Petroleum Geology of the Lake Kickapoo East (Caddo) Field Archer County, Texas

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Abstract

The Lake Kickapoo East (Caddo) Field is located in west Archer County, Texas in a multi-pay area that has produced from the Mississippian Lime, Bend Conglomerate, Caddo Limestone, Strawn Sandstone and Gunsight Sandstone reservoirs. The Caddo Limestone is the focus of this presentation and provides an example for exploration for Caddo Limestone reservoirs in western Archer County and eastern Baylor County.

The Lake Kickapoo East (Caddo) Field is an area where multiple Caddo buildups or mud mounds have been identified, drilled and produced. The reservoirs are isolated deposits located on a wide spread Caddo Limestone shelf. Seismic surveys combined with subsurface mapping have assisted in identifying potential mud mound buildups.

The Caddo Limestone reservoirs contain a chalky limestone with excellent porosity, but due to microporosity in the chalky portion the Archie water saturation calculations indicate the oil productive reservoirs should be water productive.

Excellent potential exists for the discovery of additional Caddo reservoirs in western Archer and eastern Baylor Counties.

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Caddo Lime Reservoirs in the Bend Arch Area, North Central Texas, Jack L. Crabtree, SW Section 1987 Convention Transactions

Jack L. Crabtree - Robinson #1 – thin section and analysis

Jeff Ritchie – personal communication

ENVERUS – production data
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CADDO LIMESTONE PRODUCTION
ARCHER COUNTY, TEXAS
Lake Kickapoo East Field

Multi-pay field with production from the Gunsight Sand, Strawn Sand, Palo Pinto Limestone, Caddo Limestone, Conglomerate and the Mississippian Limestone.
GUNSGHT SAND, PALO PINTO LIME, STRAWN SAND, CADDO LIME, CONGLOMERATE & MISS REEF- PRODUCTION ARCHER COUNTY, TEXAS
Palo Pinto Lime, Strawn Sand, Caddo Lime, Conglomerate & Miss Reef - Production
Archer County, Texas
CADDO LIME - PRODUCTION
ARCHER COUNTY, TEXAS
ISOPACH OF THE UPPER CADDYO LIMESTONE
AVERAGE EFFECTIVE POROSITY DISTRIBUTION – UPPER CADDO
SINGLE FOLD SEISMIC GRID
SINGLE-FOLD SEISMIC
NORTH TO SOUTH STRATIGRAPHIC CROSS SECTION
MONTHLY OIL PRODUCTION OVER TIME

9,660 BO/JUL-84
MONTHLY GAS PRODUCTION OVER TIME

17,308 MCF/DEC-85

TOTAL MO GAS (MCF)
UPPER CADDO LIME – PAY SECTION

DST 4976-4986’
Open with fair to good blow
Reopen tool with GTS in 10 min.
Recovered 210’ free oil, 180’ heavy O&G cut mud, 10’ SW
FP – 163 PSI
BHP – 2273 PSI

Resistivity = 2.3 ohms; Porosity = 16%; Rw = 0.035 ohms; Sw = 77%

Initial Potential Pumping – 82 BOPD, 44 BWPD, Trace of Gas 4974-78’
Cumulative Oil Production = 15,137 BO 10/1984-1/2023 (hole in casing)
Sample Description

LS (60%) White-Buff-Light Brown dense-chalky, microsucrosic, microcrystalline, fossiliferous

Excellent yellow to bright yellow fluorescence, trace of stain
fair visible porosity

Good streaming cut, with fair to good residual cut.

Hot wire 170 Units/15 Units baseline
Drilling break – 2 min/ft – 5-6 min/ft
BETTIS BOYLE & STOVALL_RICHARDSON NO. 1 - LOCATION
2,000X THIN SECTION
UPPER CADDJO LIMESTONE
Initial Potential – 40 BOPD & 30 BWPD, Natural

Chalky Limestone – result of recrystallization of the original micritic texture.

This recrystallization forms a mosaic of euhedral calcite crystals. Presence of secondary microporosity (1-3 microns) and the associated minute pore throat openings present in this type of reservoir. (A.J. Ehlmann).
ENTERPRISE ENERGY CORP._CARPENTER NO. 2 - LOCATION
51X SEM THIN SECTION
CADDON LIMESTONE

51 X - 4,911’ - The surface of this micritic lime displays little porosity or textural differentiation.
1000X SEM THIN SECTION
CADDO LIMESTONE

1000X - 4,911' - High magnification reveals the difference between calcite spar infill and micritic calcite. Note the intergranular microporosity within the micrite. This type of porosity could generate matrix flow.
TAKEAWAY:

Potential bypassed Caddo Lime producers due to water saturation calculation indicating water production.

Possible negative bias for Caddo Lime even with good hydrocarbon shows.
ACKNOWLEDGEMENTS

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