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U.S. Q4 2014 REFINING MARGINS FALL AMID CRUDE OIL PRICE DECLINE

Special Topic: Will the Crude Oil Price Decline Alter U.S. Refinery Crude Slates?

Houston, February 17, 2015

Baker & O'Brien, Inc.'s 14Q4 release to *PRISM*[1] subscribers reflects a quarter-to-quarter fall in average U.S. refining margins compared to both the prior quarter and the year-ago quarter. A rapid decline in benchmark crude oil prices during the period was accompanied by shrinking crude oil differentials, which put most refined product crack spreads under pressure. As the adjacent table shows, with the exception of PADD 1, all PADD regions joined in the refining margin decline, with PADD 4 margins exhibiting the largest drop.

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

	14Q4 vs. 14Q3	14Q4 vs. 13Q4
PADD 1	0.29	0.79
PADD 2	-1.55	-2.72
PADD 3	-1.61	-1.80
PADD 4	-4.25	-4.38
PADD 5	-1.21	-1.20
U.S. Overall	**-1.54**	**-1.81**

As shown in the table below, the U.S. Gulf Coast (USGC) LLS 321 crack spread fell by over $8/Bbl. The decline in the Chicago WTI 321 crack spread, while somewhat more muted, still reflected a fall of more than $4/Bbl. However, a relatively steady LLS-Maya differential—averaging $9-10/Bbl.—helped support coking refinery margins. Continuing this trend, during January 2015, Maya traded at a near 20% discount to LLS—a level not enjoyed by coking refiners in more than five years. This helped drive coking margins up into the $12/Bbl. range.

Key Refining Margin Metrics, $/Bbl.

	2014 Dec.	2014 Q4	2014 Q3	2014 Annual	2013 Annual
WTI	59.50	**73.38**	97.48	93.10	97.93
LLS	61.90	**76.34**	100.95	96.74	107.31
Brent	62.53	**76.25**	101.85	98.91	108.62
LLS – Maya	9.68	**9.22**	10.05	11.01	9.94
USGC LLS 321*	3.22	**6.31**	14.66	12.12	10.63
USGC LLS 6321**	1.22	**3.57**	9.16	8.05	6.92
Chicago WTI 321***	7.86	**15.14**	19.41	19.05	22.83

** 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*

Compared to 14Q3, WTI and LLS discounts to Brent narrowed by about $1/Bbl. By year-end, refinery margins were still adjusting to the crude oil price decline. December saw both the USGC and Chicago crack spreads significantly lower than the quarter as a whole.

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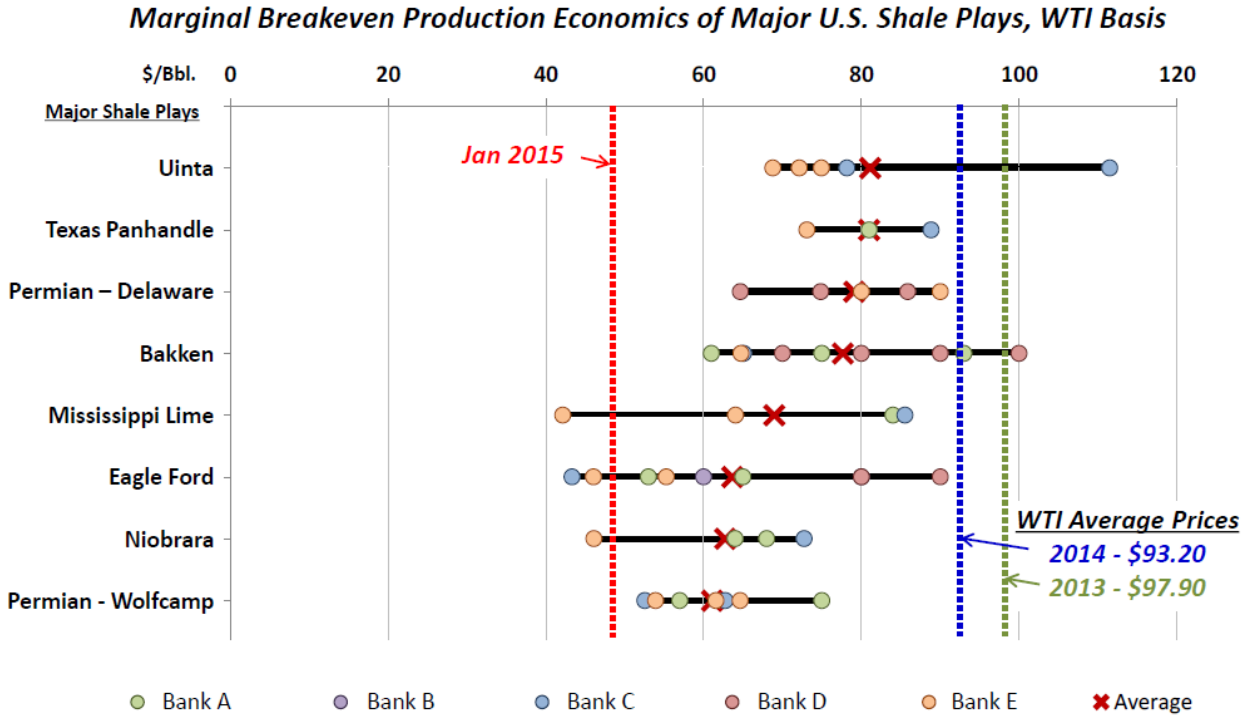
The rapid decline in world oil prices, beginning in October 2014, has raised questions about the continuing viability of certain shale oil plays, especially in marginal zones. In order to assess the

[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.

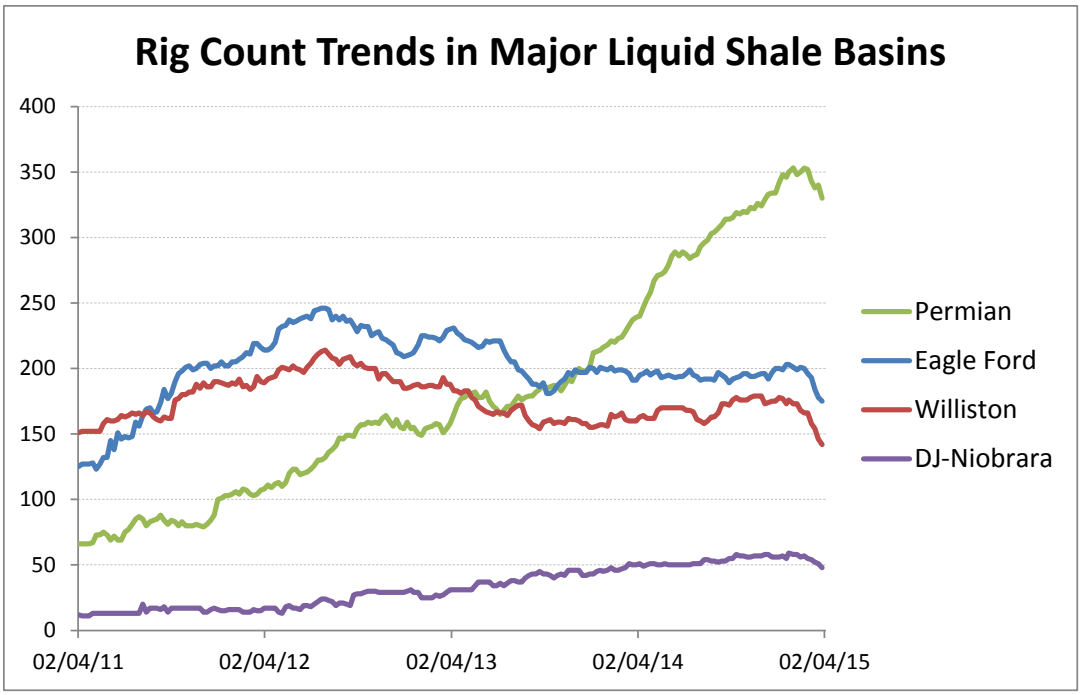
potential impact of prevailing price levels on shale oil economics, we reviewed and analyzed publicly-available breakeven analyses from a cross section of financial institutions. The figure below reveals that in virtually all cases—even though there is no strong consensus on the WTI breakeven price in any one shale play—the prevailing crude oil price is near or below the predicted breakeven ranges predicted.



Source: Banking analyst reports; note that some banks provide more than one assessment per play, reflecting different zones

Thus, at current price levels, it is reasonable to assume that drilling activity will decline in essentially all of the North American shale plays. As shown in the next figure, data from Baker Hughes confirm a declining rig count in each of the four major shale plays— the Permian, Eagle Ford, Williston, and Denver-Julesburg (DJ Niobrara) Basins. The total rig count in these four areas has fallen from a high of 788 active rigs in October 2014, to a recent total of 695, or a drop of about 12% (93 rigs). As the chart shows, during 2014, a large portion of the net increase in rig count was in the Permian, while rig counts in the other three plays were either flat or increased relatively slowly during the same period.

Despite the declining rig counts, most analysts believe U.S. production will continue its rise, at least through the first half of 2015. There exists an "inventory" of wells that have already been drilled and are simply waiting to be fractured (i.e., "frac-ready" wells) to commence production. As this inventory of frac-ready wells declines, however, and with drilling rig counts falling, we are likely to see the commencement of a slow decline in overall crude oil production in the latter half of 2015. This decline will be tempered to some degree by the recent commissioning of large offshore projects in the Gulf of Mexico, so the year 2015 may still see a net positive increase in overall U.S. production. Nonetheless, the production plateau, and likely decline, in light, tight shale oil (LTO) production will be coming when many U.S. refiners have been "gearing-up" to enable the processing of more of these grades.



Source: Baker Hughes

It stands to reason, therefore, that U.S. refinery crude slates will be affected by these developments. Recent narrowing of mid-continent crude oil differentials have made some light crude waterborne imports competitive again. This is likely to continue unless—or until—crude oil prices rise sufficiently to reverse the rig count decline and crude inventory that is currently being stockpiled begins to be released, swinging the pendulum back again in the other direction.

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.

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