Over-Pressured Wells a Risk for E&P Operators in Deep-Water Gulf of Mexico, Says Joint IHS/GPT Report

Release Date: Tuesday, February 15, 2011 1:10 pm EST

Terms: Energy & Power Media Energy

Dateline City: HOUSTON

Contacts: Melissa Manning

Study designed to help reduce exploration and drilling risk in highly prospective region

HOUSTON (February 15, 2011) – In a study designed to evaluate and address exploration and production (E&P) drilling risks associated with over-pressured formations, it was found that dramatically different magnitudes of overpressure existed across all 149 deep-water wells studied in the highly lucrative deep-water U.S. Gulf of Mexico Lower Tertiary Wilcox play. Understanding the variation and magnitude of overpressure is of critical importance, according to the authors of the study, information and insight provider IHS (NYSE: IHS), and pressure consultants GeoPressure Technology Limited (GPT), an Ikon Science Company.

The IHS/GPT Deep-Water Gulf of Mexico Lower Tertiary Wilcox Pressure Study sought to gain an understanding of overpressure in the deep-water Gulf in terms of its distribution and potential impacts on future exploration of the region’s petroleum system. The study examined 149 deep-water Gulf wells, which were extracted from the IHS Pressure Database, a global dataset of re-interpreted, quality controlled, sub-surface formation pressure data.

The study focuses on key wells in Alaminos Canyon, Keathley Canyon, Walker Ridge, Garden Banks, Green Canyon and Atwater Valley, a combined study area that spans offshore acreage covering hundreds of miles across offshore Texas, Louisiana and Mississippi in U.S. federal waters. Water depths in the region range from 4,000 feet to 10,000 feet and the total depths of the wells can exceed 30,000 feet total vertical depth, sub-sea (TVDss). Reservoir pressures in the Wilcox can exceed 20,000 pounds-per-square-inch (psi).

The Lower Tertiary Wilcox trend covered in the study has proven to be a highly successful exploration target, with considerable upside potential of up to 15 billion barrels of recoverable oil reserves, according to IHS estimates.

“What we learned from the study is that overpressure variation has a significant impact throughout the play. Understanding the overpressure variation helps to minimize the drilling risk and inform on future exploration targets,” said Mark Diaz, senior geopressure analyst at IHS, and one of the study authors. “There are a number of operational challenges that exist alongside varying pressure regimes, including high bottom-hole temperatures, complex structural variances, and a canopy of salt that sits over much of the play, which makes the use of seismic data to visualize sub-salt structures largely ineffective.”

“This study gives clients a set of analytical tools and supporting insight that enables them to make sound exploration decisions and minimize the potential risks associated with drilling when they have poor visualization of the subsurface,” said Sam Green Ph.D., principal technical author of the study for GPT.

According to the report, all of the wells with formation pressure data that were studied indicated overpressure, although the degree of overpressure varied widely. The overpressures in the report ranged from 9.1 pounds-per-gallon Equivalent Mud Weight (ppg EMW) up to 15.7 ppg EMW across the Miocene and Wilcox.
“Calculating those pressures correctly is incredibly important,” Diaz said, “since excessive pressures impact every aspect of the planning process.”

Analysis of the overpressure in the Wilcox showed that the highest overpressures are primarily in eastern Keathley Canyon and across the Walker Ridge protraction areas. The Wilcox data were analyzed with respect to compartmentalization versus lateral drainage as an explanation for the overpressure variation observed. The overpressure observations made in the Miocene have a significant impact on the sub-salt play as a whole.

Although a number of high-profile discoveries have been made to date in this play, including Cascade, St. Malo and more recently BP’s 2009/10 Tiber well in northwest Keathley Canyon, which is expanding the extent of the play, dry holes such as the Unocal Sardinia project in Keathley Canyon (block 681), and the ExxonMobil Hadrian well in Keathley Canyon (block 919), have proven problematic and costly, noted the report.

“Despite its prospectivity, the play clearly is not fully understood in terms of the petroleum system and its impact on the distribution of hydrocarbons,” said Green.

“Part of this problem lies in the fact that the majority of this play is sub-salt, with the inherent problems of using seismic data to visualize structures below the salt canopy. Even if traps are identified, and the risks assessed for reservoir quality and charge, variable overpressure regimes exist in the sub-salt, which can make drilling these prospects problematic.”

Green added: “As part of this study, we developed a unique set of algorithms to calculate overburden gradients and fracture gradients across the many protraction areas, which aids engineers in the well design and planning process.”

According to IHS estimates, if the U.S. deep-water Gulf of Mexico were a country, it would rank number eight in the world with respect to barrels-of-oil-equivalent (Boe), discovered from 2000 to 2009. In terms of oil discovered during this period, the entire Gulf of Mexico, including the deep-water and shelf regions, would rank number three in the world.

As of the end of October 2010, 6,269 wells were actively producing in the U.S. Gulf of Mexico, of which 486 were deep-water wells (wells exceeding 1,312 feet of water depth, according to the IHS E&P Well and Production Database. So far in 2011, based on IHS data, the U.S. Gulf of Mexico has produced 820 MMBoe. Of that figure, the deep-water Gulf has delivered about 516 MMBoe, or approximately 70 percent of the total production for the entire Gulf.

“As the industry moves into ever deeper water to find larger reserves, over-pressured and high-temperature wells continue to be a significant challenge to safety, productivity and project cost,” said Green.

Additional data from IHS was used in the study, including formation temperatures, fracture pressures, mud-weights, wire-line log data, corrected deviation surveys, well summary reports and well-header information, correlated bio-stratigraphical information, and bottom-hole temperatures. The wells selected for inclusion in the study were chosen based on pressure data quality and geospatial distribution. A total of 49 wells penetrate the Wilcox reservoir, the remainder encountered either lower Miocene sediments or were used to supplement the fracture pressure and mud-weight part of the database.

The IHS/GeoPressure Technology study features a set of maps and plots illustrating overpressures at key stratigraphic ages, as well as a series of focused analyses dealing with topics such as determination of fracture gradients, lithostatic gradients, lateral drainage and an approach for predicting pressure in deep un-drilled compartments, is also included.

For more information on the study, please contact sales.energy@ihs.com.

To speak with IHS analyst Mark Diaz, regarding the IHS Deep-Water Gulf of Mexico Lower Tertiary Wilcox Pressure Study, please contact melissa.manning@ihs.com, or press@ihs.com.

###

About IHS (www.ihs.com)
IHS Inc. IHS (NYSE: IHS) is a leading source of information and insight in pivotal areas that shape today's business landscape: energy, economics, geopolitical risk, sustainability and supply chain management. Businesses and governments around the globe rely on the comprehensive content, expert independent analysis and flexible delivery methods of IHS to make high-impact decisions and develop strategies with speed and confidence. IHS has been in business since 1959 and became a publicly traded company on the New York Stock Exchange in 2005. Headquartered in Englewood, Colorado, USA, IHS employs more than 4,400 people in more than 30 countries around the world.

About GeoPressure Technology: (www.ikonscience.com/geopressure)

GeoPressure Technology Limited was founded in 1997 and has grown to offer training and consultancy in pressure problems, as well as a suite of niche software designed to manage and visualize pressure data. GeoPressure Technology is located in the University of Durham Science Park in the historic city of Durham, Northeast England. It maintains links with research groups of Durham University focused on challenges relating to fluid pressures in the subsurface. The GeoPressure Technology team includes geologists, geophysicists and data analysts plus support staff. In 2006, GeoPressure Technology became an Ikon Science company.

IHS is a registered trademark of IHS Inc. All other company and product names may be trademarks of their respective owners. Copyright © 2011 IHS Inc. All rights reserved.

Language: English