“Honing the Zone” or “Drilling the Perfect Horizontal Well”

This was the title of the presentation given by KC Oren at the June 5th RMAG Luncheon Meeting. Mr. Oren has been in the Oil and Gas E&P industry for over 30 years in both the drilling and geosciences sectors. He has BA degrees in Chemistry and Mathematics (Michigan State University, ’79, ’80) and holds a teaching certification for secondary education (1980). He now resides in Frisco, Colorado and is employed by Horizontal Solutions International as Vice President for Sales and Marketing of HSI’s TrueTime™ Solutions.

Mr. Oren started his talk by stating that the main goal of successful horizontal well drilling was to stay in the producing zone. Several instructional videos on this topic are available on his company’s web site at [http://www.horizontalsi.com/overview-videos](http://www.horizontalsi.com/overview-videos). Close collaboration by all parties involved is essential. Every company generally shares the following objectives:

- Safest lowest cost wells
- Less NPT (non-productive time)
- Fast ROP (rate of penetration)
- Highest IP (initial production rate)
- Best EUR (estimated ultimate recovery)

He then gave an example of what happens when there is a lack of communication and people do not pull together. The above diagram shows a well that was drilled in Canada with very little well control in the area. The closest offset well was more than a mile away, but the company did have 3-D seismic indicating a consistent regional dip.
The target zone interval (between the upper orange top and green bottom markers) proved to be 16 meter shallower than predicted, but the drilling team hoped that by simply drilling ahead they would catch up with the regional dip and track back into the target zone. Unfortunately, because of the softer zone beneath the target, the bit tended to stay in the lower zone. The drill team decided put on a new more aggressive bottom hole assembly (BHA) to track back into the target zone. However, the new BHA triggered a severe dogleg which caused the pipe to twist off. After several days fishing, a new directional driller (DD) came on location with instructions from the drilling manager to “get this well on track.” He proceeded to get the well back to the original plan, but totally out of zone. Subsequently a second sidetrack was kicked off and the well stayed in zone, albeit briefly. An over aggressive BHA and drill bit created directional control problems. Finally, a commercial geosteering company was called in to correct the situation and the well proved a very economic prospect.

Mr. Oren quoted Ken Bowden the CEO of Horizontal Solutions saying that “horizontal drilling was a lesson in humility.” He summarized the lessons from this well:

- BHA will most likely not perform as planned.
- Wellbore position uncertainty exacerbates the problem of landing the well in zone.
- Targeting methodology is critical to smoother wellbores and staying in zone.
- Effective intra-company and inter-company communications are essential.

Mr. Oren then discussed wellbore position certainty and made the comment that accuracy was improved if more frequent surveys are made, particularly at the transition between drilling states, i.e. between slide and rotary drilling. Errors can also be made when the kelly bushing height changes when there are different rigs used for drilling horizontal and vertical sections. He stated that if the goal is to stay within a geologic horizon, then the actual position of the wellbore relative to a geologic marker is the key geo-navigation parameter. He talked about the use of a gamma ray detector within a geosteering system to achieve this objective.

Mr. Oren then outlined various management techniques that can help in reaching the goal of a successful horizontal well. His presentation can be downloaded from Horizontal Solutions’ website at: http://www.horizontalsi.com/media/default/pdfs/Outcrop_123013s.pdf