



Tools for **What's Next**



Shale Resource Play Toolkit from TerraSpark Geosciences Helps True Oil Improve Decision-Making and Minimize Risk in Complex, Highly-Faulted Plays

Wyoming-based E&P company reduces production risk and improves fracture visibility and interpretation using advanced seismic interpretation technology

CUSTOMER AT A GLANCE



Family owned and operated since 1953, True Oil, LLC is an energy exploration and production company with operations throughout the Rocky Mountain region. True Oil works to increase reserves of oil and gas through drilling and acquisitions, and efficiently produces and optimizes recovery of existing reserves to achieve long-term profitability. The company adheres to the highest environmental standards and stewardship qualifications. To learn more, visit www.truecos.com.

"TerraSpark's Shale Resource Play Toolkit is immediately intuitive and easy to use, regardless of the user's familiarity or expertise with seismic interpretation systems. It provides a platform that can be used not only to improve understanding of highly faulted conditions, but also for communicating project status and viability to any asset team or function within the company."

– Dan Behringer, geologist, True Oil

Objectives

- Improve fault visualization in a high-fracture, complex shale play
- Increase the probability of hitting fractures
- Assess fracture permeability
- Plan and execute well bores that hit as many fractures as possible
- Achieve three-dimensional volumetric visibility

Shale Resource Play Toolkit Solution

- Insight Earth Base™ 3D visualization and interpretation to improve visibility and workflow definition relative to targeted fracture zones
- Insight Earth Automated Fault Extraction™ in conjunction with Regional Highlighting tool to target and evaluate fault probabilities within the interpretation volume
- Insight Earth Well Path™ to define correlation between well bore performance (fractures hit) and interpretation-driven path predictions
- Horizon Edge Stacking tool to minimize discontinuities from incoherent reflections in the seismic volume

Outcomes

- 200 percent increase in the quantity of identified fractures
- Created a fully-defined, visually intuitive "cloud of fractures" to improve probability matrices
- Improved visibility and performance predictability of projected well path bores
- Greater yet simplified control of project parameters and related business decision-making processes
- Achieved "intuitive workflow performance" in a traditionally non-intuitive discipline

According to Dan Behringer, a geologist at Wyoming-based True Oil, fracture permeability is critical to the company's well projects across the Rocky Mountain area, and particularly in that region's high-fracture shale plays.

"There is a huge premium for us to identify relative probabilities in our favor to intersect these fractures," he notes. "Greater visibility and predictability means a better chance of success and achieving long-term profitability from our reserves."

True Oil uses the Shale Resource Play Toolkit from TerraSpark Geosciences to address this and other seismic interpretation challenges. The toolkit is powered by TerraSpark's Insight Earth® 3D interpretation platform, which includes various patented tools and technologies. According to Behringer, the toolkit has proved a valuable resource for virtually all the company's 3D visualization and interpretation needs, including assessment of fractures, building probability-based workflows to develop and execute effective well bores, and achieving greater visibility and understanding of complex shale conditions.

The Shale Resource Play Toolkit also simplifies and eases the process of communicating project status and viability to both the company's executive group and its geology/geophysics asset teams.

"It's a valuable, intuitive platform, easy to use, easy to understand regardless of your familiarity with seismic interpretation systems," Behringer says. "It makes the process of extracting and translating business value much easier."

High-Fracture Shale Means Greater Risk

Dan Jarvie, adjunct professor at the Energy Institute at Texas Christian University, recognizes the challenge that True Oil and other exploration and production companies face as they venture into the higher risk world of high-fracture, low permeability plays.

"These plays are basically hydrocarbon systems where the source and reservoir are the same rock unit or formation," he notes. "These plays are typical for shale gas but may also include shale oil."

Because of their inherent complexity and inaccessibility, these plays typically develop slowly over time, on a well-by-well basis. Once the formation has been identified and targeted, development continues by locating viable wells within the depositional boundary. This ensures lower than average long-term declination rate, but presents a unique challenge: optimizing and improving the probability of finding successful wells within a system that integrates both the source and reservoir in a single depositional formation.

This has only been achieved in recent years through the application of advanced 3D seismic interpretation platforms, using effective attribute calculation, seismic inversion and microseismic data acquisition and interpretation.

Increasing the Probability of Hitting Fractures

Given the increased risk of failure in extracting resources from these complex zones, one of True Oil's greatest business risks is executing well bores that fail to hit key faults

or identify key fractures. It means wasted effort and the need to realign, reevaluate and try again. It's a time-intensive process, and each miss translates into a lengthened workflow. To improve the probability of hitting fractured permeability within these shale plays, True Oil turned to TerraSpark for greater visualization and interpretation of complex faulting and high-fracture conditions.

True Oil used the toolkit's Automated Fault Extraction (AFE) tool to target and evaluate fault probabilities within the interpretation volume. AFE, in conjunction with a Regional Highlighting tool, allowed True Oil to develop a visually intuitive cloud that identified areas of greater probability of fractures, and singled out regions with lower probability of success.

True Oil then used Insight Earth Well Path to help define the correlation between well bore performance and the volume interpretation results identified in the AFE workflow.

The company realized immediate success, after articulating the seismic interpretation probabilities and discovering targeted faults amidst "giant open fractures" in their well bore according to Behringer.

"Only a volume measure calculation could have helped us execute successfully, given the complex, fractured conditions," Behringer says. "The fractures we're seeing are very large, among the largest in the region. With Automated Fault Extraction, we're able to target and predict fracture prevalence and conditions, which helps in navigating toward related fault probabilities."

Selling the Project and Communicating the Workflow

As a geologist, one of Behringer's principal challenges is communicating project status and workflow to other teams within True Oil. It's a challenge that geologists around the world face, as they try to identify and articulate business value extracted from highly-technical data volumes.

Drilling in the Rocky Mountains shale region dates back to the 1950s, a long term hit-and-miss process in an effort to squeeze the shale plays of available resources. The impulse of business decision makers is to proceed cautiously, which can lead to reluctance to engage various plays that are not understood or deemed too risky. As Behringer points out, the long term process that played out over decades is now a short-term workflow with far greater probability of success with the use of 3D seismic interpretation tools.

"It can be very challenging to sell these projects, and I've used other interpretation platforms that were complex, non-intuitive and hard to understand for anyone other than expert users," he notes. "That creates difficulty when trying to communicate to various teams. TerraSpark delivers a lot of valuable tools and modules that can be used to address particular problems or challenges. Yet the entire platform is integrated, immediately intuitive and easy to navigate. I recognized the value of the Well Path Planning tool to sell the project early on, and used it successfully to communicate anticipated performance improvements at the earliest stages of the process.

"We can now intelligently engage the region and achieve productive outputs with greater precision and chance of success. That didn't exist years ago."

To learn more, visit www.terraspark.com or contact our sales team at 832-319-6430.