ChevronTexaco and Landmark Consulting & Services Team Resurrect a Mature Field

Customer: ChevronTexaco
Location: Lafayette, Louisiana

**CHALLENGE** – Declining offshore field was approaching economic threshold; designated a non-core asset; internal resources limited; needed to evaluate remaining potential based on 10-year-old speculative 3D survey and new technology

**SOLUTION** – Formed a joint, integrated asset team with members of Landmark’s Consulting & Services group; reprocessed seismic data, identified AVO anomalies; introduced new drilling and completion technologies

**RESULTS** – Drilled 17 commercial wells out of 18 over 5-year project; identified more than 100 Bcf of gas in a single fault block; raised production more than 800 percent; asset now among best producing properties in the Gulf

To maximize the value of their investments, E&P asset owners focus their most vital resources on core areas and activities. Therefore, it’s not unusual for companies to have declining fields in their portfolios that may hold substantial upside potential, but lack resources for further development. Teaming up with professional consultants and applying innovative technologies has proven effective in revitalizing certain mature properties. For example, ChevronTexaco and Landmark’s Consulting & Services group successfully resurrected a 30-year-old asset in the Gulf of Mexico.

Discovered in 1966, the field had produced approximately one trillion cubic feet of natural gas by the mid-1990s. However, production had dropped to about 15 million cubic feet (MMcf) per day, which was approaching the economic threshold. Due to poor financial performance, the field was designated a non-core asset and resources were redeployed elsewhere.

“Rather than divest the property, however,” says Doug Bourque, senior petroleum engineer for ChevronTexaco, “we decided to re-evaluate the field’s remaining potential. There were, after all, multiple pay zones worth taking another look at, and a speculative 3D survey over the area to help do just that.” Early mapping had yielded two prospects.

To supplement limited manpower and introduce new and evolving technologies into this mature field, ChevronTexaco approached Landmark’s consulting group in 1998 and formed an integrated asset team for the project. Membership consisted of a roughly 50/50 mix of professionals from the two companies. Bourque was the team’s production engineer.

**ADVANCED SEISMIC TECHNOLOGY** – During the initial assessment, the team decided to reprocess existing speculative 3D seismic using more-advanced algorithms to validate proposed locations and determine if additional reservoirs could be developed. The original data had been post-stack processed in 1988. In 1998, the survey was reprocessed using Kirchhoff pre-stack time migration.

Due to collaborative teamwork and the introduction of new and evolving technologies, ChevronTexaco and Landmark’s Consulting & Services group successfully increased production by more than 800 percent over five years.
“The pre-stack migrated volume provided much higher data quality, enabling the team to identify promising anomalies and clarify fault interpretations,” says project geophysicist Jim Stevens, Landmark Consulting & Services. “The new data also provided pre-stack gathers, which enabled us to perform reliable AVO [amplitude versus offset] analyses. These interpretation enhancements contributed to rapid prospect generation and risk reduction.”

Based on reprocessed data, interpreters accurately imaged another fault, roughly parallel to the main field fault, forming a previously hidden fault block in which three productive pay zones were identified. AVO analysis on the far offset volume, using pre-stack gathers, allowed them to quickly scan the data set for solid leads, many of which turned into drillable prospects. One new fault block contained 107 Bcf of gas.

Seismic technologies also contributed to successful well planning. In one case, in-depth analysis helped the team avoid drilling an unnecessary and expensive well. “Below three pay zones identified by amplitude anomalies in a new fault block, the seismic data showed another, deeper amplitude anomaly,” Stevens explains. “At first, this new lead appeared quite promising because it matched a 250-foot stacked pay analog at the same stratigraphic level nearby. But when we compared pre-stack gathers from the analog zone with those of the prospective target, the direction of increasing response was opposite that of the known pay, effectively killing the deeper target. Not drilling for that target saved $3 million in operational costs.”

To drill through shallow depleted reservoirs, a conventional well plan might have set 7 5/8-inch casing above the depleted sands, drilled a 6-inch hole, set a 5-inch liner across the sands, then drilled out with a 4 1/2-inch hole to TD. This, of course, would not be ideal. Why not start with a larger hole? Because costs would have been much higher. “Instead, the team decided to set expandable casing above the depleted sands,” says Bourque. “This was the first time this technology was used in the Gulf of Mexico.” They started with a conventional hole, set 7 5/8-inch × 8 5/8-inch expandable liner above the depleted sands, reduced the mud weight, and drilled out with an 8 1/2-inch hole—reducing drilling dollars without sacrificing the optimal hole size at TD.

Thru-Tubing FracPac™ treatment is normally considered a re-completion procedure for low-rate wells. Here, it was employed as a primary completion technique for high-rate wells. “As an initial completion technique,” adds Bourque, “Thru-Tubing FracPac reduced our costs and improved field economics, yielding high-rate completions. One well produced 20 MMcf per day. Without this approach, it might have produced five.”

All told, 18 wells were drilled during the five-year project, 17 of which were commercially successful. “By 2003, production had risen to approximately 180 MMcf per day—a more than 800 percent increase—achieving levels comparable to peak rates of the 1970s,” Bourque concludes. “Once again, this mature asset is among ChevronTexaco’s best producing properties in the Gulf.”

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