TORCH and Rotary Steerable Drilling

Recently, Marathon Engineering and Technology, Drilling and Completions was granted the opportunity to be on location for the first running of titanium drill pipe. Marathon had initiated the concept of titanium drill pipe in 1995 for the short radius rotary steerable work in both our West Texas and Rocky Mountain operations. Marathon worked with RTI in the initial development steps of the material and connection selection.

Currently, Marathon utilizes the articulated motors for our short radius. Due to failures of the systems available in the early 90's, we abandoned the attempt to drill radiuses less than 70' and currently drill radius of 90' or more.

There has been much resistance to implementing the rotary steerable technology as developed by Amoco and licensed to TORCH (as well as other service companies) due to the reported failures. A case in point is a recent discussion with Amoco and their attempt early this year in East Texas. Often the failures are due to improper techniques, such as a poor cement job for kick off or a lack of experience with the tools. Other discussions have been that azimuth control is a problem. There has been a lot of negative and little of the positive in terms of press.

This technology is not meant to replace motors and steerable systems where well paths are complex and targets are extremely tight. Nor is it meant to replace operations where the daily spreadrate is high; as there can be more time spent drilling than with motors and a steering tool. This technology is meant to be applied well specific, where tight control of trajectory is not critical and horizontal well costs are in the low hundred thousand dollars or not economical using current Marathon practices. A recent comparative cost estimate indicated that the TORCH system is approximately 35% less than Marathon's current conventional horizontal land drilling process.

This technology allows for minimum radius of curvature where geology or gas/water contacts are a critical component. Furthering this technology allows for application in the hotter environments where motor life is a concern as well as better underbalanced operations as the pressure drop for the motor can be eliminated.

In the late 70's and early 80"s, before steerable systems were available, the directional driller had to lead the well and understand the behavior of the combination bit and bottom hole assembly. Experience on the part of the directional driller and field knowledge was a significant factor. With the introduction of the steerable systems and motors, we, the industry have become accustomed to " gold plating" in well path trajectories and information requirements. From what we experienced on the Bluegrass location, azimuth control can be managed within an acceptable range if the proper knowledge of the bit and build assembly behavior is determined and the well is appropriately designed for that walk tendency.

I began to understand the nature of the application while I was on the Bluegrass Energy Watson well in Kansas. As engineers, we need to question each step of the process to determine what degree of data and associated operations is required. The purpose of the technology that we are championing at Marathon E&T is low cost horizontal drilling/reentry's. We have to keep focused on the balance of cost with well objectives versus our current horizontal drilling process paradigms.

Marathon has been evaluating companies to provide service for low cost horizontal drilling with the rotary steerable tool since February. Our findings conclude that TORCH appeared to have the most experienced rig site personnel; which in terms of making the system work, we considered to be a significant factor. Based on the data I had collected, it was our opinion that TORCH provided the best probability of success on our first trials with the rotary steerable system.

In terms of the Watson wells and TORCH's operations, I was very impressed with the tool and it's performance. We got pretty rough with the curve building assembly due to some of the specifics associated with the titanium drill pipe testing.

I was not disappointed, and in fact, was pleasantly surprised to find more experience than just Joe Chavez. All of the four TORCH personnel on location, Joe, Lawrence, Terry, and Randall were very knowledgeable as well as conscientious. In addition they accepted our intrusion into their normal business and were helpful at assisting us collect data as well as explain what they were doing.

Following is an example of where I would question my standard directional "best practices". There was quite a bit of discussion on location concerning "knowing where we were": i.e., the tie in of the drill pipe depth to the log depth. I know that typically I would have a gamma ray tie in. But in regards to this well depth, sand thickness, and cost objectives I need to rethink what I typically do. Does it add value? Is it critical to the success of the well? I think that if I had accurate pipe straps and details on rig elevations from both operations and then if my drilling information agreed I would reconsider the need for a tie in run. I was only an observer and cannot comment on the specifics to this well, but this is the kind of thing that would be discussed for Marathon's application of this technology in the pre-planning meeting with TORCH.

We believe that low cost horizontal drilling can open potential for improved recovery at economic rate for currently producing oil and gas fields in the continental United States. We are interested in discussing with TORCH drilling some wells for us in West Texas and the Rocky Mountain region in combination with further testing of the titanium drill pipe that Marathon has.

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