellan Longhorn pipeline in 2013.
- Permian Basin volumes will shift into PADD II in 2015 to replace declining Midcontinent production.
- Movements to the Gulf Coast will peak in 2025 at nearly 2.6 million BPD.
- Pipeline capacity from the Permian Basin to the Gulf Coast is projected to exceed movements through 2020.
- **A pipeline shortfall of 0.8 million BPD of capacity will develop by 2025.**
- See Appendix 2 for existing and planned Permian Basin exit pipelines.

**Pipeline Movements from Western Canada and the Rocky Mountains to the Gulf Coast**

	Movements to the Gulf Coast			Pipeline Capacity, South of Cushing, OK and Patoka, IL	
	<u>Western</u> <u>Canada</u>	<u>Rocky</u> <u>Mountains</u>	<u>Total</u>	<u>Capacity</u>	<u>Surplus</u>
2013	182	150	332	550	218
2015	537	0	537	1,550	1,013
2020	722	78	800	2,210	1,410
2025	1,511	99	1,610	2,210	600

Comments

- Crude movements to the Gulf Coast will rise from 332 MBD in 2013 to 1.6 million BPD by 2025.
- Existing pipeline capacity out of Cushing/Patoka is 1.55 million BPD and will rise to 2.21 million BPD by 2017.
- See Appendix 3 for existing and planned pipelines from Cushing, OK and Patoka, IL to the Gulf Coast.

**Crude Movements into PADD IV**

- **Current pipeline delivery systems from the Rocky Mountains and Western Canada are sufficient to meet crude demand requirements through 2025.**

**Table IV-20**

**Required Crude Oil Logistic Improvements, MBPD**

**Rail Movements into PADD V**

	Planned Movements <u>by Rail</u>	Rail <u>Capacity</u>	Required Rail Cap. <u>Additions</u>
2013	90	148	- -
2015	275	370	- -
2020	1,076	- -	706 - 1,782
2025	1,106	- -	736 - 1,842

Comments

- Movements by rail into PADD V are expected to rise from 90 MBPD in 2013 to over 1.1 million BPD in 2025.
- Existing rail off-loading capacity exceeds short term rail capacity requirements.
- **Projected rail expansion plans appear to be insufficient to meet required movements in 2020 - 2025.**
- See Appendix 4 for existing and planned PADD V rail offloading facilities.

**Crude Movements out of Western Canada**

	<u>Crude Movements out of Western Canada</u>			<u>Existing Exit Capacity with the Alberta Clipper</u>			
	to the <u>U.S.</u>	to Eastern <u>Can./Exports</u>	<u>Total</u>	<u>Pipelines</u>	Rail <u>Movements</u>	<u>Total</u>	<u>Surplus</u>
2013	2,476	329	2,805	3,568	120	3,688	883
2015	2,637	531	3,168	3,656	593	4,249	1,081
2020	2,587	1,262	3,849	3,918	750	4,668	819
2025	3,174	1,536	4,710	3,918	750	4,668	-42

Comments

- Movements out of Western Canada are expected to rise from 2.8 million BPD in 2013 to 4.7 million BPD in 2025.
- Existing exit pipeline capacity out of Western Canada is 3.6 million BPD.
- The Enbridge Alberta Clipper pipeline is viewed as highly likely with a capacity of 350 MBPD and a startup date in 3Q2015.
- Four other major exit pipelines are being discussed (see Appendix 5).
- **At least one of these four new pipelines will need to be in place by 2025 to achieve the Canadian production forecast.**
- Incremental movements to the U.S. between 2013 and 2025 are 698 MBPD.
- The Alberta Clipper (350 MBPD) and rail (630 MBPD) will add 980 MBPD of capacity.
- **Construction of the Energy East or Northern Gateway pipelines by 2025 will be required to meet Canadian export requirements.**

**Table IV-21**

**Gasoline Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-2,555	-2,486	-2,318	-2,118	- Reduced utilization of Colonial/Plantation systems.
PADD II	-83	105	302	484	- Increased movements into PADD I from Ohio and into PADD III for export via Mississippi River.
PADD III	2,855	2,906	3,003	3,102	- Likely origin of PADD I-IV exports (increase of 1.3 million BPD).
PADD IV	17	39	42	52	- Surplus volumes to be moved into PADDs II and V.
PADD V	<u>94</u>	<u>147</u>	<u>277</u>	<u>366</u>	- Incremental 272 MBPD to be exported.
Total U.S.	328	712	1,306	1,886	

Conclusions

- No incremental requirements for Colonial/Plantation systems.
- Modest pipeline upgrades to be made in moving PADD II volumes from Ohio into western Pennsylvania.
- The most significant logistic improvements to be focused on product exports (which are increasing by 1.6 million BPD).
- Exports will be primarily from PADD III but also from PADD V.

**Table IV-22**

**Jet/Kerosene Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-331	-317	-323	-327	
PADD II	-44	3	10	13	- Increased movements into PADD I from Ohio and into PADD III for export via Mississippi.
PADD III	496	558	580	525	
PADD IV	-12	-3	7	22	- Surplus volumes to be moved into PADDs II and V.
PADD V	<u>-33</u>	<u>-24</u>	<u>-18</u>	<u>-27</u>	
Total U.S.	77	217	255	206	

Conclusions

- No incremental requirements for Colonial/Plantation systems.
- Modest pipeline upgrades to be made in moving PADD II volumes from Ohio into western Pennsylvania.
- No significant logistics improvements required for Jet/Kerosene movements.



**Table IV-23**

**Distillate Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-826	-882	-938	-959	- Increased usage of Colonial/Plantation systems.
PADD II	-161	-170	-229	-256	- Shortfall grows slightly, requires greater receipts from PADD III.
PADD III	1,935	1,951	1,947	1,910	- Surplus remains constant. Movements to PADDs I and II and exports.
PADD IV	27	23	27	25	- Surplus volumes to be moved into PADDs II and V.
PADD V	<u>3</u>	<u>-15</u>	<u>-47</u>	<u>-65</u>	- Modest shortfall developing in PADD V.
Total U.S.	979	907	760	655	

Conclusions

- Movements from PADD III to Padd I increase by 133 MBPD from 2013 to 2025. Surplus capacity will exist on Colonial/Plantation systems due to reduction of gasoline movements by 437 MBPD.
- Movements from PADD III to PADD II will increase slightly (Explorer Pipeline).
- Exports will decline by 324 MBPD as internal demand grows faster than production.
- No significant logistics improvements required for Distillate movements.

**Table IV-24****Residual Fuel Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-54	-57	-52	-55	
PADD II	12	42	11	10	
PADD III	179	224	234	242	- Incremental 63 MBPD to be exported.
PADD IV	9	11	15	-9	
PADD V	<u>-9</u>	<u>17</u>	<u>19</u>	<u>18</u>	
Total U.S.	137	237	227	206	

Conclusions

- No significant logistics improvements required for Residual Fuel movements.

**Table IV-25**

**Other Products<sup>1</sup> Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-283	-247	-246	-285	
PADD II	-381	-383	-390	-449	
PADD III	-639	-323	-546	-625	- Splitter and hydroskimmer products offset by NGL growth.
PADD IV	27	27	9	1	
PADD V	<u>28</u>	<u>58</u>	<u>-42</u>	<u>-88</u>	
Total Refining	-1,248	-868	-1,215	-1,446	
Adjustments	-1521	-1521	-1521	-1521	
NGL Demand	<u>2,320</u>	<u>2,318</u>	<u>2,684</u>	<u>2,910</u>	
Total U.S.	-449	-71	-51	-57	

Conclusions

- Increase in Other shortfall is predominantly the result of increased Natural Gas Liquids (NGLs) production.
- NGL logistics are being developed in conjunction with increased natural gas drilling.
- Logistic requirements for Other refining products (non-NGLs) are not viewed to be significant.

1. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table IV-26**

**Total U.S. Refined Products Supply and Demand Balance - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Comments</u>
PADD I	-4,048	-3,989	-3,878	-3,743	- PADD I product shortfall to decline by over 300 MBPD.
PADD II	-657	-403	-296	-198	- PADD II product shortfall to decline by 459 MBPD.
PADD III	4,826	5,317	5,218	5,155	- PADD III exports to rise by around 1.7 million BPD.
PADD IV	69	97	101	91	- PADD IV movements generally flat.
PADD V	<u>83</u>	<u>184</u>	<u>189</u>	<u>202</u>	- PADD V exports to rise by 119 MBPD.
Total Refining	273	1,205	1,334	1,507	
Adjustments	-1521	-1521	-1521	-1521	
NGL Demand	<u>2,320</u>	<u>2,318</u>	<u>2,684</u>	<u>2,910</u>	
Total U.S.	1,072	2,002	2,497	2,897	

Conclusions

- No major product infrastructure improvements are necessary for movements between PADDs.
- **Logistic improvements will be necessary for the incremental export of over 1.8 million BPD between 2013 and 2025.**

<b>Table IV-27</b>					
<b>U.S. and Canadian Crude Oil Exports - MBPD</b>					
	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Likely Destinations</u>
<b><i>Crude Exports from the U.S.</i></b>					
<i>Gulf Coast</i>					
Light Sweet			255	480	Europe, Latin America
Light Sour				177	Europe, Latin America
Ultra Light Sweet				754	Far East, Europe
Condensate	<u>25</u>	<u>25</u>	<u>25</u>	<u>25</u>	Canada
	25	25	280	1,436	
<i>Southwest</i>					
Light Sweet				195	Europe, Latin America
<i>Rocky Mountains</i>					
Ultra Light Sweet	108	332	525	525	Canada
<i>Alaska</i>					
Medium			358	258	Far East
<b>Total U.S.</b>	<b>133</b>	<b>357</b>	<b>1,163</b>	<b>2,414</b>	
<b><i>Crude Exports from Canada*</i></b>					
<i>Western Canada</i>					
Super Light			33	36	} Dependent on export pipeline: Far East if TransMountain or Northern Gateway. Europe/ Latin America if Energy East.
Light Sweet			498	580	
Light Sour			89	150	
Medium			259	<u>384</u>	
			879	1,150	
<i>Eastern Canada</i>					
Light Sweet				53	Europe
<b>Total Canada</b>			<b>879</b>	<b>1,203</b>	
<b>Total U.S. and Canada</b>	<b>133</b>	<b>357</b>	<b>2,042</b>	<b>3,617</b>	

\* Excluding movements to the U.S.

**Table IV-28**  
**U.S. Product Exports - MBPD**

	<u>2013</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>Likely Destinations</u>
<i>Refined Products</i>					
Gasoline	328	712	1,306	1,886	Mexico, other Latin America
Jet/Kerosene	77	217	255	206	Canada, Mexico, other Latin America
Distillate	979	907	760	655	Mexico, other Latin America, Europe
Residual Fuel	137	237	227	206	East Asia, Latin America, Europe
Other <sup>1</sup>	<u>-449</u>	<u>-71</u>	<u>-51</u>	<u>-57</u>	Latin America, Europe, East Asia
	1,072	2,002	2,497	2,897	
<i>NGLs</i>	286	1,149	2,673	2,735	Canada, Mexico, Latin America
<b>Total Exports</b>	<b>1,358</b>	<b>3,151</b>	<b>5,170</b>	<b>5,631</b>	

1. Includes aviation gasoline, petrochemical feedstocks, naphtha, lubricants, waxes, petroleum coke, refinery gas and other miscellaneous products.

**Table IV-29**  
**Crude Price Forecast**  
**High Production Export Case**  
(current dollars per barrel)

	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2025</u>
<b><u>BENCHMARKS</u></b>											
Brent (Sullom Voe)	102.78	98.84	97.49	94.14	94.41	97.82	101.47	105.61	109.74	114.03	119.52
LLS (St. James)	100.58	96.94	95.95	92.86	93.14	96.53	100.12	104.15	108.25	112.38	117.72
WTI (Cushing)	95.71	92.03	91.01	87.87	88.12	91.48	95.02	99.00	103.04	107.11	112.38
Bakken (Clearbrook)	91.28	87.67	86.65	83.59	83.83	87.21	90.77	94.76	98.77	102.69	107.72
Maya (FOB)	89.29	85.91	83.93	80.41	80.38	83.51	86.70	89.61	93.07	96.71	101.55
Canadian WCS (Hardisty)	82.24	78.69	76.70	73.06	73.16	76.07	79.29	82.09	85.45	89.00	93.75
<b><u>DIFFERENTIALS</u></b>											
Brent - LLS	2.15	1.51	1.14	0.88	0.87	0.89	0.95	1.05	1.09	1.25	1.40
LLS - WTI	4.87	4.91	4.94	4.98	5.02	5.06	5.10	5.15	5.21	5.27	5.34
WTI - Bakken	4.43	4.36	4.35	4.29	4.29	4.27	4.25	4.25	4.27	4.42	4.66
LLS - Maya	11.29	11.03	12.02	12.45	12.76	13.02	13.42	14.54	15.17	15.67	16.17
Maya - WCS	7.05	7.22	7.23	7.35	7.22	7.45	7.41	7.52	7.63	7.71	7.80

## Implications of Increasing U.S. Light Tight Oil Production

### Appendix Tables

<u>Number</u>	<u>Tab</u>	<u>Table Name</u>
Appendix 1	<a href="#">Appendix 1</a>	PADD I Rail Offloading Facilities
Appendix 2	<a href="#">Appendix 2</a>	Permian Basin Exit Pipelines
Appendix 3	<a href="#">Appendix 3</a>	Cushing, OK and Patoka, IL Exit Pipelines
Appendix 4	<a href="#">Appendix 4</a>	PADD V Rail Offloading Facilities
Appendix 5	<a href="#">Appendix 5</a>	Western Canada Exit Pipelines

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## Appendix 1

### PADD I Rail Offloading Facilities

Company	Location	Capacity MBPD	Online
<i><u>Online in 2012</u></i>			
Global Energy Partners	Albany, NY	160	2012
Buckeye Partners	Albany, NY	130	2012
Plains All American	Yorktown, VA	130	2012
Sunoco Logistics	Westville, NJ	70	2012
United Refining	Warren, PA	<u>65</u>	2012
		555	
<i><u>Online in 2013/2014</u></i>			
PBF Energy	Delaware City, DE	210	2013
Monroe Energy	Trainer, PA	60	1H2013
Phillips 66	Linden, NJ	60	1H2013
Philadelphia Energy Solutions	Philadelphia, PA	240	1H2013
Enbridge/Canopy	Eddystone, PA	80	2Q2014
Phillips 66	Linden, NJ	50	2Q2014
PBF Energy	Delaware City, DE	<u>65</u>	2Q2014
		765	
<i><u>Proposed Additions</u></i>			
Global Energy	New Windsor, NY	70	TBD
Enbridge/Canopy	Eddystone, PA	80	TBD

## Appendix 2

### Permian Basin Exit Pipelines

Company	Pipeline	Capacity MBPD	Startup	Destination
<i><u>Existing Direct Pipelines</u></i>				
Sunoco *	West Texas Gulf	250		Houston/Nederland, TX
Magellan	Longhorn	<u>225</u> 475	2Q2013	Houston, TX
<i><u>Existing Indirect Pipelines</u></i>				
Plains	Basin	450		Cushing, OK
Oxy	Centurion	<u>75</u> 525		Cushing, OK
<i><u>Planned Pipelines</u></i>				
Magellan	Longhorn Expansion	50	3Q2014	Houston, TX
Oxy/Magellan	BridgeTex	300	4Q2014	Houston, TX
Sunoco	Permian Express II	200	3Q2015	Nederland/Beaumont, TX
Plains All American	Cactus	<u>200</u> 750	3Q2015	Gardendale/Corpus Christi, TX

\* The Sunoco West Texas Gulf pipeline also supplies the Mid-Valley pipeline into PADD II (not included).

Appendix 3					
Cushing, OK and Patoka, IL Exit Pipelines					
Company	Pipeline	Startup	Origin	Destination	Capacity
<i>Existing Pipelines</i>					
Enbridge/Enterprise	Seaway I	2Q2012	Cushing, OK	Houston/Beaumont, TX	150
	Seaway II	4Q2012	Cushing, OK	Houston/Beaumont, TX	250
TransCanada	Keystone	1Q2014	Cushing, OK	Houston/Nederland, TX	700
	Seaway III	4Q2014	Cushing, OK	Houston/Beaumont, TX	<u>450</u>
					1,550
<i>Planned Pipelines</i>					
Enbridge/Energy Transfer	Trunkline	2H2016	Patoka, IL	St. James, LA	660
Total Capacity					2,210

## Appendix 4

### PADD V Rail Offloading Facilities

Company	Location	Capacity MBPD	Online
<i><u>Online in 2012</u></i>			
Tesoro	Anacortes, WA	50	2012
U.S. Oil	Tacoma, WA	40	2012
Westway Terminal Co.	Port of Grays, WA	10	
Imperium Terminal Services	Port of Grays, WA	10	
Tesoro	Martinez, CA	12	2012
Alon	Long Beach, CA	12	2012
Alon	Paramount, CA	<u>14</u>	2012
		148	
<i><u>Online in 2013/2014</u></i>			
Global Partners	Port of St. Helens, OR	30	1H2013
BP	Cherry Point, WA	20	1H2014
Kinder Morgan	Richmond, CA	72	2Q2014
Phillips 66	Ferndale, WA	30	4Q2014
Plains	Bakersfield, CA	<u>70</u>	4Q2014
		222	
<i><u>Proposed Additions</u></i>			
Savage/Tesoro	Vacouver, WA	380	2H2015
Alon	Bakersfield, CA	125	4Q2015
U.S. Development	Port of Grays, WA	45	1H2016
Phillips 66	Rodeo, CA	30	1Q2016
Valero	Benicia, CA	40	1Q2016
Questar	Paramount, CA	tbd	3Q2016
Targa	Stockton, CA	40	2016
NuStar Energy	Vancouver, WA	50	tbd
Shell	Anacortes, WA	tbd	tbd
WesPac	Pittsburg, CA	242	tbd
Westway Terminals	Port of Grays, WA	tbd	tbd
Imperium Terminal Services	Port of Grays, WA	<u>tbd</u>	tbd
		952	

## Appendix 5

### Western Canada Exit Pipelines

Company	Pipeline	Origin	Destination	Capacity	Startup
<i>Existing Pipelines</i>					
TransCanada	Keystone	Hardisty, AB	Houston/Nederland, TX	590	
Enbridge	Line 1	Edmonton, AB	Cushing, OK, PADD II, E. Canada	1,865	
Enbridge	Line 67	Hardisty, AB	Cushing, OK, PADD II, E. Canada	450	
Plains	Rangeland	Edmonton, AB	PADD IV	83	
Spectra	Express	Hardisty, AB	Casper, WY and Wood River, IL	280	
Kinder Morgan	Trans Mountain	Edmonton, AB	Anacortes, WA	<u>300</u>	
				3,568	
<i>Proposed Pipelines</i>					
Enbridge	Alberta Clipper	Hardisty, AB	Superior, WI	350	3Q2015
Kinder Morgan	Trans Mountain Exp.	Edmonton, AB	Anacortes, WA	590	2018+
TransCanada	Energy East	Hardisty, AB	St. John, NB	1,100	2018+
TransCanada	Keystone XL	Hardisty, AB	Steele City, NE	800	2018+
Enbridge	Northern Gateway	Broderheim, AB	Kitimat, BC	<u>525</u>	2018+
				3,365	