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McMoRan Davy Jones Gas Discovery

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This is a post by Arthur E. Berman and Joshua H. Rosenfeld. Art is new on The Oil Drum staff. He is a geological consultant with 31 years of experience in petroleum and natural gas exploration and production. This is a link to Arthur Berman's biography.-- Gail

McMoRan Exploration Company has made a significant discovery in the U.S. Gulf of Mexico that may contain 2-6 trillion cubic feet (Tcf) of natural gas reserves. The well was drilled in 20 ft of water 10 miles south of the Louisiana coast on South Marsh Island 168 (Figure 1). The discovery by McMoRan (operator) and partners Plains Exploration & Production Company and Nippon Oil Corporation is very deep (28,125 to 28,262 feet drilling depth) but with excellent quality. The gas-saturated reservoir rock is located in the upper Wilcox Sandstone (Paleocene-Eocene). There is 135 ft of gas pay with as much as 20% porosity and 10-20 ohm-meters of resistivity.

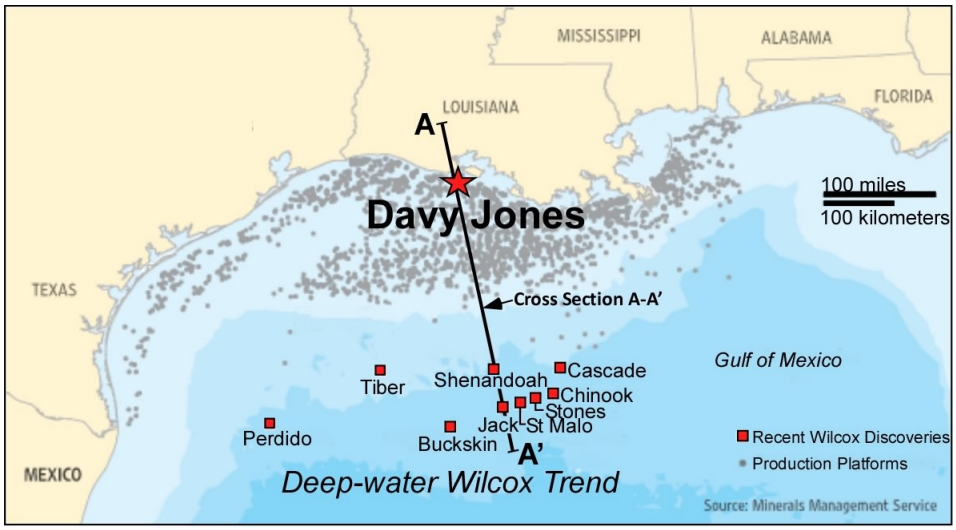

Figure 1. Davy Jones Location Map. Modified from *The Wall Street Journal* (September 3, 2009).

The Davy Jones well was drilled on a large anticlinal feature with approximately 20, 000 acres of structural closure at Wilcox level (Figure 2).

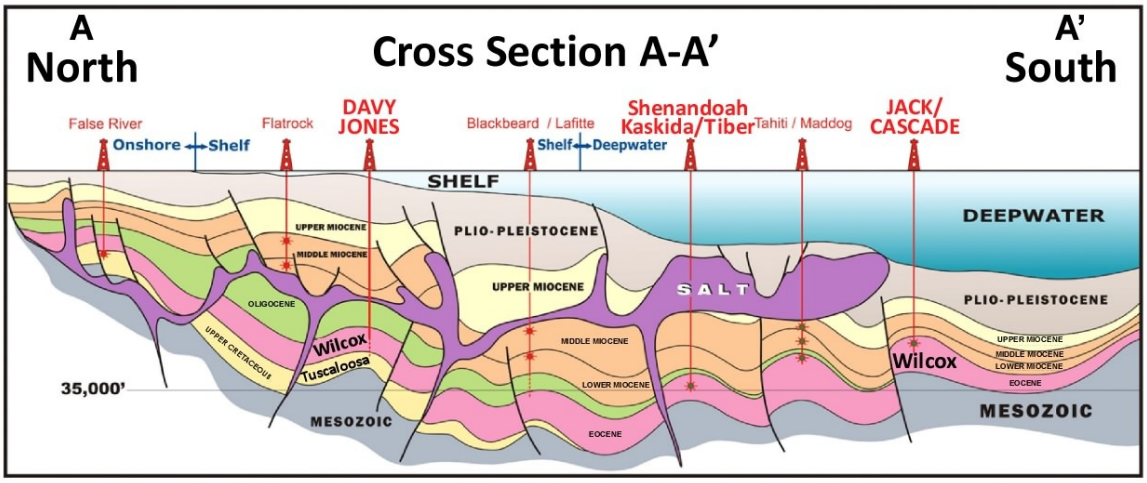

Figure 2. Idealized structural cross section showing prospects and discoveries in Tertiary and Upper Cretaceous reservoirs. Modified from McMoran Exploration Company 3rd Quarter 2009 Conference Call (October 19, 2009).

McMoRan intends to continue drilling another thousand feet or so in order to evaluate the next two potential reservoir strata known as the lower Wilcox "Whopper Sand" and the Cretaceous Tuscaloosa Sandstone (Figure 3). The Tuscaloosa is a prolific producing reservoir onshore.

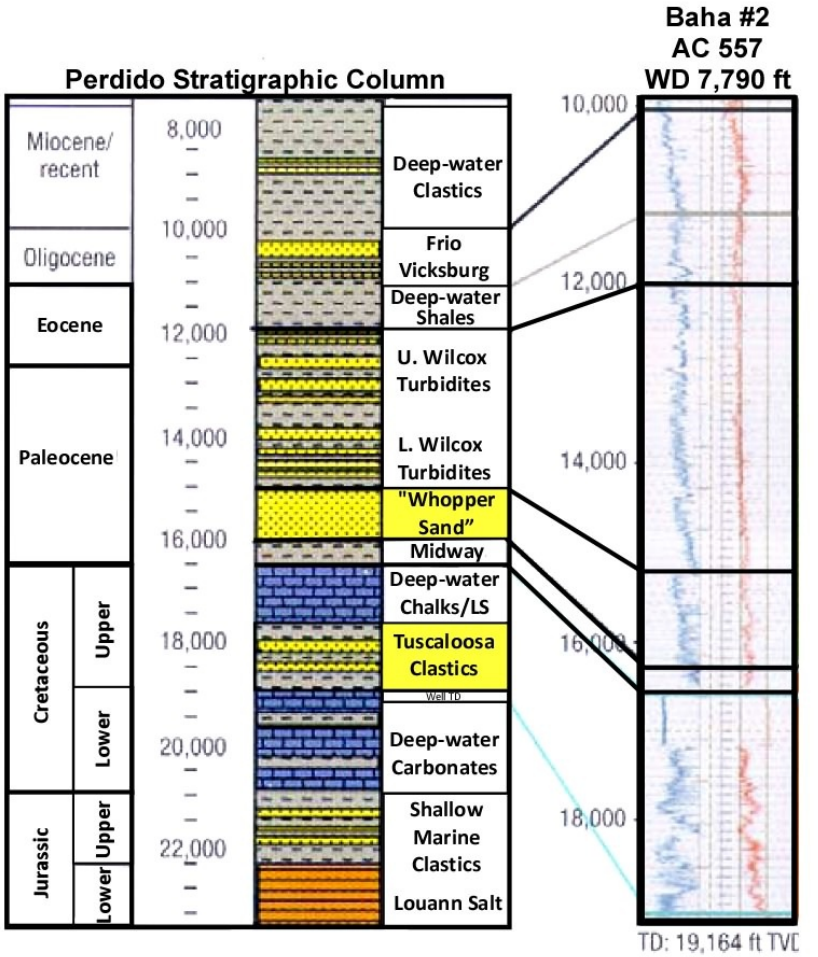

Figure 3. Alaminos Canyon Perdido Fold Belt Stratigraphic Column. Modified from Meyer et al (2005).

The discovery is especially important because it provides a link between onshore Wilcox production and a series of discoveries from equivalent strata in the deep-water Gulf of Mexico

including the Tiber Field announced by BP in September 2009. In 2001, the announcement of a Wilcox discovery in Unocal's deepwater Trident-1 (Perdido) well came as a complete surprise to most of the industry. Since then, these reservoir sands have been found in a 300-mile long and 50-mile wide fairway parallel to the present-day shelf margin beneath 5,000 to 10,000 feet of water, containing more than 20 fields. The stratigraphy of the undrilled gap between the onshore and the deepwater Wilcox under the coastal plain and continental shelf of Texas and Louisiana, however, has remained conjectural. This "down dip" Wilcox play has been ignored by drillers until McMoRan's test because structural complexity and deep targets involve high risk, expensive exploration.

Recent discoveries of oil and gas in the deep-water offshore region of the Gulf of Mexico may have recoverable resources of up to 15 billion barrels of oil equivalent. Reservoirs consist of Paleocene to Eocene submarine fan and turbidite sandstones whose thickness exceeds 1000 feet. This sequence has been correlated with the onshore Wilcox Group. The considerable thickness, and wide areal extent of the deep-water offshore Wilcox interval challenges the common perception that most sandstone in the Wilcox was deposited within shelf and upper continental slope environments with only thin, channelized sands reaching the deep basin within shale-dominated turbidites.

For the last decade, curious geologists have struggled to explain the counter-intuitive presence of hundreds of feet of massive Wilcox sand across a wide swath of the Gulf of Mexico so far from the contemporaneous shoreline, and whether this sand trend is continuous from the onshore into the deepwater (Berman and Rosenfeld, World Oil, June, 2007). Conjecture also swirls around whether the Wilcox extends southward and underlies Mexico's deepwater and shelves.

The news from the Davy Jones well appears to open an important new gas play in the Gulf of Mexico. McMoRan's findings will undoubtedly encourage more deep drilling for Wilcox targets in this trend. Meanwhile, the next 1,000 feet in the Davy Jones well may yet reveal the highest quality reservoir sands that correlate with the basal Wilcox "Whopper Sands" in the deepwater.

Some analysts have said that this discovery proves that concerns about peak oil and gas are unfounded. This is common whenever important discoveries are announced. It is, therefore, worthwhile to place the Davy Jones discovery in the context of broader petroleum supply, demand, cost and timing factors. While 2 Tcf is a lot of gas, it is about equal to one month of U.S. consumption during peak winter months, and we currently have an over-supply of natural gas that may persist for some time.

It is worth mentioning that the announced discovery is based on sketchy information from well logs and is does not represent an actual flow test. The reason for this incomplete data is the extreme depth, pressure and temperature of the Wilcox reservoir in this well.

Bottom-hole pressures are 27,000 pounds per square inch, according to comments by J.R. Moffat in Houston on February 18, 2010, by far the highest pressures known in Gulf of Mexico wells, and almost 10 times the rocket engine chamber pressure required for spacecraft liftoff. In Moffat's question-and-answer session at the same meeting in February, he said that bottom-hole temperatures are 440 degrees Fahrenheit. Gas has never been produced at these temperatures and pressures, and may present engineering obstacles. In addition, gas reserve volumes will shrink at surface conditions. There is also a possibility that the gas will contain carbon dioxide, which will reduce the volume of commercial gas and present a disposal problem.

The Davy Jones well has cost almost $200 million so far, and development drilling is expected to cost $1.5-2.0 billion. Production facilities will add to that cost. There are few rigs in the world that

are capable of drilling at these depths and temperatures, so Davy Jones will have to stand in line with all of the deep-water Wilcox discoveries in the Gulf of Mexico and the pre-salt fields in Brazil's Santos Basin for rig availability. The earliest estimates for first production are in 2013.

At the same time, the apparent discovery opens a new trend in the Gulf of Mexico that could contain considerable new reserves. The Davy Jones discovery announcement comes at a time when few oil and gas companies are pursuing objectives other than shale plays. Fortunately, there are wildcatters that are willing to pursue these high-risk, high-reward plays, this time with apparent success. Stay tuned because this is a promising development.