Productive Logging while Drilling Maximizes the Pay Exposure- a Case Study from Mumbai High North Field.

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The Mumbai High North (MHN) field is a highly heterogeneous multilayered carbonate reservoir, now in a declining phase of production. Most wells being drilled are either high angle or horizontal to maximize reservoir exposure. Continuous and heavy losses due to depletion of pressure in certain reservoir sections are common in this field and affect the drilling, logging, and often completions process. The shales present between carbonate reservoirs are also prone to swelling and can lead to borehole stability problems, especially in the high-angle wells drilled in this field. It is therefore important to monitor the measurements recorded while drilling to identify any formation or borehole effect that may impede this process and to steer the well accurately to achieve maximum reservoir contact.

Wells drilled in the MHN field record logging-while-drilling (LWD) measurements, including conventional logs such as density, porosity, natural gamma ray, electromagnetic propagation resistivity, as well as 16 sector density images, density caliper, and photo-electric factor. Correlating these measurements with offset wells data while drilling is important for identifying the desired target. These correlations require the measured logs to reflect the virgin formation accurately. The ability of LWD measurements to identify uninvaded formation assists in first identifying the target layer and later steering the trajectory to stay within the target. The key to accurate geosteering is the use of density images in conjunction with standard LWD measurements. Continuous interpretation of this image data in combination with the standard measurements is required to enhance reservoir contact.

Geosteering has become an integral part of drilling wells I the Mumbai High North field. Case studies are presented of three horizontal and high-angle wells in which this technique was used to pace well trajectories in the best part of the reservoir to optimize production. In all these cases the target layers wer efficiently identified and the trajectories successfully landed within the zone of interest, thereby demonstrating the LWD technology’s ability for accurate quantifications of the virgin formation properties and geosteering under the existing reservoir conditions.