320,000-acre 3-D shoot under way

Monterey Shale Gets New Look

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Surprise.

Yet another emerging shale play is in the making.

Don't yawn – this one is different.

It's old, but new again – and Big.

We're talking the Miocene-age Monterey shale in southern California that's been produced in one way or another for more than 100 years.

"Almost all the oil in California has been sourced by the Monterey," said AAPG member Marc Kamerling, senior geologist at Denver-based Venoco Inc. "Only a small percentage has come from other source rocks."

To put this in perspective, the Monterey has sourced producing giants such as the Kern River, Elk Hills and Midway-Sunset fields, to name a few.

It's the source rock for about 37 to 38 billion barrels in conventional traps such as sandstones, according to Kamerling. All told, it's estimated to contain more than 500 billion barrels of oil in place.

Along with the copious amounts of Monterey oil being produced from conventional reservoirs, there's also production from the shale itself. In fact, the rock produced in the Santa Maria Basin as far back as 1900.

"Historically, production goes all the way from outcrops mined early on to the very deep," said Mike Edwards, vice president of corporate and investor relations at Venoco. "The Alcatraz Asphalt Company had a couple of open pit mines along the Santa Barbara coast, and a mine shaft they used now sits below the campus of the University of California, Santa Barbara."

The new tools and technologies spawned by the many still-relatively new shale plays across the United States have encouraged companies such as Venoco to look at the Monterey shale in a whole new way, i.e., an unconventional play with enormous production potential.

Kamerling noted that the EUR from fields identified as Monterey producers only is 2.5 billion barrels.

He is quick to point out some major differences between the Monterey and other shale plays being pursued that are typically associated with 300-million-year-old – or older – structures.

"This is five to 17 million years old," he said. "There are now large areas in the peak oil generation window, so it's generating oil now.

“Some of the larger Monterey fields have only been in geological existence less than one million years,” he noted. “The Ventura Avenue anticline is very young and has already produced maybe more than a billion barrels of oil from a Monterey-sourced sandstone reservoir.”

Managing the ‘Mishmash’

Hydraulic fracturing in shale plays is commonplace these days, but Kamerling said they don’t anticipate having to frac the wells they intend to drill, noting there are a lot more structures there than in, say, Mid-Continent shale plays.

Nothing’s off the table though.

“Some areas are gently dipping, and we’re approaching this with an open mind and not focusing on any one technology we think will solve all our problems,” he said. “We think many different things will work and should be tried in different areas.

“Our main completion technique will be to do large acid jobs on these wells drilled horizontally,” he added.

The Monterey shale may be practically oozing oil that can range anywhere from 6 degree API gravity up to the 30-plus degree API realm of light crude, but evaluating and understanding this baby can be mentally taxing given the fact that it’s at best a mishmash of rock types.

“It’s basically a large deposit of diatomaceous material,” Kamerling said. “At one state it’s diatomite but with low permeability, and it must be stimulated to recover oil – the unaltered diatomite is referred to as the Opal A phase.

“As pressure and temperature increase with depth, it becomes more brittle and more fractured as it alters into cristobalite tridymite, which is known in the industry as the Opal CT phase,” he said.

“The Monterey evolves into a quartz phase as lithification progresses,” he added.

Kamerling noted the shale produces from all three phases and can vary significantly among different wells.

“In any one spot, you can usually find all of these rock types in different proportions and thicknesses,” he said. “The shale also may contain sandstones, depending on where you are.”

The play poses the added challenge of dealing with a twisted and broken subsurface created by all the wrenching, folding, compression and other physically disturbing activity in this tectonically active region.

The upside to this movement is that it tends to create varying hydrocarbon traps.

Looking for Land

When Venoco embarked on a leasing program in 2006 with its eye on the Monterey as an unconventional resource there was no shortage of available acreage, despite the presence of such a well-recognized and highly productive source/reservoir rock.

Edwards explained that California has long been the domain of the major companies since the start of the 20th century, when they acquired massive fields that are still producing. They've had little incentive to engage in the expense and time needed for wildcatting, leaving large areas in the state unexplored.

This doesn't mean leasing is a slam-dunk.

"There are a lot of small mineral interest owners," Edwards noted, "and there's a lot of land work involved in finding them."

Venoco's work is cut out for it with a goal over the next two years to increase its holdings to 350,000 acres from the current 150,000-plus acres in southern California, which includes about 50,000 acres HBP from the Monterey itself or other zones.

The company has a 10-well Monterey program in the works for this year, including both vertical evaluation wells and development-style horizontal wells targeting zones between 6,000 feet and 14,000 feet. Even though there have been many thousands of penetrations through the Monterey, it most often was not the target zone, so cores weren't cut.

The company also lays claim to the offshore South Ellwood field, which it purchased in 1997. This field discovery in 1969 jump-started the Monterey play in the Santa Barbara channel and led to development of some highly productive fields.

Kamerling noted they are in the midst of a joint 3-D seismic shoot with Oxy. He said the ongoing survey will cover about 320,000 acres and will be the largest 3-D seismic shoot ever in California.

Even though it's known for attempting to move under the radar, Oxy has established a reputation as a go-getter in the California oil patch with some impressive fields under its control – a notable exception to the dominance of the Big Guys.

It's thought that the Monterey producing gross column is hundreds of feet thick at Oxy's Elk Hills field, which the company produces from vertical wells.