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## Jurassic Cotton Valley Reservoir Quality, Eastern Offshore Gulf of Mexico: Chlorite Coatings and the Porosity Preservation Story Found Below 20,000 ft

The Jurassic Cotton Valley formation was penetrated near 20,000 ft in a shelf-margin growth-faulted well location in Viosca Knoll Block 251. The sands cored in the subject well describe three shallow water parasequences, each having argillaceous transgressive rocks overlain by coarser-grained highstand sandstones.

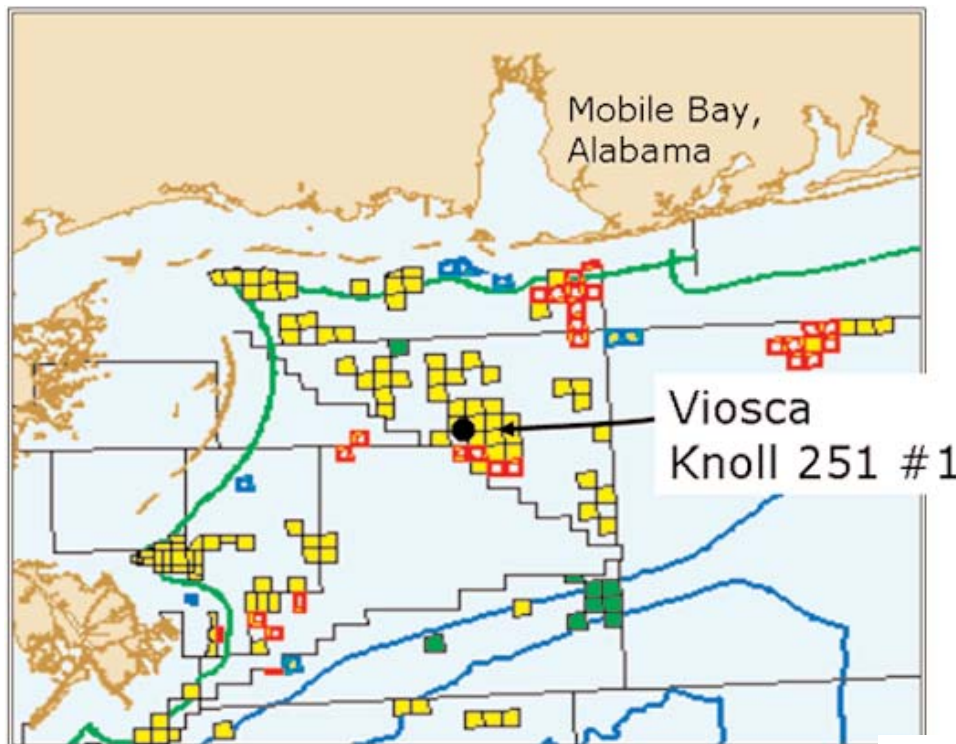
Intergranular, intragranular and fracture porosity are contained within these sandstones. Log porosity ranges from 1% to 14%

overall, and core porosity ranges from 1.0% to 6.7%. Although quartz is the main cement, chlorite grain coatings inhibit quartz cement when they are well developed. Late fractures are partly filled with quartz and carbonate cement, and unfilled fractures are thought to enhance reservoir deliverability.

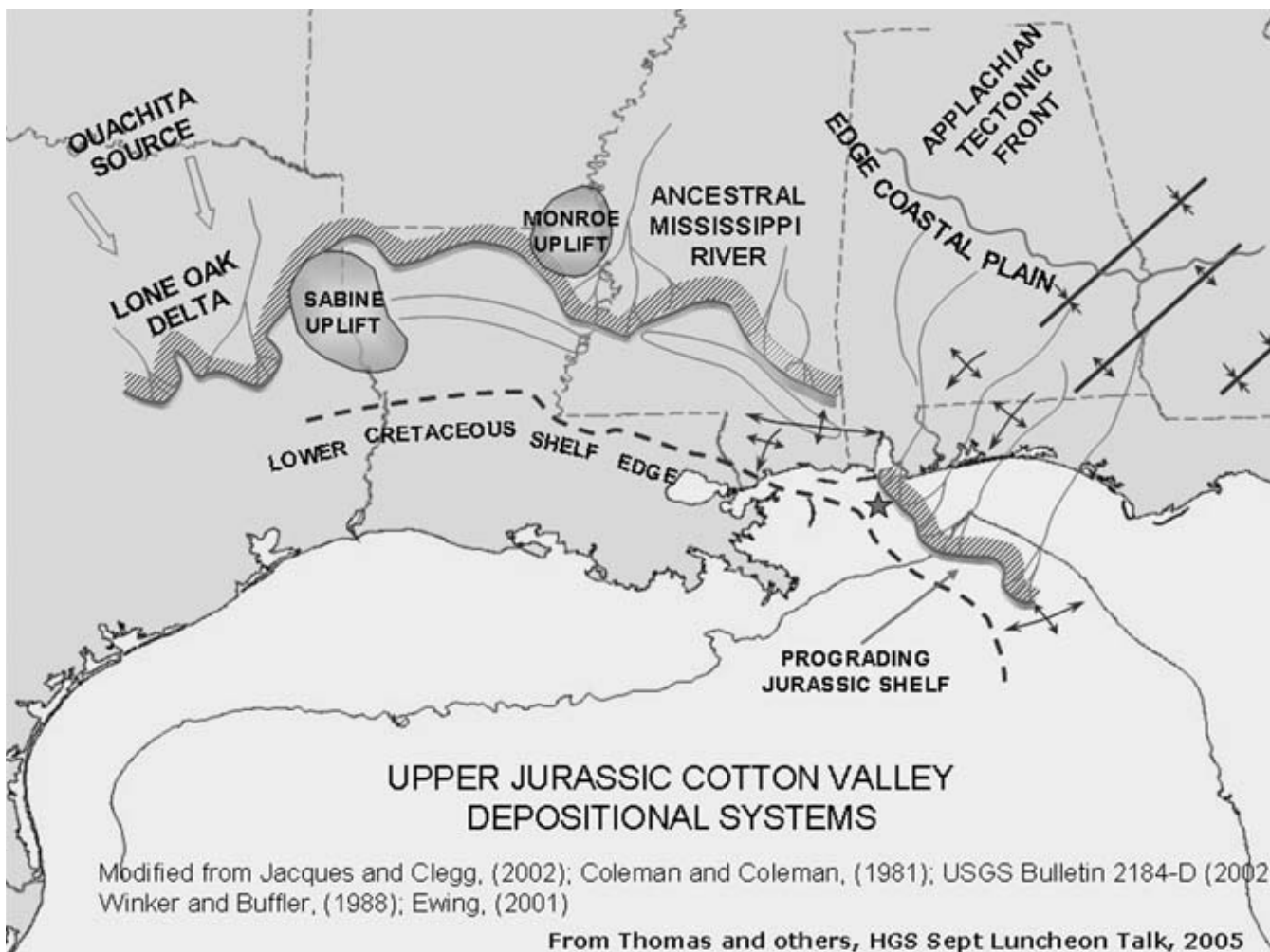
*Reservoir quality is driven by quartz cement volume and reservoir viability is lost below 15,000 ft.*

Cotton Valley in the eastern Gulf of Mexico (GOM) composition and diagenetic path stand in contrast to the quartzarenites found farther west on trend. Fluvial-deltaic Cotton

Valley sands deposited and reworked in East Texas and North Louisiana systems are highly quartz cemented and contain few clay coatings. Reservoir quality is driven by quartz cement volume and reservoir viability is lost below 15,000 ft. In contrast, progradational fluvial-deltaic sands in Viosca Knoll are lithic arkoses and contain muscovite and biotite both as discrete mica and as metamorphic rock fragments. This sandstone composition shift is related to proximal Appalachian drainages and minor strandplain reworking in the eastern GOM. Biotite dissolution influences the Cotton Valley diagenetic pathway to one favoring chlorite coatings and porosity preservation below 20,000 ft.



Location map showing the deep well location in Viosca Knoll 251.



*Upper Cotton Valley depositional systems offshore Gulf of Mexico, showing the prograding Jurassic shelf.*

Reservoir quality uncertainty was constrained with Touchstone\* modeling. With the subject well as calibration, chlorite coatings are shown to preserve reservoir quality to even greater depths. ■

**EDITOR'S NOTE:** \*Touchstone is a software system for analysis of controls on reservoir quality in analog sandstones and for forward modeling of sandstone diagenesis and petrophysical properties.

**Biographical Sketch**

ANDREW THOMAS started work in 1981 with Texaco in New Orleans, after receiving a Master's degree in geology from Indiana University and a bachelor's degree in geology from the University of Georgia. He has lived in New Orleans twice and Houston twice, working various reservoir quality issues in sandstones and carbonate rocks for both Texaco and Chevron. Andy currently works



in Houston within the Chevron Energy Technology Company and does global consulting regarding sandstone diagenesis, reservoir characterization and reservoir quality prediction using Touchstone. He is an AAPG Certified Petroleum Geologist and member of SEPM, serves on the executive committee of the Clay Minerals Society, and is a past HGS delegate to the AAPG.

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