Congressional Research Service

MEMORANDUM April 2, 2013

To: Senate Energy and Natural Resources Committee
Attention: Tristan Abbey

From: M. Angeles Villarreal, Specialist in International Trade and Finance
Anthony Andrews, Specialist in Energy Policy
Robert Pirog, Specialist in Energy Economics
Ian F. Fergusson, Specialist in International Trade and Finance

Subject: **U.S.-Mexico Oil Swaps**

This memorandum responds to your request for background information on the regulatory framework for possible crude oil "swaps" between the United States and Mexico, and on the U.S. and Mexican oil industry. The memorandum includes a section on private sector involvement in this potential arrangement, a brief overview of NAFTA provisions on energy, the U.S. export control system, and a description Mexico's crude oil production and refining industry.

Private Sector Involvement

In order to maximize existing refinery capacity, it has been proposed that U.S. oil companies may soon seek to export light, sweet crude oil to Mexico in a swap arrangement for its heavier crude.[1] Such a transaction would reflect the existing capabilities to refine crude oil in the two countries: refineries specializing in heavier crude in the United States and in lighter crude oil in Mexico. The shifting of privately owned crude oil flows to different refinery destinations may reflect the new realities of the North American crude oil market, which includes lighter crudes coming from the Bakken shale formation in North Dakota and surrounding areas. These shifts would be likely to occur only if the companies involved saw profitable opportunities in carrying out the transactions.

If the capacity of large refiners located along the U.S. Gulf Coast is in excess relative to U.S. fuel demand, lowering their capacity utilization rates, their profitability is likely to suffer. If, in addition, heavier grades of crude oil, which they were designed to refine, are no longer relatively plentiful compared to light, sweet crude, and have lost a portion of their price advantage, profitability again could suffer. If a similar, but reverse situation with respect to the two types of crude oil, existed in Mexico, the basic conditions for the swap of crude oils might exist. These swaps may not necessarily involve only two companies; several may be involved in more round-about transactions.

[1] This was most recently proposed by Adam Sieminski, Director of the U.S. Energy Information Administration (EIA) in Bloomberg LP, "U.S. May Swap Light Oil for Mexican Crude, Sieminski Says," March 1,2013.

An example of the market pressures that are leading to the export of U.S.-sourced crude oil is the recent securing of an export license from the Department of Commerce (DOC) by Valero Energy Corporation to ship crude oil from Texas to its refinery in Quebec City, Canada. The license is for one year, and Valero expects to ship about 90,000 barrels per day to Canada beginning this summer. Some of the refinery's output could find its way back to the U.S. east coast petroleum product market. Since Valero is not an oil producing company, it is likely that the company is purchasing this oil from producers in the Eagle Ford shale field or Permian basin fields in Texas. It has been reported that both BP Plc. and Royal Dutch Shell have applied for similar licenses.[2] DOC's policy is reported to be "to approve applications for exports of crude oil to Canada for consumption or use therein."[3] between exports of U.S. sourced crude oil to either of these countries.

NAFTA Provisions on Energy

The North American Free Trade Agreement (NAFTA) liberalized tariff barriers in U.S.-Mexico trade in energy and basic petrochemicals, but it contained certain exceptions in foreign investment and licensing requirements in the energy sector.[4] Under NAFTA Article 603, each NAFTA party is allowed to administer a system of import and export licensing for energy or basic petrochemical goods as long as the licensing system is operated in a manner consistent with the provisions of the agreement.[5] NAFTA investment provisions removed significant investment barriers in numerous sectors (other than energy), provided protections for investors in the three NAFTA countries, and provided a mechanism for the settlement of disputes between investors and a NAFTA country. However, the agreement also included explicit country-specific liberalization commitments and exceptions to national treatment. One major exception for Mexico was foreign investment in the energy sector. The Mexican government reserved the right to prohibit foreign investment. It also included exceptions related to national security.[6] Nothing in NAFTA specifically prohibits the practice of swaps, nor addresses specific oil industry practices.

Export Licensing

U.S. crude oil exports generally are prohibited under U.S. law. The Energy Policy and Conservation Act of 1975 (P.L. 94-163, EPCA) directs the President to restrict the export of crude oil. Other statutes have restricted exports of crude oil transported on pipelines that received federal right of ways,[7] produced on the outer continental shelf,[8] or produced from the Naval Petroleum Reserve.[9] There are certain cases where crude oil exports are permitted in statute: if it is shipped on the Trans-Alaska Pipeline, is of foreign origin, or is from the Strategic Petroleum Reserve if such export will directly result in import of refined products not otherwise available.

---

[2] Reuters, *Valero to Ship U.S. Crude to its Canadian Refinery,* March 12, 2013.

[3] Ibid.

[4] For more information, see CRS Report R42965, *NAFTA at 20: Overview and Trade Effects,* by M. Angeles Villarreal and Ian F. Fergusson.

[5] *North American Free Trade Agreement, Texts of Agreement, Implementing Bill, Statement of Administrative Action, and Required Supporting Statements,* House Document 103-159, Vol. 1, pp. 929-930.

[6] Ibid., pp. 31-32.

[7] Mineral Leasing Land Act, 30 U.S.C. § 185(u).

[8] Outer Continental Shelf Lands Act, 43 U.S.C. § 1354.

[9] Naval Petroleum Reserve Act, 10 U.S.C. § 7430.

EPCA and other statutes allow the President to permit crude oil exports in circumstances where the President determines that such exports are in the national interest. The President made such determinations for limited exports of heavy crude oil from California in 1992,[10] crude oil produced from Alaska's Cook Inlet in 1985, [11] and oil exports to Canada for use or consumption therein in 1985 and 1988.[12] In 1995, Congress passed P.L. 104-58, which amended the Mineral Leasing Act to permit exports of oil carried on the Trans-Alaska pipeline, unless the President determined that these exports are not in the national interest.

Under the Export Administration Act of 1979,[13] the Bureau of Industry and Security (BIS) of the Department of Commerce provides export licenses for crude oil exports under so-called short supply controls. Its licensing decisions are based on the statutory prohibitions and exemptions above. However, it will review other applications to export crude oil on a case-by-case basis to determine whether they are in the national interest and consistent with the EPCA. The Export Administration Regulations (EAR) provide general guidance on the types of transactions that it will approve:

- Those that will result directly in the importation into the United States of an equal or greater quantity and an equal or better quality of crude oil or quality or quantity of petroleum products;
- Those that the contracts may be terminated if the petroleum supplies of the United States are interrupted or seriously threatened;
- Those for crude oil that the applicant can demonstrate, for compelling economic and technical reasons beyond the control of the applicant, cannot be reasonably marketed in the United States.[14]

Depending on the specifics of the transactions, the type of swap described here may be approved either under the present statutory authority presented above, by a case-by-case national interest determination by BIS, or potentially by a national interest determination of the President.

Mexico's Crude Oil Production

Mexico is a major non-OPEC oil producer in the Western Hemisphere and a major oil supplier to the United States. In 2011, it supplied the Unites States with 8% of its crude oil demand. Since 2004, however, its production has been in decline, as has its positions as a supplier to the United States.[15]

According to the 2010 BP Statistical Energy Survey, Mexico had proven oil reserves of 11.7 billion barrels at the end of 2009 or 0.87 % of the world's reserves. The Oil & Gas Journal reported proven oil reserves of 102 billion barrels at the end of 2011. Mexico produced an average of 3.0 million barrels of

[10] 3 C.F.R. 382 1992.

[11] 51 Fed.Reg. 20252.

[12] 54 Fed.Reg. and 50 Fed.Reg. 25189.

[13] The EAA is currently expired, however, its provisions and those of the regulations implementing it, the Export Administration Regulations (EAR), are maintained through a declaration of national emergency and invocation of the International Economic Emergency Powers Act (IEEPA, P.L. 95-223).

[14] Export Administration Regulations, 15 C.F.R. 754.2 (b)(2)(i).

[15] U.S. EIA, "Mexico," October 17, 2012.

crude oil per day in 2009, 3.85% of the world total and a change of -6.2 % compared to 2008. Mexico exported 1.5 million barrels per day (bpd), 2.73% of the world total. [16]

The center of Mexico's oil industry, the Bay of Campeche in southeastern Mexico, accounted for 67% of Mexico's crude oil output in 2002.[17] Most of the oil produced in this region is a heavy crude oil (22 degrees API), known as Maya-22. Besides Maya, which accounts for nearly 50% of Mexico's crude oil production, about 73% of Mexican crude oil output in the first seven months of 2004 was heavy grades. Mexico produces oil from three major fields within the area: Cantarell; Ku-Maloob-Zaap; and Ek-Balam. The discovery of Cantarell, once one of the world's most prolific oil fields, turned Mexico into a major oil exporter in the 1980s. Mexico also produces two main grades of lighter crude oil: light, low-sulfur Isthmus-34; and extra-light Olmeca-39. Fields yielding these grades are located in the South, mostly near the Gulf of Mexico. Of these crudes, Maya accounted for 87% of country's exports, followed by Olmeca (12%) and Isthmus (1%) in 2003. For a comparison of various crude oil grades, refer to **Figure 1**.[18]

In 2009, Mexico was a net oil exporter, averaging nearly 1million bpd. Exports from the Maya field peaked at 1.6 million bpd in 2004 after a major redevelopment of the Cantarell field lifted output from the field above 2 million bpd. Production and exports have fallen sharply since 2004 as Cantarell has lost production capacity. On January 5, 2011, Reuters reported that exports of Mexico's Maya heavy crude oil blend were expected to fall by more than 10 percent in 2011, due to increased domestic demand and a lack of new production. In May 2011, the Baker Institute reported that Mexico could become an oil importer by 2020 without sufficient investments in oil field development and the use of new advanced technologies. Demand for oil in Mexico had grown from 500,000 bpd in 1971 to 2.15 million bpd by 2010.

Maya-22 is a heavy crude oil with an API specific gravity between 21 to 22 degrees, and a sulfur content of 3.4 by weight percentage (thus making it a sour crude).[19] Distillation methods classify this crude as paraffinic and naphthenic. It is actually a blend of crude oils produced from Mexico's Cantarell and Ku Maloob Zaap oil fields. Its residuals produces an excellent grade of asphalt. A blend of Maya with a medium-gravity crude is an attractive feedstock to refining schemes. Since June 1998, the Cangrejera Petrochemical Complex, located in Coatzacoalcos, Veracruz, has processed only Maya crude, about 150,000 bpd. Olmeca-39 is a paraffinic, light crude with a gravity of 38.9° API. Between 1990 and 1995, the Salamanca refinery processed this Pemex crude to produce high viscosity-index lube oils. Olmeca-39 is comparable to Bakken light sweet crude in term of API gravity (see Figure 1).

Mexico's Refining Industry

Petroleos Mexicanos (Pemex), established in 1938, is Mexico's state oil company. At the end of 2007, Pemex Refinación owned and operated six refineries: Cadereyta, Madero, Minatitlán, Salamanca, Salina Cruz, and Tula.[20] These refineries comprise atmospheric and vacuum distillation units, where the bulk of crude oil input is processed. Secondary processing facilities include desulphurization units and facilities for catalytic cracking, reforming and hydrotreating. During 2007, these refineries processed 1.30 million

[16] EIA, ibid.

[17] American Petroleum Institute gravity index.

[18] Statistics in this paragraph represent the latest data available.

[19] *Oil and Gas Journal*, "Assays for the Following Mexican Crudes Have Been Updated: Isthmus, Maya, Olmeca, and Marine Light," p. 45, March 4, 1991.

[20] PEMEX, General Profile, http://www.ref.pemex.com/index.cfm?action=content&sectionid=16.

bpd of crude oil (210,000 barrels at Cadereyta; 141,000 barrels at Madero; 170,000 barrels at Minatitlán; 188,000 barrels at Salamanca; 272,000 barrels at Salina Cruz; and 289,000 barrels at Tula), which consisted of 742,000 bpd of Olmeca and Isthmus crude oil and 528,000 bpd of Maya crude oil. In terms of domestic sales, Pemex Refinación sells its own and imported refined products to satisfy the increasing demand in Mexico. In 2011, Pemex chief Juan Jose Suarez Coppel said the company was actively looking to acquire a "significant" refining asset in the United States as demand for gasoline was on the rise in Mexico. Pemex was also looking to add more than 50,000 bpd in refining capacity in 2011.[21] Other countries refine the respective crude oils in the United States in order to directly access the U.S. market; for example, Venezuela's Citgo and Saudi Arabia's Motiva.

Olmeca-39 production is reportedly in decline, but Pemex has not reported more recent refinery operations. Pemex could be searching for a light sweet crude oil to replace Olmeca-39, in which case Bakken crude might serve as a substitute.

U.S Refiners of Maya-22

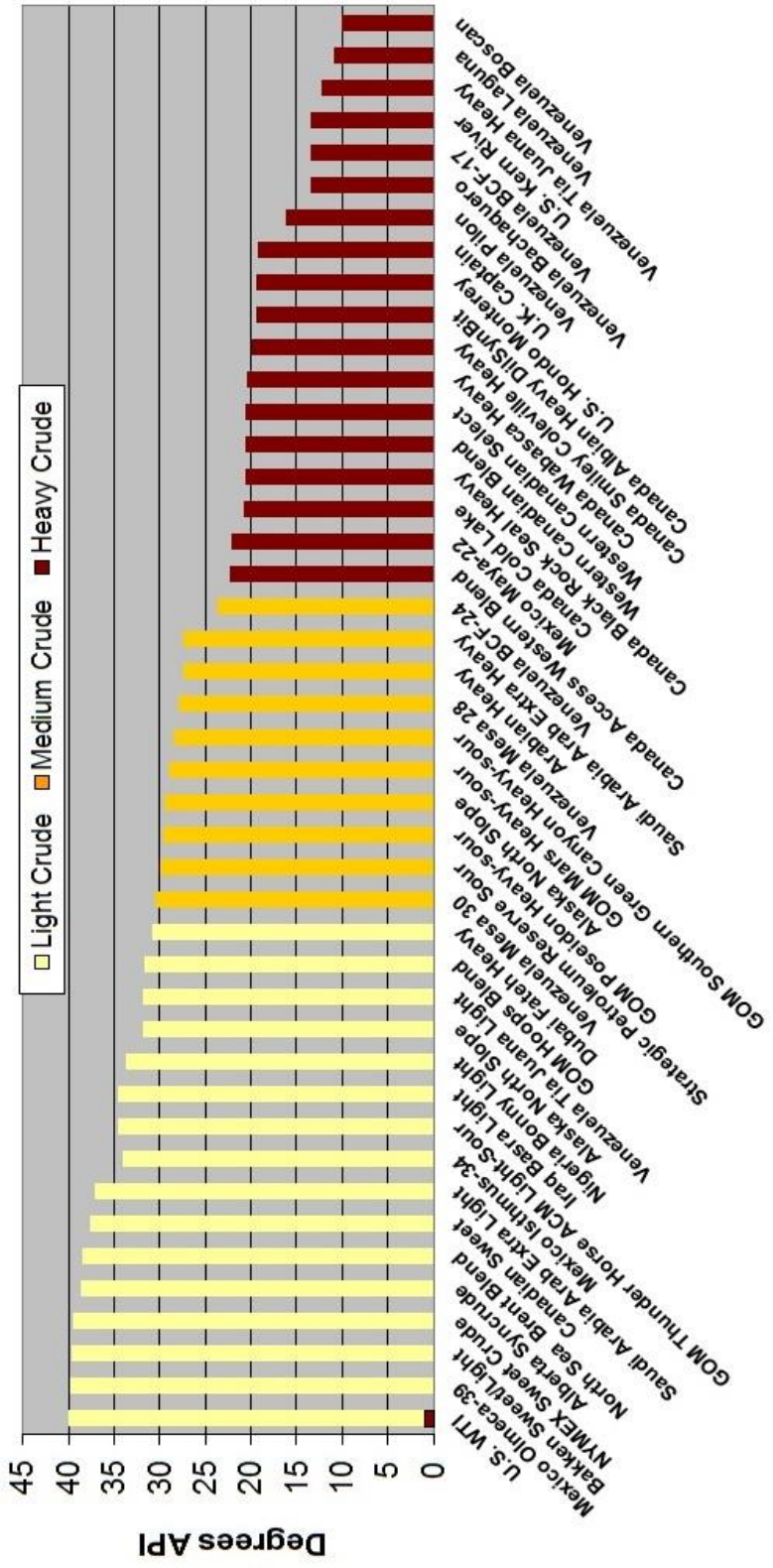
For 2012, the U.S. Energy Information Administration reported that the United States imported 377.4 million barrels of crude oil from Mexico.[22] In October 2010, Valero (444,000 bpd), ExxonMobil (145,000 bpd), and Chevron (102,000 bpd) were the top Maya non-Pemex affiliated Maya crude buyers.[23] The Shell-Pemex Deer Park joint venture refinery near Houston processed 243,000 bpd of Maya in October 2010, while Mexican refineries averaged 453,000 bpd processed in the first 11 months of 2010. Some or all of these refineries are likely to have the coking capacity needed to break down Maya's heavier residual fraction into the lighter hydrocarbon range of gasoline. For further information on the U.S. refining industry, refer to CRS Report R41478, *The U.S. Oil Refining Industry: Background in Changing Markets and Fuel Policies*, by Anthony Andrews et al.

[21] *Petroleum Economist*, April 2011.

[22] U.S. EIA, *U.S Imports by Country of Origin*., http://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_ep00_im0_mbbl_a.htm.

[23] *Reuters*, "FACTBOX-Five facts about Mexico's Maya heavy crude oil blend," http://www.reuters.com/article/2011/01/05/mexico-oil-maya-idUSN0523273420110105.

Figure 1 Crude Oils



Source: CRS Compilation.