

## A NEW APPROACH TO LITHOLOGIC AND SEDIMENTARY STRUCTURE ANALYSIS FROM WELL LOGS

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### ABSTRACT

A new method is presented which visually integrates lithologic and sedimentary structure data from well logs. Lithology is classified using a new technique based on formation mineralogy determined from spectral well logs. Geologic interpretation is enhanced by combining the lithologic results with sedimentary structure analysis from wellbore images. This method has been used successfully in studies of Gulf Coast fluvio-deltaic deposits to map lithofacies and depositional facies changes, for correlation between wells and for interpretation of reservoir quality.

Rock classification is achieved by determining mineral concentrations from spectral and other log responses, using mineral-suite models applicable to the region. Rock classification is based on the widely used scheme of Pettijohn *et al.* (1982) (arenite-graywacke-mudstone). Percent fine-grained matrix in the rock is the principal classification variable in their scheme, and is assumed to be a function of percent total clay volume. This approach to classification has the added advantage in petroleum exploration of emphasizing rocks of high reservoir quality.

Sedimentary structures interpreted from high resolution wellbore images are summarized independently of the lithologic analysis. Sedimentary structure analysis yields information on such practical factors as bedding thickness, directional permeability, and petroleum reservoir potential. When combined with the lithologic data, distribution of the sedimentary structures significantly enhances construction of reservoir models.

While great detail is available from lithologic and sedimentary feature analysis, studies undertaken in the Gulf Coast indicate that a broader overview of lithologic and sedimentary features leads to a better synthesis of these data. Offshore and onshore Gulf Coast examples are shown which illustrate the method and its results.

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