Petrophysical Analysis of Siliceous-Ooze Sediments, More Basin, Norwegian Sea

Pelagic siliceous-ooze sediments occur above the hydrocarbon reservoir of the Ormen Lange gas field in More Basin, Norwegian Sea. A possible hydrocarbon prospect of siliceous ooze was proposed, but siliceous ooze is significantly different in texture from most commonly known reservoir rocks. Logging and core analysis data were integrated to characterize and evaluate these sediments. "True" density porosity was obtained by taking the number of electrons per unit volume of bulk siliceous ooze into account and it was calibrated to the overburden-corrected core porosity. A grain-density log was calculated from the gamma-ray log and empirical grain-density data were calibrated with X-ray diffraction analysis data. The grain-density log was used with the calculated true porosity log and the brine density of 1.025 g/cm(3) to convert the bulk-density log from conventional limestone and water scaling of electron density to opal and brine scaling of electron density. The neutron-porosity log was corrected for the hydrogen-index contribution of solid phase. The corrected neutron porosity is lower than the conventional neutron porosity by 3 to 4 p.u. The true density porosity and the corrected neutron porosity are similar. This indicates that our interpretation is consistent, such that it can be applied elsewhere. The studied sediments apparently do not contain hydrocarbons. The relatively low Biot's coefficient, averaging approximately 0.94, indicates that the siliceous ooze is relatively stiff. Amplitude-versus-offset analysis indicated that an oil-saturated sandstone layer can be distinguished from water-saturated siliceous ooze.

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