MEMPHIS, TENNESSEE – IN WITH A NEW CRUDE OIL PIPELINE AND MAYBE OUT WITH ANOTHER

October 26, 2017

Over the past few years, rising production in the Canadian oil sands and U.S. shale plays such as the Bakken, Permian and Eagle Ford has given refiners new options for sourcing their crude, causing changes in oil pipeline utilization and prompting the development of new pipelines — or the reversal of existing pipes. A prime example of all this is playing out in Memphis, TN, where a Valero Energy refinery will be shifting from mostly U.S. Gulf Coast-sourced light crude to light crude that will flow in on the new Diamond Pipeline from the Cushing, OK, crude storage hub. Valero’s change in crude sourcing will be yet another blow to the 1.2-MMb/d Capline Pipeline, which for decades has moved crude north from the Gulf Coast to Patoka, IL, and other points along the way, including western Tennessee. Today, Amy Kalt of Baker & O’Brien looks at the thinking and economics behind Valero’s plan and at the latest news on Capline.

We’ve looked at Capline and Diamond many times before here in the RBN blogosphere. More than five years ago, we noted in the opening line of Draggin’ the Capline that “Crude oil wants to flow south to the U.S. Gulf” and that the utilization of the 1.2-MMb/d Capline Pipeline (yellow line in Figure 1) from the St. James, LA, crude oil hub to the Patoka hub (which is connected to more than 2 MMb/d of Midwest refining capacity) had fallen to only 14%. This decline was largely because Midwest refineries had gained access to the increasing volume of crude available from western Canada and the Bakken. This low rate of Capline utilization raised questions about whether the pipeline’s flow should be reversed to help move Bakken and western Canadian crude south. (Capline is co-owned by Plains All American, with a ~54% stake; Marathon Petroleum, with ~33%; and BP, with ~13%.)

A couple of years later, in Diamonds Are Forever, we discussed the plan by a joint venture of Plains All American and Valero Energy to build the 200-Mb/d Diamond Pipeline (green line) to transport crude from Plains’ Cushing storage terminal to Valero’s 195-Mb/d refinery in Memphis. When Diamond is completed later this year, the crude flows from Cushing into Memphis are expected to largely displace crude that is now transported to the refinery from St. James via Capline and Valero Energy Partners’ Collierville Pipeline (short brown line near center of map), a 52-mile-long, 210-Mb/d pipeline lateral from Capline (at Collierville, MS) to the Memphis refinery. In other words, Diamond’s startup will put another nail in the coffin for a northbound-flowing Capline — a matter we discussed again in Living on the Edge.
Last week, the almost-inevitable happened when Capline’s owners agreed to hold an open season to test shipper interest on a potential reversal of the pipeline. Marathon Pipe Line (MPL; Capline’s operator) noted in the open season notification that, if successful, the southbound pipeline would have an initial capacity of 300 Mb/d and be operational in the second half of 2022.

A few refiners utilize crude oil shipped up Capline from time to time for portions of their crude supply, but none as heavily or ratably as Valero’s Memphis refinery and Marathon Petroleum’s Catlettsburg, KY, refinery. Valero’s Memphis refinery, which the company came to own in 2005 as part of its acquisition of then-rival Premcor, was initially built in 1941 and is of the “cracking” variety. Its ability to upgrade the very bottom of the barrel (residuum) is limited so the refinery needs to use very high-quality light crude oil grades (typically around 40 degrees API and less than 0.2% sulfur). The bottoms from the refinery’s atmospheric crude tower (which include the residuum) are processed in the fluid catalytic cracker (FCC) — in other words, the Memphis refinery has a generally similar configuration to other cracking refineries in the Northeast U.S.

Valero’s Memphis refinery receives most, if not all, of its crude supply for the refinery from Capline since there are no other crude oil pipelines connected to the facility. Prior to 2012, the refinery imported some waterborne crude oil via the Louisiana Offshore Oil Port (LOOP; also discussed in Living on the Edge), the LOOP Pipeline (short red line), LOOP-to-Capline (LOCAP) Pipeline (short purple line) and Capline; a typical grade processed at Memphis was Saharan Blend from Algeria, which produces high-quality residuum (low carbon and metals content) and thus allows almost complete conversion of the barrel. However, premium crude oils like Saharan Blend are relatively expensive and margins can be squeezed during bottom-of-cycle periods. (In fact, during 2008, Valero put the Memphis refinery up for sale, but ultimately decided to keep the facility.)

The boom in Midcontinent and other U.S. shale oil production and the resultant price discounts of those crudes versus imported barrels such as Saharan Blend provided huge incentives for Valero to process 100% domestic grades such as Light Louisiana Sweet (LLS), Bakken, West Texas Intermediate...
Valero announced in 2012 that it had switched the Memphis crude diet to 100% domestic, but the need for Midcontinent, Permian and other crude oils to take a long, circuitous route to the Birthplace of Rock ‘n’ Roll (a title claimed by Memphis — and disputed by Cleveland, OH, Wildwood, NJ and other cities) ate into the cost savings as price differentials narrowed.

Within the next couple of months, the new Diamond Pipeline — 440-miles long, capacity of up to 200 Mb/d — is planned to begin operation, giving Valero easier (and presumably cheaper) access to the light, sweet oil that’s widely available in Cushing, including: Bakken crude (via the Enbridge system); Denver-Julesburg (DJ) Basin and Niobrara crude (via the White Cliffs, Saddlehorn, Grand Mesa, or Pony Express pipelines); Permian crude (via the Basin and Centurion pipelines); and SCOOP/STACK crude produced close to Cushing.

As we said, Valero currently has access to most of these crude oils out of the Gulf through Capline, but in a roundabout manner that requires several pipeline changes from the producing basins and steep tariffs. Figure 2, which compares the delivered price of LLS to Collierville, MS (the Memphis refinery’s storage location) to the price of alternative light, sweet crudes to Cushing, hints at the savings that Valero stands to realize if the pipeline tariff is reasonable. (Note that this analysis does not include adjustments for various nuances in crude quality.) Utilizing uncommitted shipper rates, we looked at Wyoming Sweet assessed at Guernsey, WY, delivered to Cushing using the Pony Express Pipeline (red line in graph) and Bakken assessed at Clearbrook, MN, delivered to Cushing utilizing the Enbridge system (green line), along with WTI assessed at Cushing (blue line). As we pointed out in the rectangle to the upper-right of the graph, the economics behind Valero sourcing its Memphis refinery’s crude supply from WTI stocks at Cushing are particularly compelling, especially in recent months, again assuming the pipeline tariff is reasonable.

Figure 2. Sources: Platts, Company Tariffs, and Baker & O’Brien Analysis
Plains and Valero (co-owners of the Diamond Pipeline) have not yet released what the tariff will be for shipment on Diamond, so we can’t say for certain how much this pipeline might improve the Memphis refinery’s profitability. When crude oil differentials for WTI at Cushing versus the Gulf Coast were wide, a pipeline tariff lower than about $7.50/bbl (extremely high given the relatively short distance the Diamond Pipeline travels) would have been profitable for Valero. However, when WTI at Cushing and Gulf Coast crude prices narrowed (as occurred during the period from late 2015 to mid-2017), Valero would have needed a crude tariff below around $2.50/bbl to make the shift profitable (ignoring the benefit of owning part of the pipeline). As of September 2017, a tariff lower than $6/bbl would have been profitable for the refinery. Wyoming Sweet and Bakken at Cushing using uncommitted shipper rates would not likely be economical of late, unless Valero were to become a committed shipper on any of the feeder pipelines into Cushing (with the lower shipping rates that would imply).

While we’re on the subject of Capline and alternative sourcing of crude, let’s also take a quick look at Marathon Petroleum’s Catlettsburg refinery. Like Valero’s Memphis refinery, Catlettsburg is not located directly on Capline, but Marathon Pipe Line (MPL) does own and operate a pipeline from Patoka, IL (Capline’s terminus) to the refinery (light blue line in Figure 1). As currently configured, with limited bottoms upgrading, the best fit for the 273-Mb/d Catlettsburg refinery is light sour grades of crude (35 to 40 degrees API; 1% sulfur), with the heavy components going to asphalt. The refinery consistently receives about 35 Mb/d of imported crude oils through Capline that are typically of the Arab Light or Arab Medium variety, with the rest of its crude coming both domestically and from Canada via Patoka, as well as some Utica shale condensate for its condensate splitter, which was added in 2015. Catlettsburg can also receive crude via the Mid-Valley Pipeline system, which connects into MPL’s Patoka-to-Catlettsburg pipeline.

Replacing the waterborne imported crude would still require sourcing crude from faraway distances, but it might be found in North America. For instance, a blend of Canadian crudes would perhaps work as a substitution for the waterborne imported crude oils, and in fact, Catlettsburg has dramatically increased its processing of Canadian crude over the last year and a half (blue bar segments in Figure 3; red bar segments represent waterborne crude imports).
Marathon may also be looking to source more crude oil through the Cushing hub with its early-2017 acquisition of the Ozark Pipeline and its planned expansion of the Ozark Pipeline and the Wood River-to-Patoka (Woodpat) Pipeline in Illinois. Let’s face it: since Marathon is a partial owner of Capline, it surely has well developed plans for the loss of imports in the event Capline is reversed.

As we mentioned in the intro to today’s blog, a reversal of Capline has been hypothesized for years while domestic and Canadian crude oil production increased. Now that there are virtually no restrictions on U.S. crude exports, southbound flows on Capline would help move more Bakken and Canadian crude south toward the Gulf Coast for export, as well as provide an easier route for eastern Louisiana refineries that can use those varieties of crude oils. In addition, given that Plains and Valero’s Diamond Pipeline is 20 inches in diameter, additional pumps would likely enable Diamond’s capacity to be increased well beyond its initial stated capacity of 200 Mb/d, potentially providing an alternative route from Cushing to the Gulf if it were to tie into Capline. The replumbing of U.S. crude pipeline networks continues.

“Memphis, Tennessee” was written and recorded by Chuck Berry in 1959 and released in that year on the Chess label. It has been covered by scores of artists, including a Billboard #2 version by Johnny Rivers in 1964. Other artists recording “Memphis” include Elvis, The Beatles, the Dave Clark Five, Jerry Lee Lewis, Led Zeppelin, Rod Stewart and Ellas Otha Bates, otherwise known as Bo Diddley.