The Importance of Microfossils in Hydrocarbon Exploration

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ABSTRACT

Microfossils commonly used in petroleum exploration are foraminifera, nannofossils (or coccoliths), diatoms, radiolaria and plant matter (pollen and spores). Because of their small size and abundance in Phanerozoic rocks, they are easily recovered from drill cuttings without the drill bit destroying the fossil. Multidisciplinary studies use a combination of microfossils to overcome poor recovery between marine and non-marine deposits and achieve the highest resolution when assigning age zonations. Biostratigraphic correlation of rock sequences deposited during equivalent time intervals will determine the lateral continuity of reservoirs and traps. Paleoenvironmental analysis using microfossils will decipher past water depths, climate, oceanography, salinity oxygen and nutrient concentrations. Integration with litholog, petrophysical and seismic data develops far superior sequence stratigraphic models. Basin eustasy, sequence boundaries, systems tracts and maximum flooding surfaces can be identified with greater confidence. In addition, the modern micro benthonics are used in environmental baseline surveys (EBS) which are essential to attaining permits and meeting environmental requirements. Quantitative analyses of live and dead specimens are obtained using grab samples of the sea floor.

A similar sampling approach can also evaluate potential geohazards to avoid exorbitant re-mobilization or reinstallation costs. The use of microfossils in developing hydrocarbon basins and exploration programs are illustrated from offshore Guyana and East Coast Marine Area, Trinidad. Standard methods and procedures for analysis of modern benthos in EBS and geotechnical site evaluations are also presented.