Saudi Aramco Mobile Geological Laboratory (MGL), Near Real-time Chronostratigraphic Resolution While Drilling Critical Exploration Zones

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ABSTRACT

The Paleozoic formations of Saudi Arabia represent a significant geological challenge because of the major unconformities separating the units, intra-formational hiatuses and sand-dominated lithologies. Hydrocarbon exploration activity targeting these formations requires a robust chronostratigraphic framework, which is provided by palynological biostratigraphy. The palynology, or organic microfossils, also deliver a crucial geological tool during the drilling of exploration wells. To address urgent geological uncertainties while drilling, and to avoid time delays caused by transporting cores and drill-cuttings to the Dhahran-based palynologists, a truck-based mobile geological laboratory (MGL), a lab technician and an Aramco palynologist are deployed to the rig-site. The MGL provides an efficient, cost-effective and safe working environment to deal with highly hazardous chemicals, such as hydrofluoric acid, used to extract the microfossils. The lab technician processes the samples and the rig-based palynologist analyzes microscope slides to build a palynostratigraphic framework in near real-time. This provides critical geological support by picking formation tops, coring points, total drilling depths (TDs), and ahead of bit prediction of casing points to avoid hazardous high pressure zones. The deployed MGL, can also be considered an operational base, providing similar geological services to nearby exploration wells. A successful case study is presented from a well in Central Saudi Arabia, where MGL operations were critical in providing a detailed palynostratigraphy of the Paleozoic section, which permitted identification of formation tops, coring points in the mid-Qusaiba sand, and to determine timely TD.