



THE POTENTIAL IMPACT OF TROPICAL STORM HARVEY ON THE PRICE AND AVAILABILITY OF PETROLEUM PRODUCTS

KEY FINDINGS

Areas of Concern

National gasoline prices have begun to rise from \$2.347 on August 23, 2017—the day before Tropical Storm Harvey was upgraded to Hurricane Harvey—to \$2.402 on August 29, 2017. The rate of price increases appears to be rising.

As expected, the largest weekly gasoline price changes are occurring in areas that are least likely to be resupplied by sea. Kentucky prices have risen the most, at \$0.123 per gallon, South Carolina, Georgia, West Virginia and Ohio have risen by about \$0.10, per gallon. North Carolina, Alabama, Delaware, and Tennessee have increased by about \$0.07 - \$0.09 per gallon.

Supply Indicators

The following are indicators of excessive crude oil builds, which are indicative of continued refinery closures and problems with moving crude oil, by pipeline, from petroleum terminals to the refineries:¹

- Reports of crude oil builds in Cushing, Oklahoma (OK), which is reported weekly by the Department of Energy's Energy Information Administration (EIA)
- West Texas Intermediate prices continuing to fall on the New York Mercantile Exchange
- Price differentials between West Texas Intermediate and Brent widening

Gasoline Availability Indicators

The following are indicators of potential gasoline shortages:

- Colonial Pipeline reports supply issues
- Gasoline Reformulated Blendstock for Oxygenate Blending prices surging on the New York Mercantile Exchange
- Gas Buddy or AAA prices changing rapidly, particularly in regions that cannot receive gasoline shipments by sea

BACKGROUND

As of August 30, 2017, there are no reports or evidence of gasoline, diesel fuel, or heating oil ("petroleum products") shortages outside of the area directly affected by Hurricane Harvey. However, evidence is mounting that gasoline (and diesel fuel) disruptions could occur if the Texas and Louisiana refineries remain closed.

¹ Crude oil and petroleum are interchangeable terms.

This product was shared with the United States Department of Energy, the United States Department of Transportation, and the United States Department of Homeland Security.

Refineries

There are 141 operating refineries in the United States, 30 of which are in Texas.² Table 1 lists the status of each of the 21 identified refineries in the Corpus Christi, TX (TX) to Lake Charles, Louisiana (LA) area. Nine refineries in the area are listed as closed while an additional five that are currently open, may close due to the lack of crude oil. Two of the 21 refineries that are open and indications are that they will continue to operate. Two refineries in the Corpus Christi, TX area are likely to re-open shortly. The status of three of the 21 refineries are unknown, though these are among the smallest of the refineries.

TABLE 1: STATUS OF PETROLEUM REFINERIES IN AFFECTED AREA

REFINERY	LOCATION	CAPACITY (MMBPD ⁷)	NOTES
Baytown (ExxonMobil)	Baytown, TX	561	Closed ⁸
Beaumont (Exxon Mobil)	Beaumont, TX	362	Closed due to high water at the facility. ⁹
Corpus Christi (Buckeye)	Corpus Christi, TX	50	Unknown ¹⁰
Corpus Christi (Citgo)	Corpus Christi, TX	158	Closed ¹¹ ; Reviewing any damage. ¹²
Corpus Christi (Koch)	Corpus Christi, TX	296	Beginning a restart. ¹³
Corpus Christi (Magellan)	Corpus Christi, TX	50	Closed ¹⁴
Corpus Christi (Valero)	Corpus Christi, TX	293	Closed ¹⁵ ; No damage found. ¹⁶
Deer Park (Shell Oil)	Deer Park, TX	326	Closed ¹⁷

² DOE/EIA, "Number and Capacity of Petroleum Refineries" on June 21, 2017 at [https://www.eia.gov/dnav/pet/pet_pnp_cap1_a_\(na\)_800_Count_a.htm](https://www.eia.gov/dnav/pet/pet_pnp_cap1_a_(na)_800_Count_a.htm), accessed August 29, 2017.

⁷ MMBP - million barrels per day.

⁸ Bloomberg, "Gasoline Jumps, Oil Slips as Harvey Slams Texas Refinery Center", on August 28, 2017 at http://www.rigzone.com/news/oil_gas/a/151556/Gasoline_Jumps_Oil_Slips_as_Harvey_Slams_Texas_Refinery_Center, accessed August 29, 2017.

⁹ New York Times, "Harvey Threatens More U.S. Gulf Refineries, Supply Constraints Emerge" on August 29, 2017 at <https://www.nytimes.com/reuters/2017/08/29/business/29reuters-storm-harvey-energy.html?mcubz=1>, accessed August 29, 2017.

¹⁰ Platts, "Oil Factbox: Refineries Now Facing Brunt of Harvey-Related Flooding," on August 28, 2017 at <https://www.platts.com/latest-news/oil/newyork/oil-factbox-refineries-now-facing-brunt-of-harvey-21772848>, accessed August 29, 2017.

¹¹ Platts, "Oil Factbox: Refineries Now Facing Brunt of Harvey-Related Flooding," on August 28, 2017 at <https://www.platts.com/latest-news/oil/newyork/oil-factbox-refineries-now-facing-brunt-of-harvey-21772848>, accessed August 29, 2017.

¹² Argus, "Texas Refiners Continue Reductions for Flooding: Update," at August 28, 2017 at <http://www.argusmedia.com/pages/NewsBody.aspx?id=1524153&menu=yes>, accessed August 29, 2017.

¹³ Wall Street Journal, "Harvey Forces U.S.'s Largest Refinery to Cut Output to 60% Capacity" on August 29, 2017 at <https://www.wsj.com/articles/harvey-forces-u-s-s-largest-refinery-to-cut-output-to-60-capacity-1504029040?tesla=y>, accessed August 29, 2017.

¹⁴ Platts, "Oil Factbox: Refineries Now Facing Brunt of Harvey-Related Flooding," on August 28, 2017 at <https://www.platts.com/latest-news/oil/newyork/oil-factbox-refineries-now-facing-brunt-of-harvey-21772848>, accessed August 29, 2017.

¹⁵ Platts, "Oil Factbox: Refineries Now Facing Brunt of Harvey-Related Flooding," on August 28, 2017 at <https://www.platts.com/latest-news/oil/newyork/oil-factbox-refineries-now-facing-brunt-of-harvey-21772848>, accessed August 29, 2017.

¹⁶ Argus, "Texas Refiners Continue Reductions for Flooding: Update," at August 28, 2017 at <http://www.argusmedia.com/pages/NewsBody.aspx?id=1524153&menu=yes>, accessed August 29, 2017.

¹⁷ Bloomberg, "Gasoline Jumps, Oil Slips as Harvey Slams Texas Refinery Center", on August 28, 2017 at http://www.rigzone.com/news/oil_gas/a/151556/Gasoline_Jumps_Oil_Slips_as_Harvey_Slams_Texas_Refinery_Center, accessed August 29, 2017.

REFINERY	LOCATION	CAPACITY (MMBPD ⁷)	NOTES
Houston (LyondellBasell)	Houston, TX	264	Operating at a reduced rate. ¹⁸
Houston (PetroMax)	Houston, TX	25	Current status unknown, but vulnerable to shut down if still operating. ¹⁹
Houston (Valero)	Houston, TX	191	Operating ²⁰
Pasadena (Petrobras)	Pasadena, TX	112	Closed ²¹
Motiva (Saudi Aramco)	Port Arthur, TX	603	Producing at 60% of capacity; significant problem getting crude in and product out. ²² May close completely. ²³
Port Arthur (Total)	Port Arthur, TX	226	Production cut to a minimum. ²⁴
Port Arthur (Valero)	Port Arthur, TX	335	At least partially closed. ²⁵
Sweeny (Phillips 66)	Sweeny, TX	247	Closed ²⁶
Galveston Bay (Marathon)	Texas City, TX	451	Running out of crude. ²⁷
Three Rivers (Valero)	Three Rivers, TX	89	Closed ²⁸ ; No damage found. ²⁹
Lake Charles (Calcasieu Refining)	Lake Charles, LA	104	Unknown
Lake Charles (Citgo)	Lake Charles, LA	425	Reduced production due to supply issues. ³⁰
Westlake (Phillips66)	Westlake, LA	260	Off-line for planned maintenance. ³¹

¹⁸ Chemical & Engineering News, "Harvey Stalls Chemical, University Activities on the Gulf Coast", on August 28, 2017 at <http://cen.acs.org/articles/95/web/2017/08/Harvey-stalls-chemical-university-activities.html>, accessed August 28, 2017.

¹⁹ Morningstar, "Morningstar Says Eleven Oil Refining Plants Vulnerable to Storm Harvey", on August 29 at <http://timesofindia.indiatimes.com/business/international-business/morningstar-says-eleven-oil-refining-plants-vulnerable-to-storm-harvey/articleshow/60279930.cms>, accessed August 29, 2017.

²⁰ San Antonio Business Journal, "Valero Keeps Houston Area Refineries in Operation as Harvey Moves", on August 28, 2017 at <https://www.bizjournals.com/sanantonio/news/2017/08/28/valero-keeps-houston-area-refineries-in-operation.html>, accessed August 29, 2017.

²¹ Platts, "Oil Factbox: Refineries Now Facing Brunt of Harvey-Related Flooding," on August 28, 2017 at <https://www.platts.com/latest-news/oil/newyork/oil-factbox-refineries-now-facing-brunt-of-harvey-21772848>, accessed August 29, 2017.

²² Wall Street Journal, "Harvey Forces U.S.'s Largest Refinery to Cut Output to 60% Capacity" on August 29, 2017 at <https://www.wsj.com/articles/harvey-forces-u-s-s-largest-refinery-to-cut-output-to-60-capacity-1504029040?tesla=y>, accessed August 29, 2017.

²³ New York Times, "Harvey Threatens More U.S. Gulf Refineries, Supply Constraints Emerge" on August 29, 2017 at <https://www.nytimes.com/reuters/2017/08/29/business/29reuters-storm-harvey-energy.html?mcubz=1>, accessed August 29, 2017.

²⁴ New York Times, "Harvey Threatens More U.S. Gulf Refineries, Supply Constraints Emerge" on August 29, 2017 at <https://www.nytimes.com/reuters/2017/08/29/business/29reuters-storm-harvey-energy.html?mcubz=1>, accessed August 29, 2017.

²⁵ Bloomberg, "Texas Refiners Spared by Harvey Brace for Storm's Second Round", on August 28, 2017 at <https://www.bloomberg.com/news/articles/2017-08-28/texas-refiners-spared-by-harvey-now-sweat-storm-s-second-round>, accessed August 29, 2017.

²⁶ Platts, "Oil Factbox: Refineries Now Facing Brunt of Harvey-Related Flooding," on August 28, 2017 at <https://www.platts.com/latest-news/oil/newyork/oil-factbox-refineries-now-facing-brunt-of-harvey-21772848>, accessed August 29, 2017.

²⁷ Bloomberg, "Texas Refiners Spared by Harvey Brace for Storm's Second Round", on August 28, 2017 at <https://www.bloomberg.com/news/articles/2017-08-28/texas-refiners-spared-by-harvey-now-sweat-storm-s-second-round>, accessed August 29, 2017.

²⁸ Platts, "Oil Factbox: Refineries Now Facing Brunt of Harvey-Related Flooding," on August 28, 2017 at <https://www.platts.com/latest-news/oil/newyork/oil-factbox-refineries-now-facing-brunt-of-harvey-21772848>, accessed August 29, 2017.

²⁹ Argus, "Texas Refiners Continue Reductions for Flooding: Update," at August 28, 2017 at <http://www.argusmedia.com/pages/NewsBody.aspx?id=1524153&menu=yes>, accessed August 29, 2017.

³⁰ Reuters, "Citgo Lake Charles Cuts Production Due to Storm-Tightened Supply," on August 28, 2017 at <https://www.reuters.com/article/us-storm-harvey-citgo-lakecharles-idUSKCN1B90IM?il=0>, accessed August 29, 2017.

³¹ Reuters, "Phillips 66 Shuts Gasoline-Producing Unit at Westlake Refinery", on August 24, 2017 at <http://www.reuters.com/article/us-refinery-operations-phillips-66-westl-idUSKCN10Z2BN>, accessed August 29, 2017.

Pipelines

Approximately 76 percent of all petroleum product that move by pipeline from Petroleum Administration for Defense Districts (PADD) 3, which includes the Gulf Coast, terminates in PADD 1 (East Coast).³² The primary pipeline between PADD 3 and PADD 1 is the Colonial Pipeline. Another 19 percent of the petroleum products move from PADD 3 to PADD 2 (Midwest). The primary pipeline between PADD 3 and PADD 2 is the Explorer Pipeline.

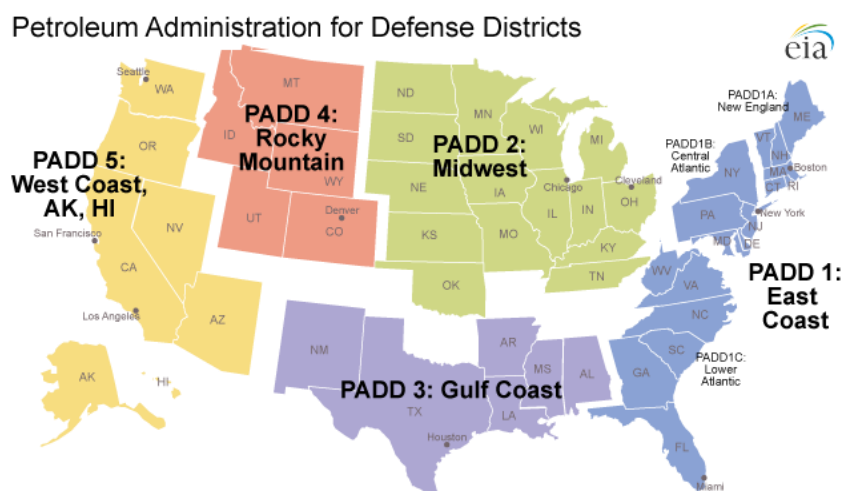


FIGURE I— PETROLEUM ADMINISTRATION FOR DEFENSE DISTRICTS³³

The critical petroleum product pipeline in the area is the Colonial Pipeline. The Colonial Pipeline moves 2.5 million barrels per day (mmbpd) of product from the Gulf Coast to the southeastern United States and up to the New York City area. This total represents about one-half of the total product used along the East Coast.³⁴ Coastal cities, such as New York City, also import petroleum products by sea. Gasoline is imported into New York Harbor from Europe as it is in less demand in Europe than diesel, which is exported from the United States to Europe because of lower diesel demand domestically. The Colonial Pipeline is the primary source of gasoline for inland population areas that cannot receive product by water (e.g., Atlanta).

The Colonial Pipeline is continuing operations, though service out of Houston has been disrupted.³⁵ Colonial is reporting receiving shipment from Beaumont, TX, Port Arthur, TX, and Lake Charles, LA. The Colonial Pipeline Company established a *Harvey Storm Response* website at <https://harvey.colonialresponse.com/>.

The Explorer Pipeline shuttered parts of their operations due to the lack of supply.³⁶ The Explorer Pipeline moves 0.7 million barrels per day from Houston through Oklahoma and Missouri before terminating in Illinois. The supply on the Explorer Pipeline is so low that pressures have fallen, which led to the closure.³⁷ Operations are expected to resume on Friday, September 1, 2017, when supply should generate sufficient pressure. Pipelines from Cushing, OK and supply from Canada could feed refineries throughout the Midwest and mitigate some of the loss of product moving on the Explorer Pipeline.

³² DOE/EIA, "Movement by Pipeline between PAD Districts", on July 31, 2017 at https://www.eia.gov/dnav/pet/pet_move_pipe_a_EPP0_LMV_mbbbl_a.htm, accessed August 29, 2017.

³³ DOE/EIA, "PADD regions enable regional analysis of petroleum product supply and movements," on February 7, 2012 at <https://www.eia.gov/petroleum/marketing/monthly/pdf/paddmap.pdf>, assessed August 30, 2017.

³⁴ Wall Street Journal, "Harvey's Lessons for America's Stretched Energy Infrastructure" on August 29, 2017 at <https://www.wsj.com/articles/harveys-lessons-for-americas-stretched-energy-infrastructure-1503947171?tesla=y>, accessed August 29, 2017.

³⁵ Colonial Pipeline Company, "Media Update #1" on August 28, 2017 at <https://harvey.colonialresponse.com/>, accessed August 29, 2017.

³⁶ New York Times, "Harvey Threatens More U.S. Gulf Refineries, Supply Constraints Emerge" on August 29, 2017 at <https://www.nytimes.com/reuters/2017/08/29/business/29reuters-storm-harvey-energy.html?mcubz=1>, accessed August 29, 2017.

³⁷ Platts, "Oil Factbox: Refinery outages, port closures spread on Harvey", on August 29, 2017 at <https://www.platts.com/latest-news/oil/newyork/oil-factbox-refinery-outages-port-closures-spread-26795344>, accessed August 29, 2017.

Other pipelines, both those that move petroleum from petroleum terminals to refineries and those that move petroleum products from refineries to terminals for final delivery to end-users, have closed. Some other common issues causing the closures include:³⁸

- Shut downs due to lack of product from refineries
- Power and communication outages
- Erosion and flooding along rivers and bayous
- Concerns with employee fatigue and control room staffing
- Access to right-of-ways for inspections before re-start

Pipelines remain at risk from erosion and flooding along rivers and bayous. Furthermore access to the pipeline facilities and right-of-ways remains limited due to severe flooding.

Ports

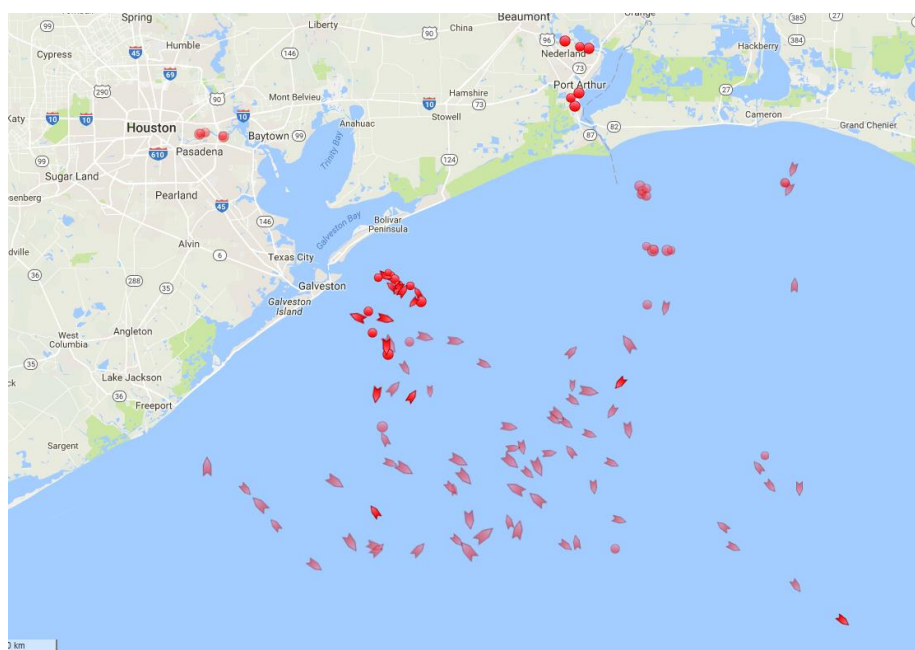


FIGURE 2—PETROLEUM TANKERS WAITING TO OFFLOAD CRUDE OIL AS OF AUGUST 28, 2017³⁹

Supply is also disrupted by the closing of ports. The Gulf Coast imports about 3 million barrels per day of crude oil, primarily from Venezuela and Saudi Arabia.^{40,41} As figure 2, shows, petroleum imports have ceased because of the port and refinery closures. Petroleum tankers remain in the Gulf of Mexico awaiting the reopening of the Houston Ship Channel.

Ports in Lake Charles, LA and Port Arthur, TX were at condition Yankee Monday, meaning that they are closed to inbound traffic.⁴² Therefore, the refineries cannot receive crude oil. The ports of Houston-Galveston, Texas City, Galveston, and Freeport, TX all remain closed for both inbound and outbound traffic.

³⁸ Department of Transportation/Pipeline and Hazardous Materials Safety Administration email dated August 30, 2017 at 07:55ET.

³⁹ Marine Traffic on August 28, 2017 at <https://www.marinetraffic.com/en/ais/home/centerx:-93.8/centery:29.1/zoom:9>, accessed August 28, 2017.

⁴⁰ DOE/EIA, "Weekly Imports & Exports," on August 23, 2017 at https://www.eia.gov/dnav/pet/pet_move_wkly_dc_R30-Z00_mbbldpd_4.htm, accessed August 28, 2017.

⁴¹ DOE/EIA, "PAD District Imports by Country of Origin," on July 31, 2017 at https://www.eia.gov/dnav/pet/pet_move_impdp_a2_r30_ep00_ip0_mbbldpd_a.htm, accessed August 28, 2017.

⁴² Platts, "Oil Factbox: Refineries Now Facing Brunt of Harvey-Related Flooding," on August 28, 2017 at <https://www.platts.com/latest-news/oil/newyork/oil-factbox-refineries-now-facing-brunt-of-harvey-21772848>, accessed August 29, 2017.

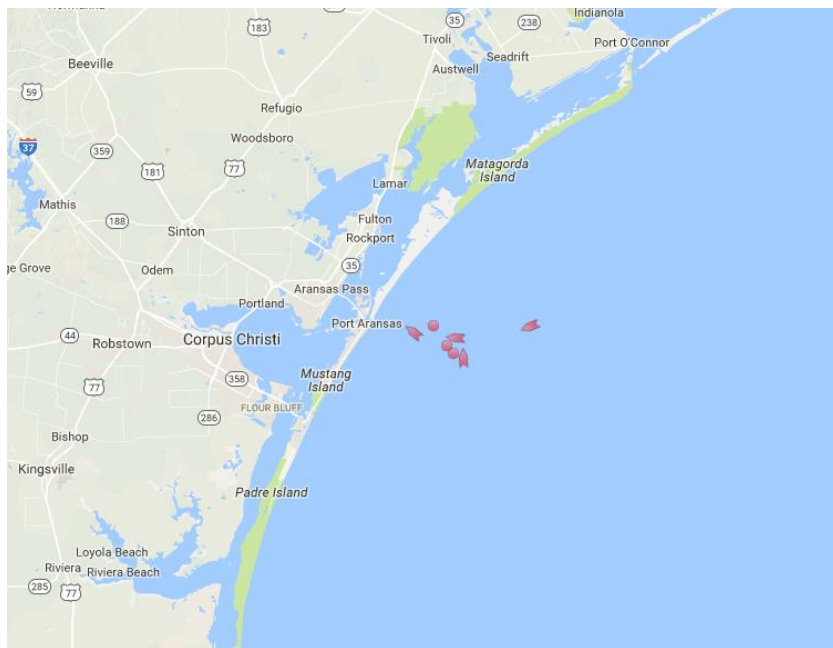


FIGURE 3— PETROLEUM TANKERS WAITING TO LOAD CRUDE OIL⁴³

The United States exports crude oil, primarily to Canada, China, and the Netherlands.^{44,45} The United States also exports a significant amount of petroleum products to South and Central America, Mexico, Canada, Europe, and Asia.⁴⁶ (In turn, the United States imports petroleum products, primarily along the East Coast.) Much of this export (except for Canada) occurs in Corpus Christi (figure 3). As the tankers cannot load due to the ports being closed in Corpus Christi, terminals must increase the amount of petroleum that they are holding.

The Port of Corpus Christi reported moderate damage and intends to re-open by September 4, 2017.⁴⁷ An oil drilling ship sank a tugboat and beached at the entrance of the shipping channel, which delayed the re-opening of the port.⁴⁸

Oil Fields

One of the major domestic petroleum fields, the Eagle Ford, which covers an area roughly defined by Corpus Christi, San Antonio and the Mexican border, was flooded and many operators ceased production.⁴⁹ Eagle Ford is the second largest oil producing region behind the Permian Basin, which is also in Texas, though the Permian was unaffected by the hurricane.⁵⁰ Production is restarting in the Eagle Ford and at off-shore facilities in the Gulf of Mexico, much of which shuttered ahead of Hurricane Harvey.⁵¹

⁴³ Marine Traffic on August 28, 2017 at <https://www.marinetraffic.com/en/ais/home/centerx:-93.8/centery:29.1/zoom:9>, accessed August 28, 2017.

⁴⁴ DOE/EIA, "Export by Destination", on July 31, 2017 at https://www.eia.gov/dnav/pet/PET_MOVE_EXPC_A_EPC0_EEX_MBBLPD_M.htm, accessed August 28, 2017.

⁴⁵ The Permian Basin produces a high grade of petroleum, which is not compatible with the Gulf Coast refineries. The Gulf Coast refineries are designed to accept low quality crudes from Canada, Venezuela and Saudi Arabia.

⁴⁶ DOE/EIA, "Oil: Crude and Petroleum Products Explained," on May 8, 2017 at https://www.eia.gov/energyexplained/index.cfm?page=oil_imports, accessed August 28, 2017.

⁴⁷ Argus, "Corpus Christi Port Sees Moderate Damage", on August 28, 2017 at <http://www.argusmedia.com/news/article/?id=1523977>, accessed August 29, 2017.

⁴⁸ Transport Topics, "Port of Corpus Christi Remains Closed After Drilling Ship Breaks from Dock, Sinks Tugboat", on August 29, 2017 at <http://www.ttnews.com/articles/port-corpus-christi-remains-closed-after-drilling-ship-breaks-dock-sinks-tugboat>, accessed August 29, 2017.

⁴⁹ DOE, "Tropical Storm Harvey: Situation Report (Report #7|Update #6) on August 28, 2017."

⁵⁰ DOE/EIA, "Drilling Productivity Report" on August 14, 2017 at <https://www.eia.gov/petroleum/drilling/#tabs-summary-2>, accessed August 28, 2017.

⁵¹ Platts, "Oil Factbox: Refineries Now Facing Brunt of Harvey Related Flooding", on August 28, 2017 at <https://www.platts.com/latest-news/oil/newyork/oil-factbox-refineries-now-facing-brunt-of-harvey-21772848>, accessed August 29, 2017.

ANALYSIS

Hurricane Harvey has disrupted the ability of exploration and production companies to move crude oil to refineries and the ability of refineries to produce and ship gasoline, diesel fuel, and heating oil.

Petroleum Supply

Roughly, two-thirds of crude oil comes from North American sources to refineries by pipeline, and one-third of crude comes by sea. The North American supply chain is disrupted because of the previously mentioned slowdown at the Eagle Ford play, some petroleum pipeline disruptions coming into the refineries, but primarily due to the refiners not operating. Since the Gulf Coast accounts for about one-half of the United States refining capacity, most of the petroleum pipelines ultimately terminate in Texas. The critical juncture for pipelines is in Cushing, OK, the self-professed “Pipeline Crossroads of the World”.⁵² Many of the major oil plays deliver petroleum to Cushing, where the petroleum is mixed to deliver specific recipes to refineries. As production continues without the commensurate amount of refining, the terminals likely are storing an increasing amount of petroleum. Because of the centrality of Cushing to the supply of crude oil, EIA provides weekly estimates of amounts in storage. Increasing storage would be an indicator of oversupply.

If the supply of petroleum is increasing into storage because demand from the shuttered refineries has decreased, then the price of petroleum should fall. On Wednesday August 23, 2017, the day prior to Hurricane Harvey being designated a hurricane, the price for West Texas Intermediate (WTI) on the New York Mercantile Exchange (NYMEX), which is the benchmark U.S. price, was \$48.41 a barrel.⁵³ On Monday August 29, 2017, the price settled at \$46.28 for a loss of \$2.13 per barrel.

As the disruption from Hurricane Harvey is a domestic problem, there should be little impact to world oil prices. Brent crude, which is the worldwide benchmark for crude oil, traded on the NYMEX at \$52.57 on August 23, 2017 and \$51.89 on August 29, 2017 for a loss of \$0.68 per barrel.^{54,55} The gap between WTI and Brent increased from \$4.16 per barrel to \$5.61 per barrel. This widening differential is an indicator of a petroleum oversupply building in the United States. As the situation normalizes, this gap should return to a more historical differential.

The port closures are also having an impact on the supply of crude oil. Because much of the 7 million barrels per day of crude oil that the United States imports is not coming to market because of the closed ports, worldwide supplies are anticipated to rise. This partially accounts for why Brent prices have fallen since August 23, 2017, the day prior to Hurricane Harvey’s landfall. The reopening of the ports and the restarting of the refineries should lead to higher Brent prices, which would be another indicator of the situation returning to pre-hurricane levels.

Petroleum Product Supply (Primarily Gasoline)

The United States has about 23.7 days of supply on hand, a level both consistent over the past six weeks and with historical seasonal levels.⁵⁶ Gasoline supplies may remain sufficient because of competing forces. The Texas refineries have been shuttered for approximately 4 days, which should lower supply. However, other refineries

⁵² Tulsa World, “Cushing: The Pipeline Crossroads of the World”, on February 21, 2016 at http://www.tulsaworld.com/business/energy/cushing-the-pipeline-crossroads-of-the-world/article_bba76566-248d-544b-b834-879764e90f2d.html, accessed August 29, 2017.

⁵³ Technically, the NYMEX prices quoted are for the October contract that settles at the end of September. These are the prices listed in financial papers and on websites. To be more accurate, one should use the spot prices, which represent the prices paid for immediate delivery. However, spot prices are not as transparent. Oilprice.com provides a list of spot prices for various types of crude and delivery points; United States prices are listed as “End of Day” prices for the prior day (<http://oilprice.com/oil-price-charts>).

⁵⁴ WTI pricing can be found at: <http://www.cmegroup.com/trading/energy/crude-oil/brent-crude-oil-last-day.html>

⁵⁵ Brent pricing can be found at: <http://www.cmegroup.com/trading/energy/crude-oil/light-sweet-crude.html>

⁵⁶ DOE/EIA, “Weekly U.S. Days of Supply of Total Gasoline,” on August 23, 2017 at https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=W_EPM0_VSD_NUS_DAYS&f=W, accessed August 28, 2017.

remain operational including some, in other parts of the country, which are increasing production.⁵⁷ Further, there is demand destruction in the areas affected by Hurricane Harvey. Additionally, European and Asian refiners, anticipating that gasoline prices will be higher in the United States than Europe or Asia, are seeking to move gasoline to the United States.^{58,59} This could provide additional supplies to coastal regions or inland areas that can be supplied, by pipelines, from the coastal regions. There may be areas that can receive gasoline by rail.

Gasoline, called Gasoline Reformulated Blendstock for Oxygenate Blending (RBOB) also trades on the NYMEX.⁶⁰ Gasoline RBOB prices initially increased from \$1.529 per gallon to \$1.60 when Hurricane Harvey made landfall. Prices quickly dropped back to the \$1.529 level on the belief that there were adequate supplies. Since Sunday August 27, 2017, gasoline RBOB has steadily increased to \$1.625 per gallon.⁶¹ Continued price rises would be an indicator of potential shortages.

Potential supply disruptions, if they were to occur, would likely first manifest as price changes. Gas Buddy and AAA both publish daily prices for the Nation, States, and selected cities. On Wednesday August 23, 2017, the day prior to Hurricane Harvey being upgraded to a hurricane, the national gas prices averaged \$2.347 per gallon.⁶² As of Tuesday August 29, 2017, the national average was \$2.402. Continued price increases would indicate potential supply issues.

As expected, the largest weekly gasoline price changes are occurring in areas that are least likely to be resupplied by sea. Kentucky prices have risen the most, at \$0.123 per gallon, South Carolina, Georgia, West Virginia and Ohio have risen by about \$0.10, per gallon. North Carolina, Alabama, Delaware, and Tennessee have increased by about \$0.07 - \$0.09 per gallon.

The Office of Cyber and Infrastructure Analysis (OCIA) provides innovative analysis to support public and private-sector stakeholders' operational activities and effectiveness and to inform key decisions affecting the security and resilience of the Nation's critical infrastructure. All OCIA products are visible to authorized users at [HSIN-CI](#) and [Intelink](#). For more information, contact OCIA@hq.dhs.gov or visit <http://www.dhs.gov/office-cyber-infrastructure-analysis>.

PDM17192

⁵⁷ New York Times, "Harvey Threatens More U.S. Gulf Refineries, Supply Constraints Emerge" on August 29, 2017 at <https://www.nytimes.com/reuters/2017/08/29/business/29reuters-storm-harvey-energy.html?mcubz=1>, accessed August 29, 2017.

⁵⁸ CNBC, "Europe Gasoline Margins at 4 ½ Month High in Harvey's Wake", on August 29, 2017 at <https://www.cnbc.com/2017/08/29/reuters-america-european-gasoline-margins-at-4-12-month-high-in-harveys-wake.html>, accessed August 29, 2017.

⁵⁹ Platts, "Oil Factbox: Refineries Now Facing Brunt of Harvey Related Flooding", on August 28, 2017 at <https://www.platts.com/latest-news/oil/newyork/oil-factbox-refineries-now-facing-brunt-of-harvey-21772848>, accessed August 29, 2017.

⁶⁰ Gasoline RBOB pricing can be found at: <http://www.cmegroup.com/trading/energy/refined-products/rbob-gasoline.html>.

⁶¹ The quoted price is for the October contract. The September contract, which will close out on Thursday August 31, 2017, is currently quoted at \$1.83 per gallon. This indicates a substantial premium for the immediate delivery of gasoline.

⁶² GasBuddy, "United States Average for Regular", at <http://fuelinsights.gasbuddy.com>, accessed August 29, 2017.

UNCLASSIFIED



**Homeland
Security**

National Protection and Programs Directorate
NPPD Customer Feedback Survey

1. Product Title:

2. Please rate your satisfaction with each of the following:

Very Satisfied (5)	Somewhat Satisfied (4)	Neither Satisfied Nor Dissatisfied (3)	Somewhat Dissatisfied (2)	Very Dissatisfied (1)
-----------------------	---------------------------	---	------------------------------	--------------------------

Timeliness of product

Relevance of product

3. How useful is this product to your mission?

Yes	No	Integrated into one of my own organization's information or analytic products
		If so, which products?
Yes	No	Used contents to improve my own organization's security or resiliency efforts or plans
		If so, which efforts?
Yes	No	Shared contents with government, private sector, or other partners
		If so, which partners?
Yes	No	Other uses (please specify)

4. Do you have questions that this product didn't answer?

Yes No (Please specify)

5. How could this product be improved?

6. Would you like to see more on this topic?

Yes No (Please specify)

7. Are there other topics or questions you would like to see addressed by OCIA?

To help us understand more about your organization so we can better tailor future products, please provide (OPTIONAL):

Name:	Sector:
Organization:	Partner Type:
Contact Number:	State:

[Privacy Act Statement](#)

[Paperwork Reduction Act Compliance Statement](#)

UNCLASSIFIED