

BAKER & O'BRIEN
I N C O R P O R A T E D

Q4 2015: U.S. REFINING MARGINS REGISTER SIGNIFICANT DECLINES

Special Topic: How Has the Crude Oil Price “Crash” Affected U.S. Refining Margins?

Houston, February 11, 2016

Baker & O'Brien, Inc.'s 15Q4 release to PRISM¹ subscribers reveals significant declines in U.S. refining margins compared to the prior quarter. These declines appear to be driven by “across the board” reductions in regional crack spreads. As indicated in the adjacent table, every PADD exhibited an average margin decline in 15Q4 vs. 15Q3. The large margin declines in the inland PADDs 2 and 4 appear to be the result of a more than \$2/Bbl. narrowing of the LLS-WTI price differential. Continued expansion of pipeline capacity to move inland crude oils to the U.S. Gulf Coast (USGC) has removed much of the price advantage that inland refiners previously enjoyed over their USGC counterparts.

PRISM Cash Margins vs. Previous Periods (\$/Bbl.)

	15Q4 vs. 15Q3	15Q4 vs. 14Q4
PADD 1	-1.91	-2.78
PADD 2	-7.60	-2.95
PADD 3	-5.20	0.99
PADD 4	-12.48	-3.65
PADD 5	-5.27	5.99
U.S. Overall	-5.79	0.48

Although a year-over-year comparison of overall U.S. Q4 margins shows a slight improvement (\$0.48/Bbl.), this masks significant differences between PADDs. For example, PADD 5 (the U.S. West Coast) registered a significant margin improvement that was directly related to refined product shortages following operational issues at the ExxonMobil Torrance refinery. This was in stark contrast to year-over-year margin declines in PADDs 1, 2, and 4.

The table below shows that the quarter-to-quarter decline in the USGC LLS 321 crack spread was more than \$7/Bbl. The Chicago WTI 321 crack spread fared even worse, exhibiting more

Key Refining Margin Metrics, \$/Bbl.

	2015	2015	2015	2015	2014
	Dec.	Q4	Q3	Annual	Annual
WTI	37.26	42.10	46.38	48.68	93.10
LLS	38.88	43.56	50.15	52.33	96.74
Brent	38.21	43.68	50.29	52.40	98.91
LLS – Maya	10.19	9.21	7.46	8.27	11.01
USGC LLS 321*	9.58	10.10	17.67	14.70	12.12
USGC LLS 6321**	5.04	6.08	12.25	10.15	8.05
Chicago WTI 321***	11.77	15.21	27.59	21.06	19.05

* LLS deemed conversion to 67% conventional 87R gasoline and 33% ULSD

** LLS deemed conversion to 50% conventional 87R gasoline, 33% ULSD and 17% Fuel Oil

*** WTI deemed conversion to 33% conventional 87R gasoline, 33% RBOB and 33% ULSD

than a \$12/Bbl. decline.

Notwithstanding these recent declines, however, the year 2015 was very good for U.S. refiners. On average, crack spreads were up in almost all markets compared to 2014, and despite the near-term falls, they are still at levels that would be considered “healthy” relative to

historical norms. December and January USGC LLS 321 indicators (\$9.58/Bbl and \$9.25/Bbl.,

¹ PRISM™ is Baker & O'Brien's refinery modeling and database system that includes operational and economic performance details for refineries in the U.S., Canada, Europe, and Asia.

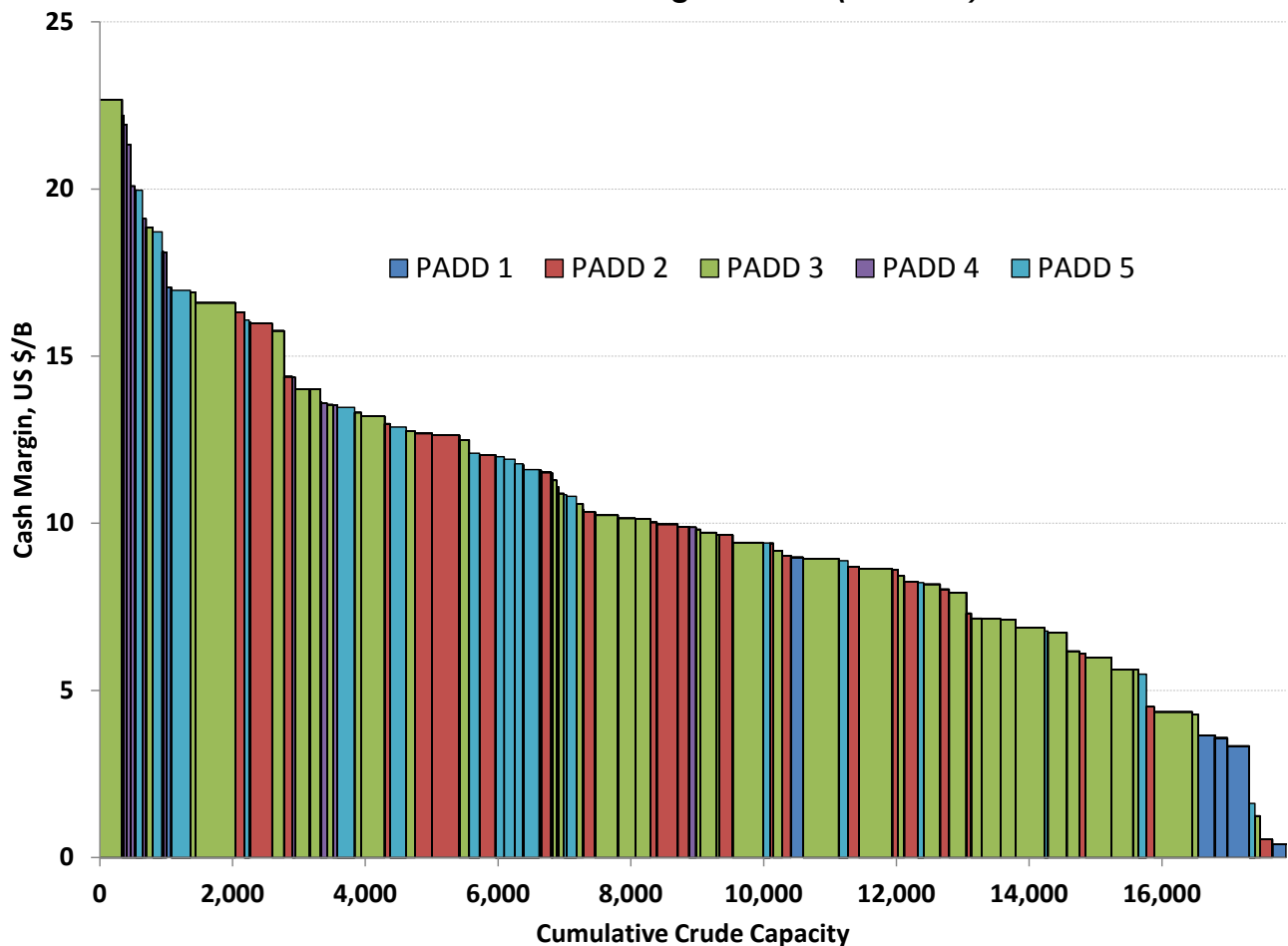
respectively) are running only modestly lower than the five-year average of \$11.11/Bbl. – a period that was exceptional from an historical perspective.

Special Topic: How Has the Crude Oil Price “Crash” Affected U.S. Refining Margins?

On December 7, 2015, the Brent crude oil price fell below \$40/Bbl.—a level that had not been experienced since February 2009. Crude oil prices have continued to deteriorate, with Brent hitting a recent low of just under \$26/Bbl. on January 20, 2016. On a sustained basis, prices this low were last seen in April and May of 2003.

It is a common effect that when crude oil prices fall in absolute terms, refining margins, crack spread indicators, and crude oil price differentials all “compress” (narrow) to reflect the lower pricing structure. However, during the current crude oil price decline, refining margins, although reduced, have remained more robust than normal. The chart below shows the calculated cash margins (vertical axis) by refinery for the entire U.S. as a function of cumulative crude oil processing capacity (horizontal axis) for the period 15Q4. Each bar represents an individual refinery and the bar width is indicative of the refinery’s capacity. The bar colors reflect each refinery’s location (PADD).

U.S. Refineries: Cash Margin Profile (Q4 2015)



A few interesting observations that can be drawn from the chart include:

- During 15Q4, margins remained robust for a large number of refineries.
- PADDs 4 and 5 did better, on average, than the other PADDs.
- With the erosion of inland crude oil price advantage, PADD 2 refining margins have become more widely dispersed across the margin range.
- The lowest refining margin quartile—approximately 4.5 MM Bbl./day of U.S. supply—is populated largely by refineries in PADDs 1 and 3.
- The very lowest margin (highest-cost) group—approximately 1.0 MM Bbl./day of supply—includes almost all of the PADD 1 refineries.

Whether the foregoing observations will be sustained as the year 2016 progresses, and what the impact may be on the industry, remains to be seen. Significant questions exist about when, and how quickly, crude oil prices may recover in the future.

About Baker & O'Brien

Baker & O'Brien is an independent professional consulting firm specializing in technology, economics, and management practice for the international oil, gas, chemical, and related industries. With offices in Dallas, Houston, and London, the firm focuses primarily on the downstream industry and assists clients with strategic studies, mergers and acquisitions, and technology evaluations. The firm also provides expert services to support insurance claims, investigate operating incidents, and support a wide range of commercial disputes in the energy industry.

About PRISM

Baker & O'Brien's *PRISM* software is used to perform detailed analysis of individual refineries and the refining value chain from crude oil load port to products truck rack. The system combines a large historical database with a robust refinery simulator to provide analytical support to competitive assessments, strategic planning, crude oil valuation, and delivered cost of supply. The *PRISM* database currently includes operational and economic performance details for all refineries in the U.S. and Canada, most refineries in Europe, and over 50 refineries in the Asia Pacific region. The *PRISM* system is available for license and is used in consulting assignments for Baker & O'Brien clients.

Contact: Kevin G. Waguespack
(832) 358-1453
kevin.waguespack@bakerobrien.com