Increasing Production in Mature Fields While Reducing Costs

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Abstract

Revitalizing and optimizing production from mature fields has become, in many cases, the most cost effective option forward for many operators given the current price of oil. Many companies are reprocessing seismic data in the hopes of eliciting new information. However, there are many other issues that need to be considered that cannot be addressed within seismic parameters, such as poor porosity, subseismic faults, poor hydrocarbon richness, depletion affects, movement of oil-water contacts, and by-passed pay.

This presentation will focus on using ultrasensitive hydrocarbon mapping to optimize field understanding and production for mature fields. Ultrasensitive hydrocarbon mapping is unique among surface geochemical technologies in that it uses passive monitoring to detect and concentrate hydrocarbons at parts per billion (ppb) levels which is 1,000 time more sensitive than traditional microseepage methods. It is important to note that reservoir pressure, porosity, and net pay thickness (i.e. good reservoir characteristics) are the primary drivers of microseepage.

The following case studies will be used to illustrate the use of ultrasensitive hydrocarbon mapping in field development efforts:

The Anadarko Basin: Ultrasensitive surface hydrocarbon compound mapping was used to detect and differentiate the conventional Red Forks **channel sand** signature from over-lying and under-lying charged formations in the Anadarko Basin.

Thirty post-survey wells were drilled based on the survey results. The survey correctly predicted 27 of 30 (**90% accuracy**) post-survey channel sand wells.

Additionally, the data showed a strong correlation between effective reservoir porosity (ϕ), net pay thickness (h), production, and the surface geochemical expression with a correlation coefficient of 0.87 which was useful in predicting future Sweet Spots in the field.

The Pietu Siupariai Field: The Cambrian Daimena Formation reservoir was 70 meters thick in the field and had a porosity of 5 % to 15 %. Productivity of the old wells in the field varied considerably from no production to 160 BOPD.

An ultrasensitive hydrocarbon survey was performed with the objective to identify reservoir sweet spots within the closing contour. The survey results demonstrated a definite correlation between the geochemical probability maps and test/production data. Three wells were drilled post-survey, based on the geochemical results, and **field production increased 16-fold** from 403 BOPD to 6,130 BOPD.

The Hartshorne Field: This case study illustrates how an ultrasensitive hydrocarbon mapping survey could enhance Enhanced Oil Recovery (EOR) programs. The Hartshorne field had charged channel sands originating from the northeast that terminated midway through the field against a fault and had a separate charged structural trap in the southwest section of the field. It was known that both reservoir sections were charged with the same hydrocarbons.

Ultrasensitive hydrocarbon mapping was used to map the hydrocarbons from the two reservoirs. This data was used to optimize the location of post-survey wells to incorporate production from

both reservoirs. A survey was conducted three years later because several of the wells began to water-out. The subsequent **survey showed dramatic movement of the gas-water contact** as well as strong depletion affects. With this new understanding the client **was able to locate new wells in optimum locations to increase production from by-passed pay sections**.

Optimizing production in mature fields while decreasing cost means, by definition, that we, as an industry, need to change our workflow paradigms. This change must include the use of a multitude of new technologies to optimize our understanding of subsurface structures and petroleum systems. Ultrasensitive surface hydrocarbon mapping can be one of those tools and has the ability to optimize production and dramatically reduce costs by substantially reducing the number of dry or noneconomic wells.

Biography

Mr. Schrynemeeckers holds a Bachelor's of Science degree in Biochemistry from Texas A&M University and Master's of Science degree in Chemistry from the University of North Texas. He began his career working for Sun Oil Company in Dallas in the Enhanced Oil Recovery (EOR) division. He then worked for many years in the environmental arena. He has served as a Laboratory Director and General Manager of several laboratories in his career. He has 25 publications, numerous professional presentations, and has also served as an editorial advisor for *Environmental Testing & Analysis Magazine*.

Mr. Schrynemeeckers then returned to the oil industry working for Baseline Resolution a geochemistry laboratory in The Woodlands, TX. His focus was developing partnerships and satellite geochemistry laboratories around the world in countries like Venezuela, Brazil, Argentina, and Egypt. He then worked for StratoChem Services, a geochemistry laboratory in Cairo for two years, and now promotes surface geochemical surveys for Amplified Geochemical Imaging, LLC.