



## Geo-Steering: Increase production while decreasing costs

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### Summary

We define geo-steering as utilizing real time gamma ray, surveys and sophisticated software, to correlate stratigraphic position and guide the wellbore in the optimal productive zone. In our examples, we will show that a geo-steered horizontal well will have increased production and reduced drilling costs.

### Introduction

Improving lateral placement and decreasing drilling costs are a necessity for a company to survive in a lean economic environment. Implementing and utilizing geo-steering software and methods has proven to reduce drilling costs and increase lateral length in the productive zone. To successfully geo-steer a horizontal well multiple disciplines are required; from the geophysicist's seismic interpretation, the geologist's structure mapping to the well-site geologist describing the samples at the wellsite. Geo-steering geologists work with all of the information available and the real time MWD data to accurately correlate the stratigraphic position of the well bore.

### Examples

The Bakken Formation and Devonian play will be our two studies where there has been successful implementation and results. (We are still in the process of getting approval to display our data)

We began to geo-steer for a company that was drilling the Bakken and Three Forks formations in North Dakota. We began the project first by shadowing the wells, which were being steered by samples and spreadsheets onsite geologists. Leaning towards samples meant that to find where they were, they had to tag a known geological sample marker. The wellbores would be undulated and occasionally out of zone.

After transitioning from sample steering to full operational geo-steering the horizontal wellbores became straighter with less bends, helping increase the flow and productivity of the well while decreasing the drilling costs and drilling issues.

Bakken Example one: None geo-steered well, where the onsite muddlogger would tag a known maker in the upper part of the target zone creating an undulating well-bore and on occasion exiting the top of the zone.

Bakken Example two: Geo-steered well, where geo-steering methods were applied. A smooth straight well-bore with decreased production traps.

We are still waiting for permission from this client to talk about the Devonian play, as they are the only company drilling this play at this time. We would really like to show this as it is a local play. But if that does not work out with this client we have a few backup case studies from the Eagleford formation.

### **HGI - Quantifying Horizontal Success**

As a geo-steering company we developed a way to compare horizontal wells success. Our geo-steering index breaks down each well's factors (Landing accuracy to plan, percentage in zone and days drilled) and gives it an HGI number. Allowing us to compare wells, plays and even our own geo-steering geologists development.

### **Conclusions**

The implementation of geo-steering methods and the use of sophisticated software helps optimize the wellbore placement and extend the reach of modern horizontals. Geo-steering provides an improved visualization and understanding of the subsurface geology in real time and post drilling. Providing additional data for the geological team to update their models and increase the success of upcoming wells.

## References

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