Heavy Mineral Stratigraphic Analysis on the Clair Field, UK West of Shetlands — A Unique Realtime Solution for Redbed Correlation While Drilling

Morton, Andrew [1]; Milne, Alex W.[2]; Bleasdale, Kevin [3] (1) HM Research Associates, West Midlands, United Kingdom. (2) BP Exploration, Aberdeen, United Kingdom. (3) Stratavarious, Sandiway, United Kingdom.

Hydrocarbons in the Clair Field, west of Shetland, are hosted by Devonian-Carboniferous clastic red beds deposited in a non-marine fluviolacustrine setting. The succession is almost entirely biostratigraphically barren, and hence alternative approaches to reservoir correlation are required. Heavy mineral analysis (HMA), which subdivides clastic successions on the basis of changes in provenance and sediment transport history, has proven successful in establishing a high-resolution correlation framework for the Clair Field. Consequently, HMA has been undertaken routinely on a real-time basis at well site for all development wells during Phase 1 of the Clair Field development, and for all Phase 2 appraisal wells. The technique offers a reliable, cost-effective and rapid method for monitoring the stratigraphy of Clair. Heavy mineral data can be acquired in less than 2 hours from receipt of sample: consequently, owing to the relatively slow ROPs frequently associated with Clair drilling, stratigraphic information can often be acquired ahead of LWD. Heavy mineral data have been used in the decision-making process in a variety of situations, including picking of casing points, picking of coring points, whether to maintain or alter well trajectory, and to terminate drilling. On Clair, formation tops can be subtle, and since HMA can establish trends and predict formation changes before they are encountered, they are critical in aiding geosteering decisions. HMA has also been used to monitor stratigraphy and to pick formation tops when logging tools have failed, allowing drilling to continue and avoiding tripping to change the bottom-hole assembly. The application of HMA to the Clair Field development will be illustrated by reference to a number of wells drilled on the field since 2005.