SOLUTION MINING RESEARCH INSTITUTE
Fall Conference – Nancy 3-5 october 2005

Well Log and Seismic Response of Permo-Triassic and Tertiary Evaporites, Zechstein – Muschelkalk – Keuper – Oligocene

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Abstract

The comparative study of sonic-density logs improves understanding of the seismic response of the various evaporitic units. The density/transit time cross-plot for each sequence demonstrates not only the possible occurrence of the reflections at the top and base of each salt layer, but also the close interconnection between the seismic image and the sedimentary process. Comparing Zechstein and Keuper sequences, the shale brought into the basin is a determining factor for the salt image, as the intensities of the reflections (i.e. acoustic impedance) at the top and bottom of the salt units are proportional to the sulphate content. In the case of the sabkha facies of the Muschelkalk, the presence of two high-impedance anhydritic layers induces tuning phenomena and provides understanding of localized erosional process affecting the salt layer. In the case of Oligocene potassic series, high resolution seismic tied at wells allows the detection of sylvite (1.86 g/cm^3) and carnallite (1.57 g/cm^3) due to their difference in density in spite of a similar slowness (sylvite 225 µs/m, carnallite 238 µs/m). The distinction between potassic minerals will be solved by a tying with gamma ray in time (220 A.P.I for carnallite and 500 A.P.I for sylvite).

Key words: Evaporitic series, wireline logs, reflection seismic, Permian, Triassic, Oligocene, halite,potassic salts.