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Open-File Report 2011–1245 Sheet 2 of 3

Evolution of overpressured and underpressured oil and gas reservoirs, Anadarko Basin of Oklahoma, Texas, and Kansas—Paleopressure and Overpressure Abstract

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5. Overpressure developed during Pennsylvanian and Permian time

Rapid deposition during Pennsylvanian and Permian time buried the Devonian Woodford Shale and Pennsylvanian source rocks (not shown) into the hydrocarbon generation window. We surmise that most of the overpressure in the deep basin developed at that time, although additional hydrocarbon generation may have occurred during Cretaceous time. The Permian cap, of Leonardian and Guadalupian age, covered the area until it was progressively eroded from east-central Oklahoma and Kansas.

6. Resistivity logs as paleopressure indicators

We established the resistivity trendline in mudrocks in 175 wells distributed throughout the Anadarko Basin. In many wells, the mudrock resisitivity follows the trendline without a reversal to the bottom of the well (A). In other wells, the resistivity trend in mudrocks reverses and decreases with depth rather than continuing to increase along the trendline (B). The depth of the first clear separation at 8,000 ft is considered to be the top of paleopressure. The reductionin resistivity is attributed to the opening of microcracks under excess pressure, which do not close with dissipation of pressure.

Well A - Edmond West 1-24

Well B -Bredy 1-6

7a. Resistivity logs arranged by map location

7b. Top of paleopressure climbs in elevation and cuts stratigraphy from south to north

8. Top of paleopressure in formations of various age

This map shows the geologic age of the formation where we located the top of paleopressure in the resistivity logs. In about half of the area, the top of paleopressure was found in rocks of Desmoinesian age. The top of paleopressure was found in formations as young as Virgilian, but only in two wells.

9. Shrinkage of paleopressured areas to present-day overpressured areas

The paleopressured areas (solid colors) were much greater than the present-day overpressured (contours) areas for rocks of Morrowan-Springer, Desmoinesian, and Missourian ages.

Morrowan and Springer

Desmoinesian

Missourian

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