PETROLEUM WATCH
California Energy Commission
September 2017

Recent Petroleum News and Outside Analyses

Prices

- **Crude Oil Prices:** Brent and West Texas Intermediate crude prices closed at $53.63 and $48.63, respectively, on September 5 (**page 2**).
- **California Retail Gasoline Prices:** On the week of September 4, prices increased to $3.06, an increase of $0.13 since the end of June. Through August, California prices averaged $0.56 higher than the national average (**page 4**).
- **California Retail Diesel Prices:** On the week of September 4, prices reached $3.14, an increase of $0.25 from the end of July. Through August, California prices averaged $0.18 higher than the national average (**page 5**).

Refining News

- **Andeavor Martinez Refinery:** Planned maintenance that began on June 6, 2017, was extended due to additional repairs required on multiple units and concluded on August 21, 2017.
- **Chevron El Segundo Refinery:** The 33,000 barrels-per-day (bpd) sulfuric acid alkylation unit had an unplanned shutdown from August 9 through August 12, 2017.
- **Valero Wilmington Refinery:** Valero had two unplanned shutdowns of the 16,000 bpd delayed coker unit from July 28 through August 8, 2017, and from August 30 through August 31, 2017. Another 18,000 bpd delayed coker unit was shut down between August 30 and September 2, 2017.

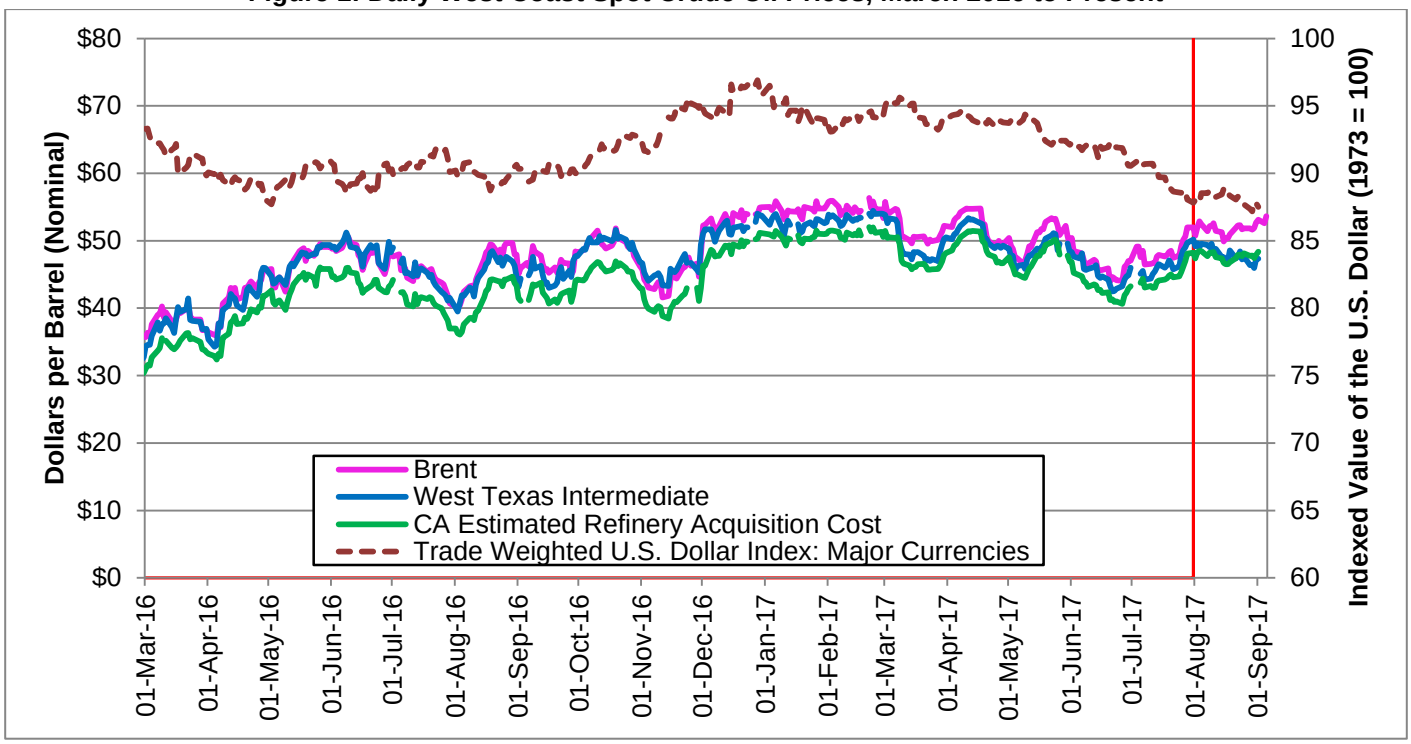
Hurricane Harvey

- **U.S Gulf Coast:** On August 26, the landfall of Hurricane Harvey on the Texas Gulf Coast disrupted the area's refining activities. By August 31, 19 refineries (including the 600,000 bpd Port Arthur, Texas, Motiva refinery, the largest in the United States) with a combined capacity of more than 3.9 million bpd, representing 72 percent of the regional and 20 percent of the national refining capacity, were offline.
- **U.S East Coast:** Service from the Colonial Pipeline, which delivers more than 3 million bpd along the East Coast, was affected by the reduced fuel supply from the U.S. Gulf Coast. On September 8, the Department of Homeland Security issued Jones Act waivers, allowing foreign-flagged vessels to transport merchandise between ports within U.S. waters, to last through September 22.
- **U.S Strategic Petroleum Reserve:** On August 31, the jump in gas prices arising from the impacted refining and pipeline operations triggered the U.S. Energy Department to make the first emergency release, since 2012, of 500,000 barrels of crude oil from the Strategic Petroleum Reserve to the Phillips 66 refinery in Lake Charles, Louisiana.

Product of the Energy Assessments Division's Supply Analysis Office.

Crude Oil Prices

Figure 1: Daily West Coast Spot Crude Oil Prices, March 2016 to Present



Source: U.S. Energy Information Administration (EIA), Oil Price Information Service (OPIS), and Federal Reserve Bank of St. Louis.
Note: Red lines on all graphs indicate end of previous *Petroleum Watch* data. Areas to the right indicate new data since last month.

Crude oil prices continued to increase in August (**Figure 1**). Brent began August at $50.77, reached to $49.90 on August 15, and finished at $52.69 on August 31, a 7 percent increase compared to July. West Texas Intermediate (WTI) started August at $49.19, recorded a monthly low of $45.96 on August 30, and finished at $47.26 on August 31, a 3 percent increase compared to last month. The California Estimated Refiner Acquisition Cost (CA-RAC)[1] reached a monthly low at $46.51 on August 16 and finished at $47.93 on August 31, a 6 percent increase over July.

CA-RAC accounts for local and Alaska produced crude oil; both have reduced costs (for various reasons) compared to WTI and Brent-based crudes. This is why CA-RAC has been consistently priced below WTI. Since the beginning of 2017, the CA-RAC price averaged $1.50 lower than WTI and $3.50 below Brent. This relationship changed as U.S. Gulf Coast refineries were preparing for Hurricane Harvey on the last week of August.

During the hurricane, demand for WTI-based crudes fell as the refineries that use WTI were shut down or forced to reduce operation rates. On August 21, CA-RAC reached $47.41, $0.02 higher than $47.39 for WTI. On August 30, the difference was largest: $1.49, with WTI at $45.96 and CA-RAC prices at $47.45. When refineries from U.S. Gulf Coast restart normal operations, WTI prices should rebound to normal.

Crude Oil Prices

August 2017 vs 2016
(Percent Change)

Brent	**13% higher**
WTI	**7% higher**
CA-RAC	**16% higher**

August 2017 Averages

Brent	**$51.70**
WTI	**$48.04**
CA-RAC	**$47.69**

September 5, 2017

Brent	**$53.63**
WTI	**$48.63**
CA-RAC	**$49.18**

1 California estimated refiner acquisition cost (CA-RAC) is a weighted average of the prices of California (San Joaquin Valley) crude, Alaskan crude, and foreign crude.

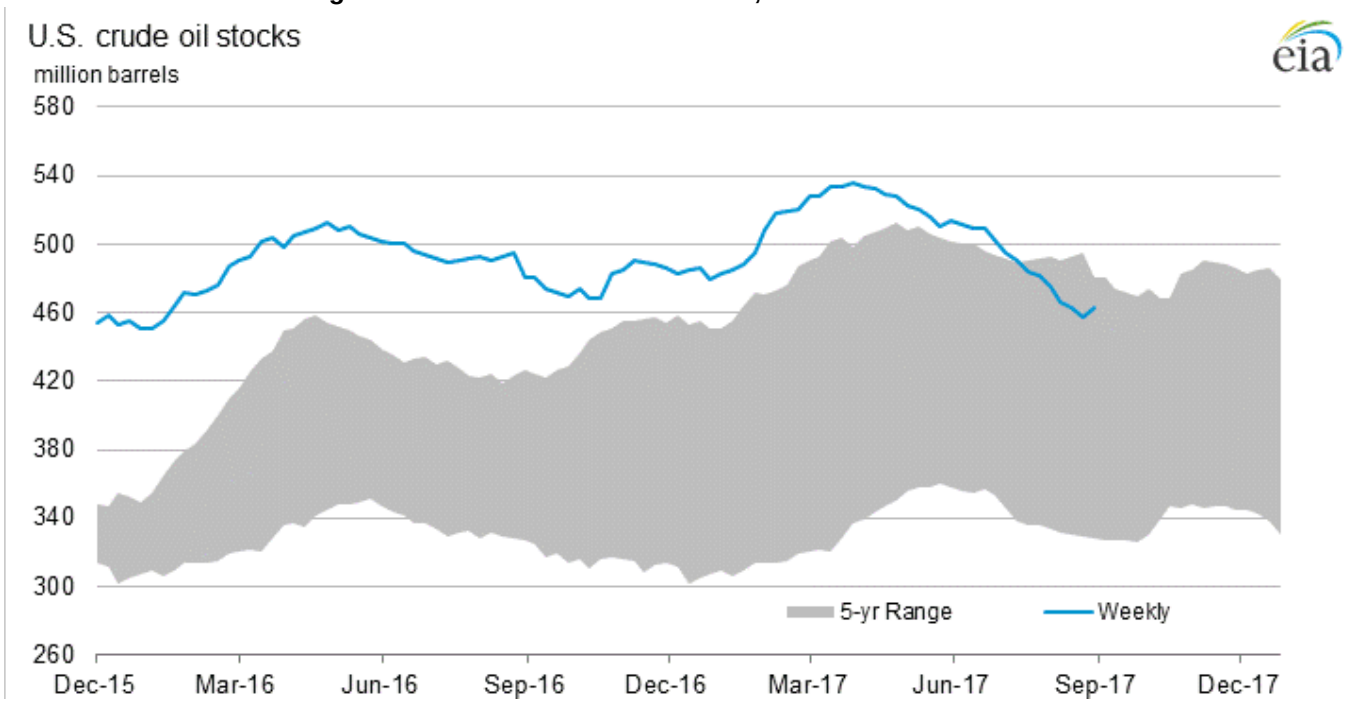
Crude Oil Production and Storage

Crude oil production, refinery inputs, and inventories have all decreased, while imports stayed flat since August's *Petroleum Watch* (**Figure 2**) because of the aftermath of Hurricane Harvey on the U.S. Gulf Coast.

- U.S. crude oil production for August was estimated at 9.33 million bpd, 66,000 bpd lower than July's monthly average of 9.4 million bpd. This is an 830,000 bpd increase from a year ago when production levels were 8.5 million bpd.
- Imports remained flat at 8.0 million bpd in August, same as in July. When compared to import levels from August 2016, this is a decrease of 230,000 bpd.
- U.S. crude oil refinery inputs sharply decreased by 550,000 bpd below July input levels, finishing August at an average 16.8 million bpd. Refinery inputs for the month are still 30,000 bpd higher than year-ago levels.
- Crude oil inventories in the United States decreased by 19.5 million barrels during August to 462.4 million barrels. Current inventories are 18.3 million barrels lower than one year ago.

On August 24, preparations for Hurricane Harvey forced refineries along the U.S. Gulf Coast to shut down. Demand for crude oil plummeted. Refinery input data showed crude oil inputs falling 3.2 million bpd from a record high 17.7 million bpd on August 25 to 14.4 million bpd on September 1. Crude oil inventories increased during the last week of August even while oil production slid; oil producers waited for prices to rise as there were fewer consumers to buy oil.

Figure 2: U.S. Crude Oil Inventories, December 2015 to Present



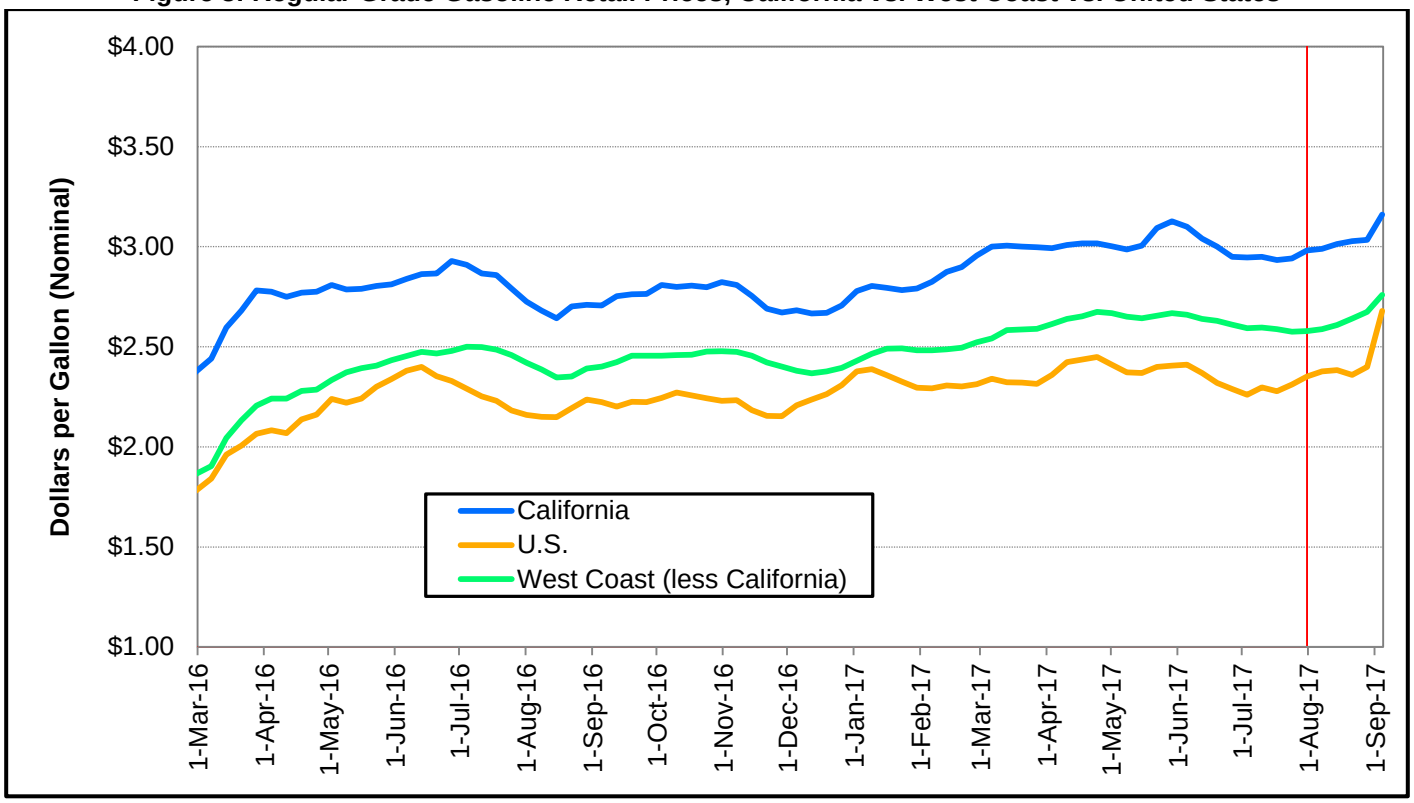
Source: U.S. EIA

- According to the Organization of the Petroleum Exporting Countries' (OPEC) August *Monthly Oil Market Report*, total July OPEC production increased by 172,600 bpd to 32.8 million bpd. OPEC's target production number set in November 2016 was 32.5 million bpd. OPEC kept its supply-and-demand balance forecast to 0.4 million bpd, 0.1 million bpd higher than the forecast reported in the previous *OPEC Monthly Report*.[2]

2 *OPEC August Monthly Report*, page i, page 51:
http://www.opec.org/opec_web/static_files_project/media/downloads/publications/OPEC%20MOMR%20August%202017.pdf.

Gasoline and Diesel Retail Prices

Figure 3: Regular Grade Gasoline Retail Prices, California vs. West Coast vs. United States



Source: U.S. EIA

Gasoline retail prices in California, United States (U.S.) and West Coast (less CA) showed an upward trend throughout August with a sharp increase during the last week of August leading into September (**Figure 3**). The U.S. gasoline price hike of $0.28 in the week following Hurricane Harvey was next largest only to the $0.46 increase that occurred in September 2005 in the wake of Hurricane Katrina. The huge upset in refinery and pipeline operations caused by flooding associated with Hurricane Harvey created a critical shortage of gasoline in much of the United States.

California and West Coast gasoline retail prices saw a moderate increase of $0.12 and $0.09 per gallon, respectively, in the same week following the hurricane. The average retail prices in August were $3.05, $2.44, and $2.65 (**sidebar**), which are $0.10, $0.14, and $0.06 more than the respective July averages and a significant 13, 12, and 12 percent above year-ago prices.

Although major Southern California refineries had just returned to full production, the low inventory levels from the beginning of August (**Figure 8**) coupled with unplanned refinery issues (**page 1**) during a high-demand summer season strained gasoline supplies. Another significant factor affecting the California retail gasoline price was the total solar eclipse on August 21, 2017. This increased gasoline demand as California traveled to the path of totality, particularly to Oregon.

Gasoline Prices

August 2017 vs 2016
(Percent Change)

California	13% higher
U.S.	12% higher
West Coast	12% higher

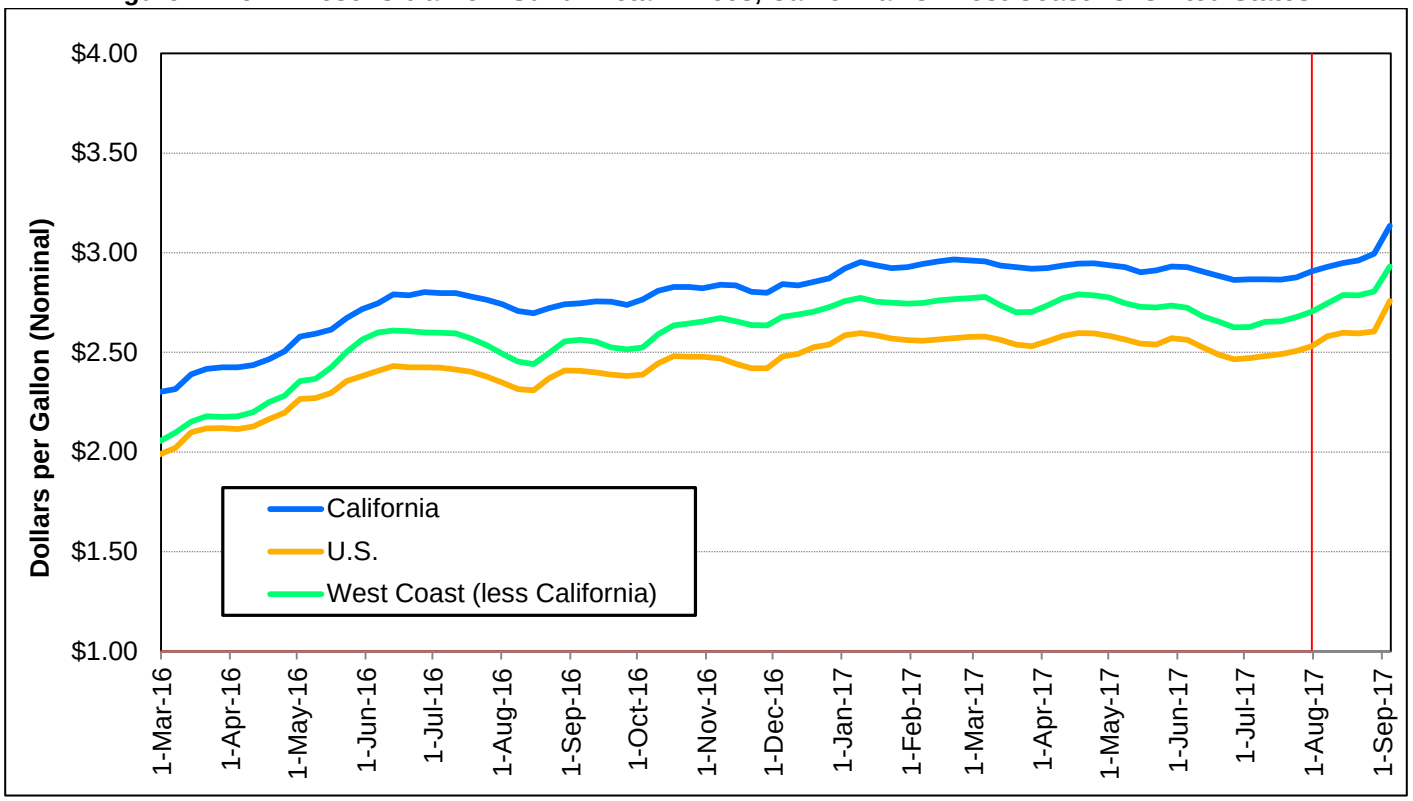
August 2017 Averages

California	$3.05
U.S.	$2.44
West Coast	$2.65

Week of September 4, 2017

California	$3.16
U.S.	$2.68
West Coast	$2.76

Figure 4: No. 2 Diesel Ultra-Low-Sulfur Retail Prices, California vs. West Coast vs. United States



Source: U.S. EIA

August diesel retail prices across the United States increased to the highest prices seen in 2017. California's average diesel retail price was $2.93 on August 7 and increased $0.07 to $3.00 on August 28. The last time California diesel cost more than $3.00 was on August 3, 2015. California diesel prices continued to rise into September as prices increased $0.14 to $3.14 the week of September 4 (**Figure 4**). As a result, the California diesel retail price has narrowed the difference to within $0.02 less than gasoline on September 4 compared to $0.07 on July 31.

The average U.S. price for August was $2.60 per gallon of diesel, 10 percent higher compared to August 2016. The average U.S. diesel price increased $0.03 from $2.58 on August 1 to $2.61 on August 28. But during the week of September 4, the diesel retail price shot up $0.15 to $2.76. Because of the high diesel price, the U.S. and West Coast prices reached a new year high at $2.76 and $2.93, respectively, on September 4. August diesel prices were the highest average prices this year as Hurricane Harvey made landfall August 25; prices may continue to increase as Hurricanes Irma and Jose threaten the East Coast.

Diesel Prices

August 2017 vs 2016 (Percent Change)

California	9% higher
U.S.	10% higher
West Coast	12% higher

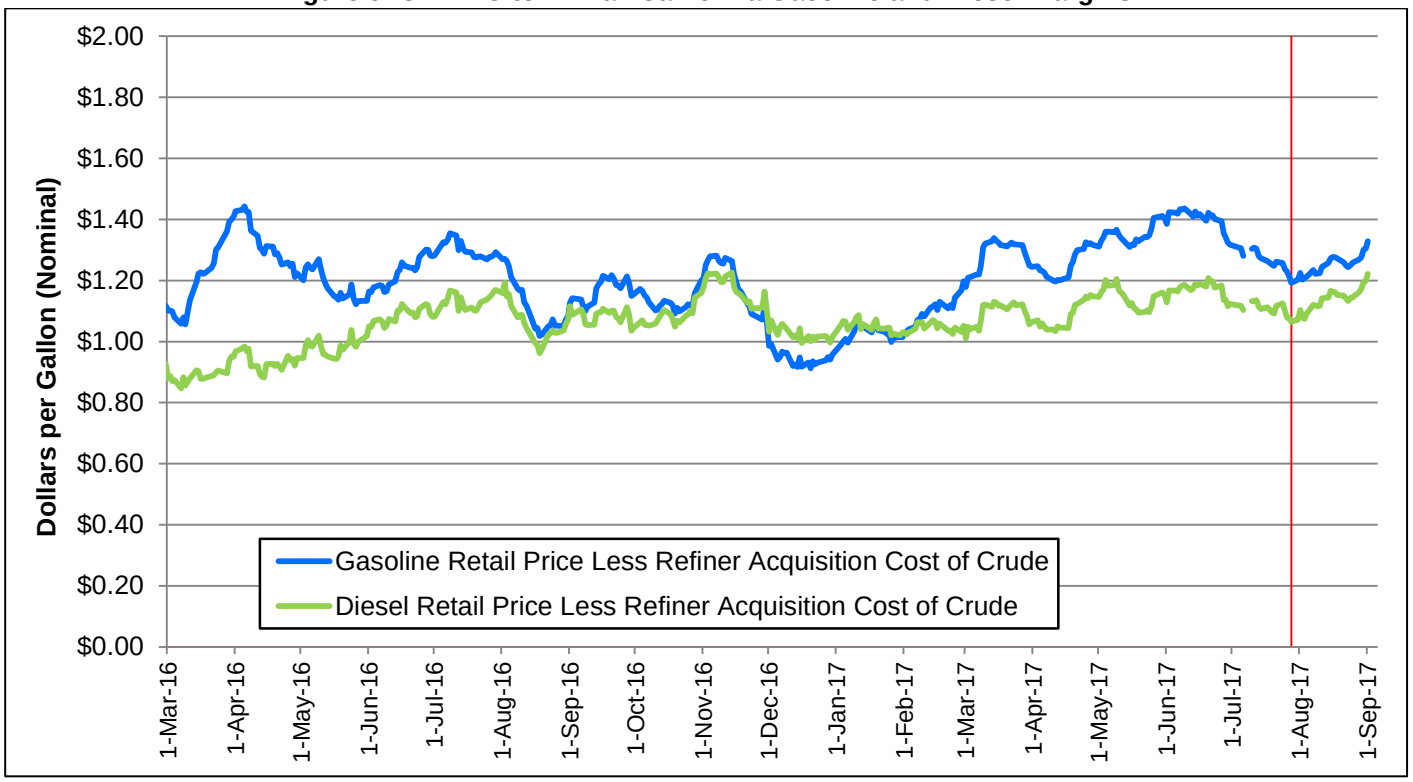
August 2017 Averages

California	$2.96
U.S.	$2.60
West Coast	$2.78

Week of September 4, 2017

California	$3.14
U.S.	$2.76
West Coast	$2.93

Figure 5: CA-RAC to Ex-Tax California Gasoline and Diesel Margins



Source: U.S. EIA and OPIS

The CA-RAC-to-ex-tax retail gasoline margin increased during August. The gasoline margin began the month at $1.22, remaining stable before increasing on August 11, and ended at $1.30 on August 31 (**Figure 5**). Retail gasoline prices increased no more than $0.10 in August.

Similar to gasoline, the CA-RAC to ex-tax retail diesel margin also increased in August. The diesel margin began August at $1.10, slowly rising to $1.14 on August 11, reaching $1.20 on August 31. Both gasoline and diesel margins have increased by less than 1 percent since last *Petroleum Watch* published in August.

Petroleum product margins in California were relatively quiet until preparations for Hurricane Harvey drove crude oil prices downward. Margin calculations are based on the retail price, excluding taxes of the product, minus the price of the crude oil used to produce the product. Margins are affected by changes in the retail price, as well the price of the crude oil. In California, August gasoline and diesel retail prices rose very slowly (**pages 4 and 5**). But WTI crude prices fell as refineries shut down along the U.S Gulf Coast, with WTI eventually falling below CA-RAC (**page 2**). This decrease in crude oil prices explains why petroleum product margins increased despite a quiet month in retail prices.

Crude to Retail Margins

August 2017 vs 2016
(Percent Change)

Gasoline	**12% higher**
Diesel	**7% higher**

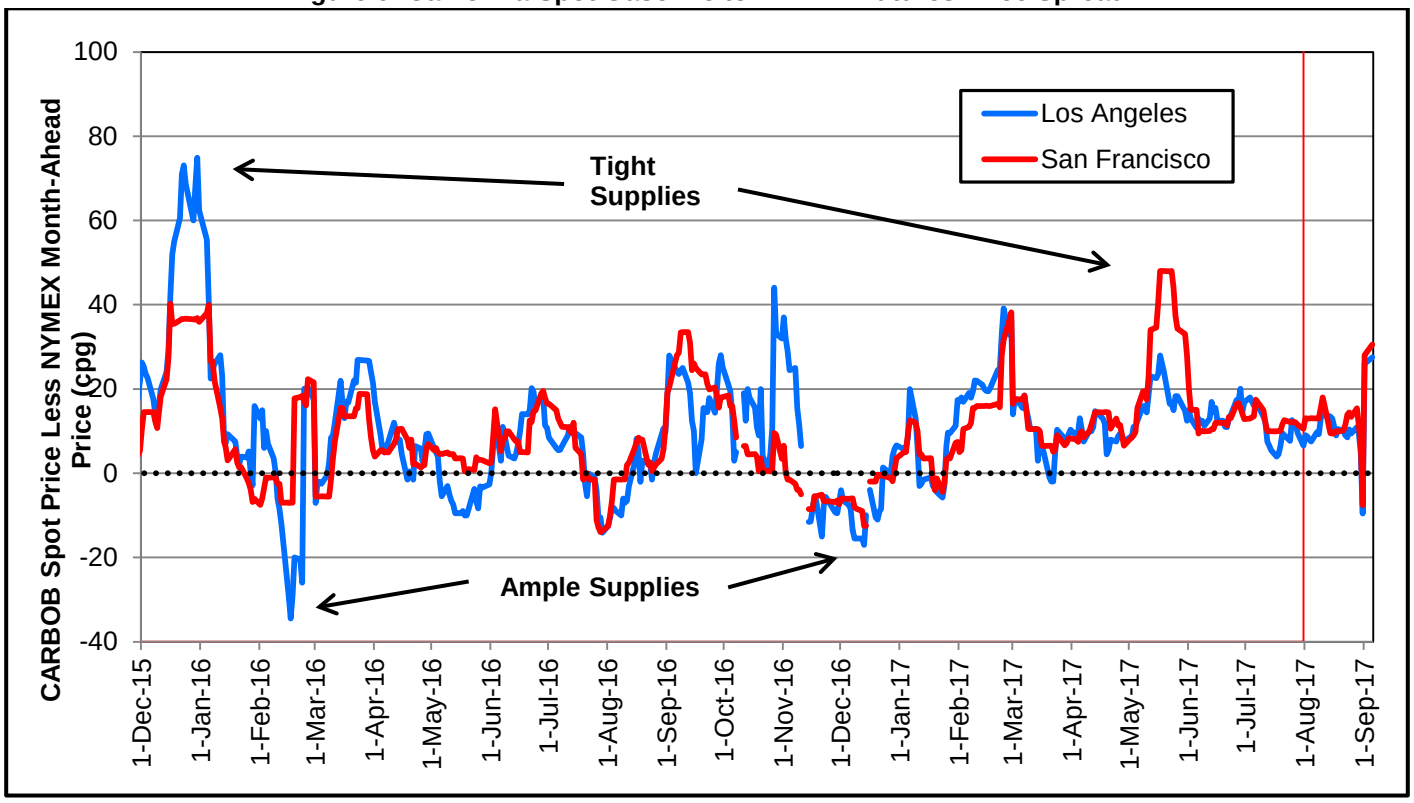
August 2017 Averages

Gasoline	**$1.25**
Diesel	**$1.14**

September 5, 2017

Gasoline	**$1.37**
Diesel	**$1.26**

Figure 6: California Spot Gasoline to NYMEX Futures Price Spread



Source: U.S. EIA and OPIS

Los Angeles (LA) and San Francisco (SF) gasoline spot prices were at a premium to New York Mercantile Exchange (NYMEX) gasoline futures contracts throughout August (**Figure 6**), until August 31 when the NYMEX futures price skyrocketed to $2.14 in the aftermath of Hurricane Harvey (**page 1**). The nation's petroleum fuels infrastructure was significantly affected, causing NYMEX gasoline futures prices to increase steeply every day from August 28 to August 31. On August 31, the NYMEX futures price increased by $0.26, the highest one-day increase since March 1, 2012. The average LA-less-NYMEX and SF-less-NYMEX price differentials were $0.11 and $0.13, respectively.

On August 10, news of extended maintenance at the Andeavor Martinez refinery raised the SF spot differentials to $0.18, while unplanned maintenance at Chevron El Segundo increased the LA differential to $0.14. On August 31, 2017, however, the NYMEX futures price spiked and reduced the LA and SF spot-differentials overnight to -$0.10 and -$0.08, respectively, the deepest discounts since gasoline overproduction in December 2016. The NYMEX futures price fell the next day, September 1, due to a combination of an emergency release of the Strategic Petroleum Reserve **(page 1)** and a move from NYMEX September to October contract pricing, which moved the spot differentials back up to $0.26 and $0.28 by September 1.

Gasoline Spot–Futures Spread

August 2017 vs 2016

Los Angeles	12¢ higher
San Francisco	12¢ higher

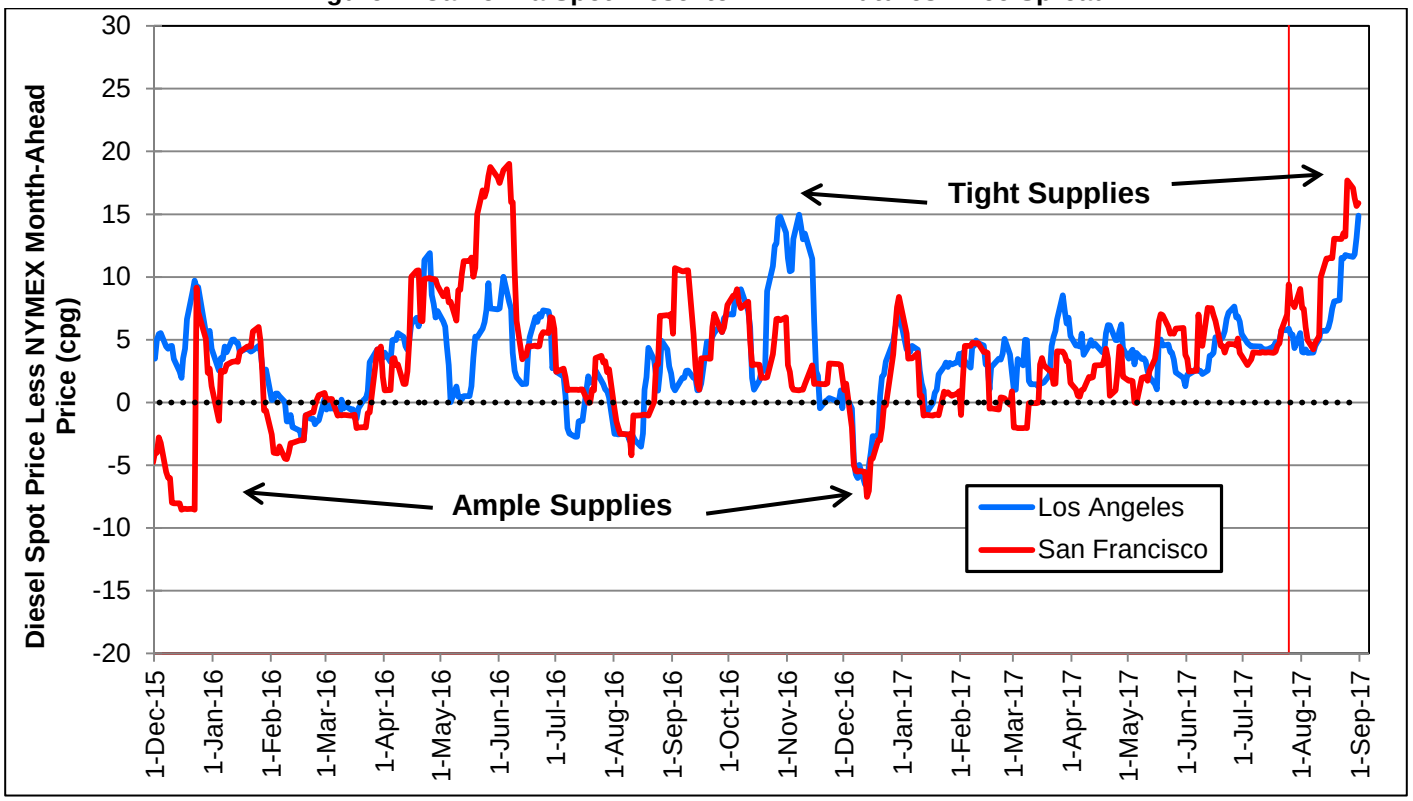
August 2017 Averages

Los Angeles	11¢
San Francisco	13¢

September 5, 2017

Los Angeles	28¢
San Francisco	31¢

Figure 7: California Spot Diesel to NYMEX Futures Price Spread



Source: U.S. EIA and OPIS

Both LA and SF less-NYMEX diesel differential prices were $0.06 each on August 8 and were well above the yearly average of $0.04 and $0.03, respectively (**Figure 7**). Thereafter, the LA and SF spreads increased dramatically through most of August by setting this year's high at $0.12 for LA and $0.18 for SF on August 25. As a result, the LA and SF spot market ended August at the highest premium of 2017.

The LA less-NYMEX spread has averaged $0.01 more than SF less-NYMEX spread for most of this year. But for August, the SF spot market price was more aggressive than the LA diesel spot market price, which kept the LA less-NYMEX spread $0.03 lower. Despite this, LA less-NYMEX was 65 percent higher and averaged $0.11 during August compared to July.

The SF less-NYMEX diesel spread was at $0.08 on August 1 and decreased $0.04 a week later to $0.04 on August 7; the next three weeks, the SF spread increased $0.12 to end August 31 at $0.16. This increase was 133 percent higher and averaged $0.06 more when compared to July.

Diesel Spot–Futures Spread

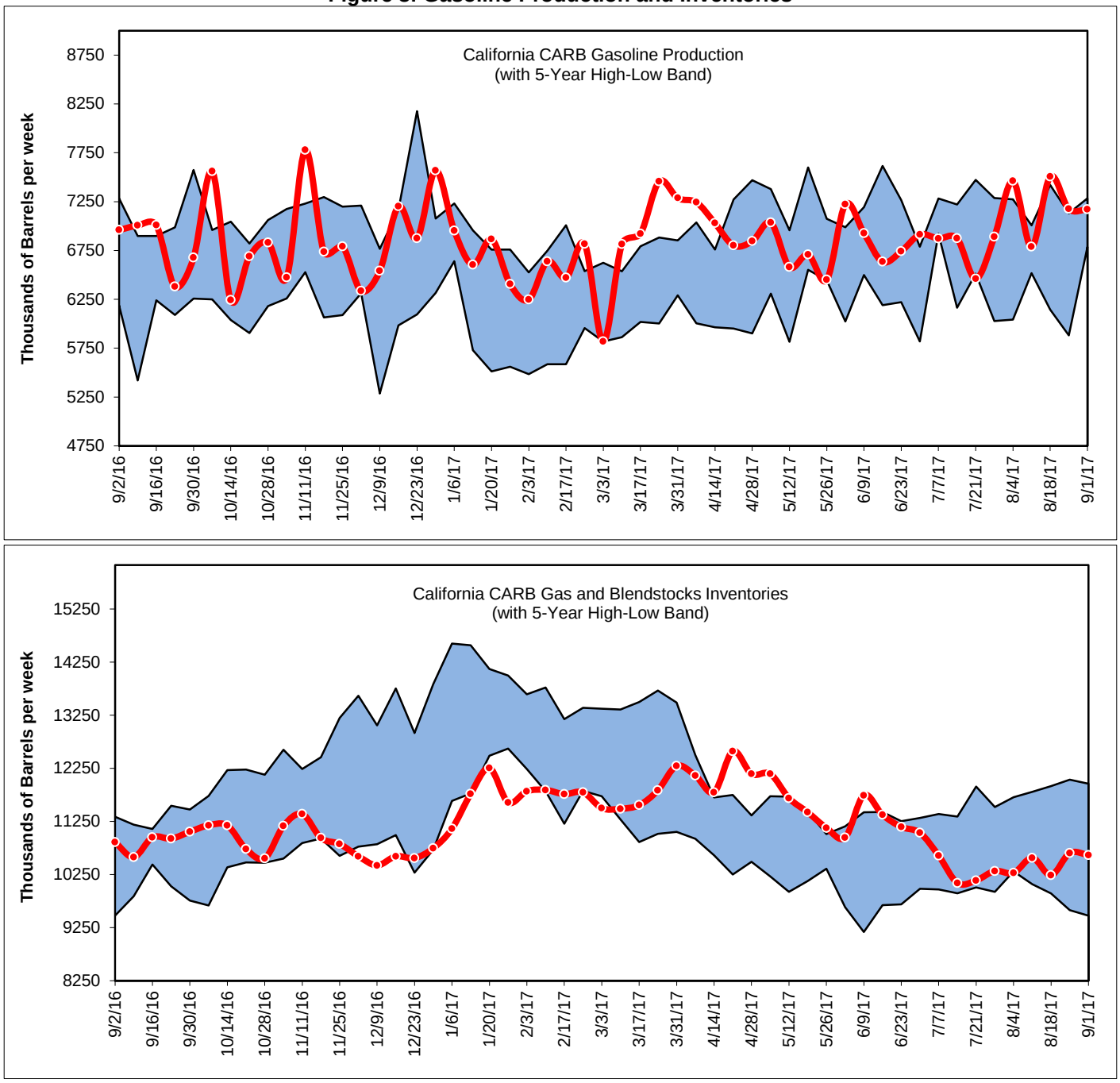
August 2017 vs 2016	
Los Angeles	8¢ higher
San Francisco	10¢ higher

August 2017 Averages	
Los Angeles	8¢
San Francisco	11¢

September 5, 2017	
Los Angeles	13¢
San Francisco	17¢

California Gasoline and Diesel Production and Inventories

Figure 8: Gasoline Production and Inventories

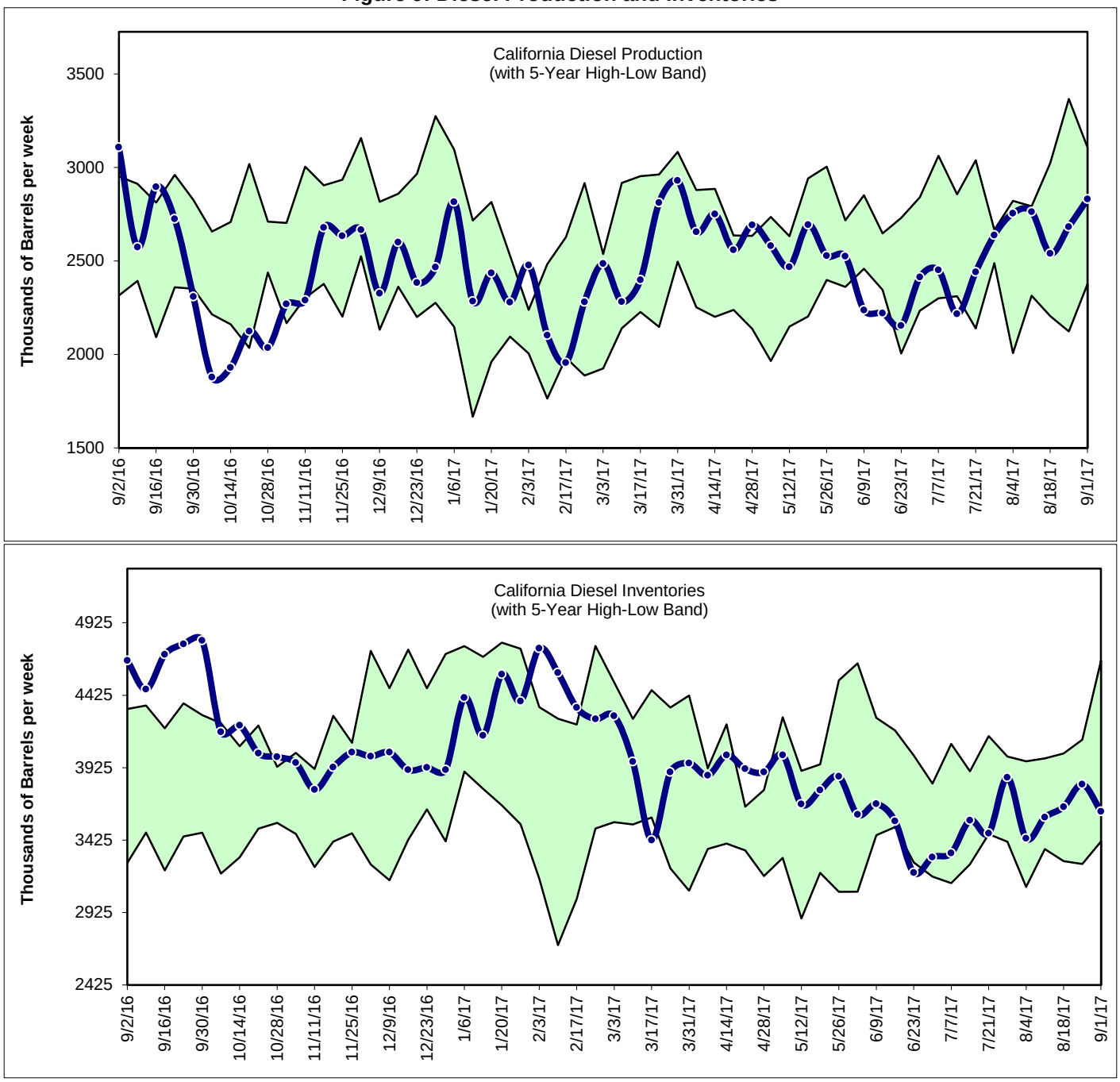


Source: PIIRA data

California gasoline production increased to 7.4 million barrels per week (bpw) on August 4 (**Figure 8**). Production climbed up to 7.5 million bpw on August 18 but flattened out to 7.1 million bpw on the weeks of August 25 and September 1. California gasoline production remained on the upper limits of the five-year band for the past five weeks.

California gasoline inventories began August just below the five-year range at 10.2 million barrels on August 4, but inventory levels increased 0.4 million barrels at the end of a five-week period. This brought gasoline inventory levels to 10.6 million barrels on September 1, well within the five-year band range.

Figure 9: Diesel Production and Inventories



Source: PIIRA data

California diesel production started off strong with 2.7 million bpw produced on the weeks of August 4 and August 11 before hitting a monthly low of 2.5 million bpw on August 18. Production then increased to 2.8 million bpw on September 1. California stayed well within the five-year band, but diesel production decreased 5 percent compared to 2016 (**Figure 9**).

California diesel inventories steadily increased reaching a peak of 3.8 million barrels on August 25 before settling down to 3.6 million barrels on September 1. In the past five weeks, diesel inventories increased 0.2 million but one still down 11 percent when compared to last year's inventory levels set on September 2, 2016.