Understanding Variability along a Lateral Wellbore in the Eagle Ford using Drill Cuttings and LWD Data

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Thanks to advances in technology and expertise, shale well drilling times continue to drop and the total drilling cost per well continues to decline. This trend is helping operators get more production from fewer rigs and reduce overall cost of developing shale plays. Enhancing this trend of improved drilling efficiency, operators are also developing methods and procedures for improving well stimulation based on local rock characteristics. Since open hole well logs (MWD/LWD) and conventional coring are seldom practical along laterals and there can be a great deal of variability, it is becoming more critical to obtain high quality geologic data from drill cuttings. In this presentation, we will show results of drill cuttings analysis from several hundred samples along both the vertical and horizontal tracts from two Eagle Ford wells.

Data collected from drill cuttings samples includes bulk density, elemental composition, and scanning electron microscopy to allow detailed visualization and quantification of pore types and organic material abundance. The cuttings data are shown in well log style displays to allow for comparison to open hole well logs (vertical/horizontal tract), identify zones of instability, act as an additional tool for geo-steering application, and assist in the identification of optimal zones for perforation. These data sets are compared and shifted to align the depths. Well No 1 has cuttings data at 30 foot intervals from the point of kickoff of the horizontal section to the end of the lateral. Well 2 has data from both a vertical pilot hole (10 foot intervals) and from the lateral wellbore (30 foot intervals). In all more than 500 sample intervals were analyzed.

Working closely with surface logging crews at the well-site, specialized sample collection and handling procedures were developed for this project. These procedures helped ensure that adequate and useable samples were collected and that the depth registration was reliable.

Analytical results show that lithology and bulk density variation along the lateral wellbore can be determined from shale cuttings samples. The drill cuttings data has been compared to other data from well logs and whole core and the results are consistent. The main observation from this work is that the process provides valuable geologic information along both the vertical and horizontal tracts of the wellbore in a time frame that is relevant for making decisions on perforation placement prior to fracture stimulation.