

# LAKE MARACAIBO

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**L**ake Maracaibo—100 miles long, 100 kilometers wide and 100 feet deep—is the granddaddy of offshore oil development. Drilled decades before deepwater technology, there's no place else where you can take a boat ride through such multitudes of individual wells.

Back in the 1920s, when foreign companies were first poking around for oil in the petroliferous Maracaibo Basin, Shell Oil took all the land positions around the edge of the large, salty lake that covered the basin's center. The next company in the hunt was Gulf Oil, which decided to make the best of a bad situation by working the very shallow water. Gulf thought it could build wooden platforms for drilling, so it ended up with a concession covering a 1-kilometer fringe all along the lake's shore. Last in the game was Standard Oil. Nothing was left by then except the deeper portions of the lake, and everyone knew those were worthless. But, Standard took that acreage anyway for lack of other options.

Little did those initial explorers realize that the

units, naturally, but 5,000 wells still produce within the lake, and many of these are stand-alone structures.

Lagoven, the PDVSA subsidiary that has operated the original Standard Oil concessions since nationalization in 1976, produces 745,000 barrels of oil per day from the lake. "We are trying to accelerate our production," says Pedro Martorano, Maracaibo-based manager of operations for Lagoven's western division. "We're expecting to drill about 250 wells this year, including about eight deep wildcats in the south part of the lake." In March, Lagoven completed a well in the south lake area that is producing 40,000 barrels per day. The affiliate has 34 rigs, including drilling and workover rigs, and two jackups that are used for the exploratory work. Maraven, the successor to Shell, has about the same number of rigs working its properties in the area.

Excellent potential still lies untapped in Lake Maracaibo's varied reservoirs, which hold light, medium, heavy and extra-heavy oil, says Scott Haberman, senior consultant at Golden, Colorado-based International Reservoir Technologies Inc. His private firm specializes in reservoir management studies and has been consulting in Venezuela since 1993. "The fields that I've worked in Lake Maracaibo are world-class," he notes. "The structures are large, with thick, porous pay zones and great source rock."

**T**he reservoirs are also complex, which in today's oil industry means opportunity. "Because the fields are extensively and complexly faulted, and also complex stratigraphically, technologies such as 3-D seismic and sequence stratigraphy can unlock a great deal of additional oil," says Haberman. The PDVSA affiliates have already collected extensive 3-D data over Lake Maracaibo: "They recognized that they needed a technology-guided drilling effort to meet the national goals for production, and that spurred them to acquire the 3-D data. It's been very effective at providing better images of the reservoirs," he says.

"We use the seismic data not only to image structure, but also to help in the stratigraphic effort," he says. "We can analyze seismic attributes to obtain an idea of net pay thicknesses, and in some of the reservoir units we can get a handle on fluid saturations as well."

What all this means is that Lake Maracaibo, thanks to the aggressive use of technology, will be sprouting derricks for many years to come.



**Although oil has been flowing from Lake Maracaibo fields since the early 1900s, its world-class reservoirs still offer a great deal of potential, says Scott Haberman, senior consultant, International Reservoir Technologies Inc.**

heavy oil deposits that ringed the lake gave way to lighter-gravity crudes in its center, or that technology would find a way to exploit the billions of barrels of oil that lay beneath the deeper waters. Of the 35 billion barrels of oil that eastern Venezuela has produced, most all has come from the fields around and under Lake Maracaibo. Today, the wooden derricks that Gulf built still stand in the shallow water, a testament to the lake's long history of production. More recent fields are developed off of platforms or drilling