Findings include the following. (1) The thermal maturity of the thrust system conforms to the maturity of the sequence that it has overthrust, suggesting that this allochthonous facies is not anomalously mature. (2) Shale units within the novaculites contain oil-prone organic matter in sufficient concentrations to constitute source rocks. (3) The composition of oils from Isom Springs field in southern Oklahoma and from McKay Creek field in west Texas is virtually identical and generally resembles Devonian oils in Oklahoma and west Texas.

We conclude that the Devonian novaculites of the Marathon-Ouachita thrust system are self sourcing and do not require a fortuitous juxtaposition of source rocks of a different age to produce a commercial deposit.

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Hydrocarbon-Induced Diagenetic Aureole (HIDA)—Mineralogical and Isotopic Models

The Permian red beds that overlie some giant oil fields in southwestern and south-central Oklahoma have undergone extensive mineralogical and chemical diagenesis. The diagenetic minerals occur within a distinctly zoned aureole that delineates the position of the oil field. The geometries of the aureoles strongly reflect the major structural elements that controlled emplacement of hydrocarbons in the underlying rocks. Calcite, ferroan calcite, manganese-rich calcite, dolomite, ankerite, pyrite, marcasite, and native sulfur are the major diagenetic minerals. The innermost zone of each aureole is characterized by abundant carbonate cementation and generally coincides with a major fault system. Pyrite and marcasite cements are commonly associated with carbonate-cemented zones; these minerals occur also in the bleached sandstones.

δC^{13} values of carbonate cements indicate 3 major sources of carbon: (1) an organic source with δC^{13} values of approximately $-32‰$ vs. PDB, (2) a freshwater source with an average δC^{13} value of $-8.0 \pm 3‰$, and (3) a hybrid source (freshwater and organic). A mixing model was developed to calculate the proportion of organic carbon in carbonate cement.

δS^{34} values of pyrite and marcasite average 6.1‰ and range from -9 to $+16‰$. The isotopic composition of sulfides is similar to that of oil in the underlying reservoirs. Formation of diagenetic pyrite and marcasite is explained by reduction of iron oxides in red beds by hydrogen sulfide, and by other organic material associated with hydrocarbons.

The HIDA concept can be used in exploration for oil and gas, specifically in structurally controlled reservoirs.

Table 1. Selected Conversions

To Convert:	To:	Multiply By:
	Linear Units	
inches (in.)	centimeters (cm)	2.54
feet (ft)	meters (m)	0.305
miles (mi)	kilometers (km)	1.609
meters (m)	feet (ft)	3.281
centimeters (cm)	inches (in.)	0.394
kilometers (km)	miles (mi)	0.621
	Square Units	
square feet (ft^2)	square meters (m^2)	0.093
square miles (mi^2)	square kilometers (km^2)	2.590
acres	hectares (ha.)	0.405
square meters (m^2)	square feet (ft^2)	10.764
square kilometers (km^2)	square miles (m^2)	0.386
hectares (ha.)	acres	2.471
	Volume Units	
cubic feet (ft^3)	cubic meters (m^3)	0.028
barrels (bbl)	cubic meters (m^3)	0.159
cubic meters (m^3)	cubic feet (ft^3)	35.315
cubic meters (m^3)	barrels (bbl)	6.290
metric tons (MT)	barrels (bbl)	7.34 (approx.)
barrels (bbl)	metric tons (MT)	0.14 (approx.)
	Weight Units	
pounds (lbs)	kilograms (kg)	0.454
kilograms (kg)	pounds (lbs)	2.205
short tons (tons)	metric tons (MT)	0.907
metric tons (MT)	short tons (tons)	1.102

To Convert:	To:	Use Formula:
	Temperature	
degrees Celsius (°C)	degrees Fahrenheit (°F)	(°C × 9/5) + 32
degrees Fahrenheit (°F)	degrees Celsius (°C)	(°F − 32) × 5/9