

**SPECIAL CORE ANALYSIS CONSIDERATIONS IN THE
DETERMINATION OF ELECTRICAL PROPERTIES OF
SHALY ROCKS AT RESERVOIR CONDITIONS**

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Abstract This paper presents some special core analysis considerations in the determination of the electrical properties and, therefrom, the volumetric parameters such as porosity and saturation of reservoir rocks. The following factors influencing the measurements of the electrical properties of reservoir rocks in the laboratory are considered, *i.e.*, confining pressure, temperature and clay minerals. Some details of a multi-sample high pressure and high temperature experimental system and a novel experimental procedure for making synthetic shaly rock samples with various clay type, content and distribution are also reported.

Systematic special core analysis experiments have been conducted on over 40 synthetic, outcrop and reservoir rock samples to investigate the effects of pressure and temperature on the electrical properties of clean and shaly rocks. An improved Waxman-Smits shaly sand conductivity model has been proposed which accounts for the effect of temperature and clay distribution on clay excess conductivity measurements. A quantitative parametric study based on the experimental data base and the improved Waxman-Smits shaly sand conductivity model is presented to demonstrate the significant influences of pressure, temperature and clay excess conductivity upon the determination of the electrical and volumetric properties of reservoir rocks.