Can operators work better with service companies?

Can a social media “feed” help co-ordinate drilling?

Using 3D models to improve safety

Whitelisting - a better way to stop viruses

Why IT people are bad at business

Pushing seismic interpretation further
Armada Oil: 3D survey of Niobrara

Armada Oil of Houston has commissioned Geokinetics to do a 25,000 acre (41.05 sq mile) 3D seismic survey of the Niobrara formation in Wyoming in a possible new area for US shale gas.

Moderate costs

As a small company, Armada Oil was seeking an opportunity which it could enter with moderate costs, says CEO James J. Cerna, speaking to Digital Energy Journal.

“You have to be more nimble and sensitive to land costs. It forces a small company to be early into plays.”

The shield of already been hydrocarbon (oil) shows from wells drilled at the North end of the project area. “We know there’s oil there,” Mr. Cerna added.

Armada Oil has acquired 1,280 acres of leases, with an option to purchase a further 23,700 acres. It has also acquired the engineering data and the 2D seismic.

The company is working together with geologists and engineers who have worked in the region for over 30 years. The technologies will probably need horizonal wells and fracking to produce, he said.

The site has good access for bringing in drilling rigs, with a interstate highway 2 miles away from the anticipated drilling site. “Access to drilling rigs shouldn’t be a problem,” he said.

Nearby there is oil and natural gas pipelines, gas pipelines, gas processing plants and oil and natural gas fields.

There is a plan to drill exploration wells and gather cores of all 3 chalk zones for analysis, with the first well drilled at the end of 2012, and the second in the beginning of 2013.

Mr. Cerna founded an internet venture in the de-carbon called NetCurrents Inc and currently lives in Silico Valley. So his company is unlikely to be conservative on the technology side.

Mr. Cerna is a rated “Commercial Multi-Engine Instrument” pilot and often flies his executives personally between their office in Oakland, California, and the lease region.

Seismic survey

The 3D seismic survey will be made over the entire 25,000 acres and record data wirelessly.

“It is probably one of the biggest shoots we’ve seen, with helicopters buzzing around and vans everywhere,” Mr. Cerna said.

The terrain is ‘gentle’, with one outcrop area, he said. “It so’s not as difficult as it could be.”

The company chose Geokinetics because “they have a great background,” he said.

“They are on the cutting edge of technology with 3D seismic, and very competitive in terms of pricing. They worked well with our consultants in the past, they had every idea that we were looking for.”

Geokinetics is headquartered in Houston and claims to be “the largest Western contractor acquiring seismic data onshore and in transition zones in oil and gas basins around the world.”

Armada expects to see the latest subsur- face modeling tools to work out the optimum direction to point the laterals in the well and exactly where they should be placed, to take advance of the natural fracturing in the ground.

The data processing will be done both in-house and with 3rd parties, to get a range of opinion.

GeoTeric: seismatic interpreter further

ff&a has developed a subsurface software called “GeoTeric” which aims to take seismic data processing further, to reveal geological and reservoir characteristics previously hidden in seismic data, giving the interpreter the power to make the most informed seismically driven decisions.

The advance of subsurface technology in the past five years has generated a mountain of seismic data acquired with ever more sophisticated techniques. Although this seismically data contains an enormous quantity of information, much of it is not being accessed, either due to lack of time or lack of functionality within the interpreter’s toolkit, says UK subsurface software company ff&a.

By giving interpreters more power to understand and define the 3D morphology of the geological images embedded within the data, the value of the seismic can be unlocked and the chances of maximizing recovery increased.

ff&a has developed the GeoTeric application to try to achieve this.

geoTeric translates geophysical data into spatially informed in a ‘data driven interpreter’ guided workflow, the company says.

It utilises 3D seismic analysis and sophisticated multi-spectral visualisation to reveal the geology which is expressed, but often hidden, in the data.

In this way, GeoTeric bridges the gap between seismic processing and standard interpretation workflows to give the power to make the most informed seismically driven decisions in days, not weeks.

At the heart of the GeoTeric expression workflow is a technique for extracting 3D geometries of geological elements as individual objects that can be used as the building blocks of a 3D geological model.

This technology is called Adaptive Geobodies and its power and efficiency arise from two properties.

Firstly, it can extract geological elements whose characteristics are highly variable because of its ability to adopt the criteria for defining a specific object much in the way that the human visual system does.

Secondly, it recognizes that seismic data is an incomplete representation of the subsurface and allows the interpreter to step in and guide the delineation process when the data isn’t enough on its own.

To counter balance the subjectivity introduced when a data driven process is over-ridden by manual intervention, objects defined in this way are assigned a confidence value that indicates how well the surface position respects the underlying data. It is therefore very easy to see where the interpretation is data constrained and where it is defined by the expertise of the geologist or geophysicist.

Fast information

Achieving the optimal GeoTeric expression workflow requires information to be delivered at the speed at which the interpreter works and thinks, so that it can be assimilated and used to build an understanding of the subsurface most effectively.

With the large amount of data within typical seismic volumes this has only now become possible due to the improvements in the hardware platform available to most interpreters.

Even with the same software, a sophisticated data design and implementation, which utilises the processing power available in both the workstations CPU and GPU, is required.

The GeoTeric expression workflow provides an on-demand extraction of geological features to enable the interpreter to consider and adapt the interpretation of what is being extracted within the data. This is in automated fault delineation, facies classification or geobody delineation.

This means the “data driven, user guided” approach will have the speed of analysis occurring at the speed of interpretation.

This is particularly beneficial in asset management when rapid interpretation is required for rapid decision making in assessing hydrocarbon potential in large licence blocks.

The future?

ff&a believes that GeoTerical Education is the future of seismic interpretation because it brings the interpreter and the data analysis together for the first time in a truly interactive, integrated manner leading to more accurate interpretation, and maximum productivity gains.

This culminates in an increased understanding of the subsurface that can be delivered directly from seismic data. The greater understanding gained by using the GeoTeric Education will lead to greater certainty and maximise the return on the investments made in seismic data that will fast track the interpretation process, through to reservoir modelling and ultimately production.

About Dr Gaynor Paton

This article was written from an interview with Digital Energy Journal and Dr Gaynor Paton, director of geoscience operations at ff&a.

Dr Paton has a PhD in Neurophysiology and brings a unique approach to arriving at solutions in volumetric seismic interpretation.

She has spent over a decade with ff&a and has been involved in over 300 seismic interpretation projects applying image processing techniques to answer some of the most challenging interpretation questions.

During this time, Dr. Paton has been instrumental in developing geology driven workflows so that the software produced by ff&a is both intuitive and effective.

In her current role as director of Geo- sciences, Dr. Paton oversees the services division of the company and guides the development of new leading edge GeoTerical Education workflows to accelerate progress in global Exploration and Production and to keep ff&a at the forefront of innovation.