

THE NATURE AND OCCURRENCE OF GEOPRESSURED RESOURCE AREAS IN THE STATE OF CALIFORNIA, USA

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ABSTRACT

The publicly available database on oil and gas fields in California provides a significant and consistent source of information which can be used to evaluate geopressure. A total of 410 pools have pressure gradients exceeding 0.45 psi/foot; these are considered to be potentially geopressured. At least 70 of these have pressures distinctly higher than predicted by the regional hydrostatic gradient, and 8 pools are superpressured.

Mud weight records are useful for identifying the top of the a geopressured zone in a well; plots of shale resistivity versus depth are used to quantify such zones. A linear correlation between pressure gradient and the ratio of observed shale resistivity to normal shale resistivity for a given depth, similar to those used in the Gulf Coast region, is developed. A single correlation is probably inadequate for the entire State; others, which account for varying geologic conditions, need to be developed. Resistivity and density logs can be used to develop a correlation which accounts for the effect of overburden pressure.

There appears to be no correlation between geopressure and elevated temperature; temperature gradients are generally within the normal range. The following modal values were determined from the database of 410 potentially geopressured oil and gas pools: porosity: 20 - 25%; salinity: 0 - 10,000 ppm and 25,000 -30,000 ppm; depth: 0 - 2,000 feet (median value 2,000 - 4,000 feet); thickness: 0 - 250 feet; and volume: 0.1 -1 billion cubic feet. The thickness and volume estimates represent hydrocarbon pools rather than water aquifers lying below them; as such, the estimates represent lower limits. Dissolved methane content is estimated to range from 7.5 to 100 standard cubic feet per barrel.

Conversions from US to SI units are found at the end of the paper.

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