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Watching technology emerge



RHONDA DUEY, Exploration Editor
rduey@hartenergy.com

*Don't despair — not all new ideas
take forever to hit their stride.*

Within companies that make their living introducing new technology to the oil and gas industry, the frustration is often almost palpable. Oil companies love to talk about and read about new technology. They're just terrified to be the first to actually use it.

An oft-cited figure (sorry, I don't know the actual source) compares technology uptake in the pharmaceutical industry (5 years to 10 years) to technology uptake in the oil industry (often 30 years or more). Granted, the oil industry suffers perhaps fewer class-action lawsuits akin to the Vioxx crisis sweeping the United States right now, but it also can seem all too willing to let another company suffer the big colossal failure that's part of any risk-reward scenario before embracing a proven and cost-effective technological breakthrough. And technology innovators continue to grit their teeth and grimace every time they get the "not invented here" or "too soon to tell" excuses from their potential clients.

So wouldn't it be cool if once in awhile we had some good news to report on this front? I think, perhaps, that I do. The technology in question is electromagnetics (EM). This is a new enough technology that some people probably don't know much about it (explanation to follow). But, at least by oilfield standards, it has taken off like gangbusters, with some pretty significant major companies touting its benefits as the next great tool to add to the exploration toolkit.

In fact, in a recent presentation on the subject, Dave Ridyard from EMGS announced that he would be giving a paper on EM (which EMGS has dubbed "seabed logging") at the upcoming Society of Exploration Geophysicists (SEG) meeting in October, and at that meeting he hoped not to have to explain how the technology works, much like most folks within the industry no longer feel a need to explain that a seismic survey involves a source, receivers that record upcoming sound waves, etc. I don't think we're quite to that point yet. But we're pretty darn close.

So for those of you who need the explanation, here it is — EM measures the same physical feature that a resistivity

well log measures. Oil tends to have a high resistivity signature relative to water or surrounding rocks. The difference between these surveys and the traditional well logs is the depth of penetration and the resolution. While a well log might peer a few feet into the formation but have very fine resolution, an EM survey has relatively coarse resolution but can see several thousand feet into the subsurface. And it measures what seismic can't — the actual fluid properties of the reservoir.

Different EM companies take different types of measurements. Controlled Source EM involves the use of an active source, while passive measurements, known as magnetotellurics (MT) or marine magnetotellurics (MMT) use naturally occurring EM signals caused by solar wind interacting with the Earth's magnetosphere.

All of these will tell you the same thing — this is not a replacement for seismic, there are places where it doesn't work as well as it might due to low resistivity contrasts, depth of investigation is still an issue, it's harder to acquire the surveys in shallow water, etc. But since the first commercial endeavor was launched just 4 years ago, EM has taken

the industry by storm in a way (and in a time frame) that few other technologies can rival.

Currently the technology is mostly being used as a risk reducer after the original prospect generation based on 2-D seismic to hone in on the best-looking prospects to shoot with a finer 3-D grid. But some companies find that, due to the low cost of acquisition, it makes sense to take advantage of having the EM crews onsite to "scan" the area in a more general

sense and see if there are resistivity contrasts that might define prospects that haven't shown up on the seismic. Ridyard reports that in almost every case that scanning has been done, the resultant prospects have turned out to be significant hydrocarbon deposits.

It also worth noting that companies have been extending this application to the point that targets that were considered beyond the scope of the technology — due either to water depth, depth of burial or resistivity contrast — can now be reliably detected and delineated. And the companies that perform the surveys continue to invest heavily in research and development to make the service more robust.

In one of the first EM presentations I ever sat through, one of the first slides was a photograph of a black box. The point was to emphasize that EM is NOT a black box; it's a quickly developing technology with a lot of potential. It's nice to see explorationists accepting that fact so quickly. **E&P**

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