phreatic cementation occurred soon after the marine cementation and occluded virtually all remaining primary porosity.

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Implications of Offshore Northern Alaska Geology for Origin of Canada Basin, Arctic Ocean

Geologic mapping and petroleum exploration in northern Alaska and seismic surveys offshore suggest that 2 pulses of rifting created the Canada basin. Mississippian to Triassic miogeoclinal rocks in northern Alaska, derived from a now-displaced northerly source land, correlate with similar strata in the Canadian Arctic Islands. Underlying Ordovician and Silurian argillite and graywacke may correlate with the clastic succession in Heezen trough of the Arctic Islands. Closing Canada basin about a Mackenzie delta pole would rejoin these correlative rocks and recreate a unified pre-Jurassic Arctic paleogeography. Rifting began in earliest Jurassic time, creating a west-northwest-trending trough beneath the Beaufort Shelf and probably the southern Canada basin. The main rifting pulse, however, began in late Neocomian time, and the main post-rift progradational sedimentary prism off Alaska is Aptian or Albian and younger.

Apparently both late Neocomian and Laramide rifting thinned the crust beneath North Chukchi basin. Marked basinward thickening of Cretaceous strata records the earlier event, and extensional faulting and basinward thickening of Tertiary strata record the later one.

The high-standing, north-trending ridges and troughs of the Chukchi borderland, which trend into the North Chukchi basin from the north, may represent localized Laramide(?) crustal extension subparallel to that which created the Laramide(?) and Cenozoic Makarov and Eurasia basins of the Arctic Ocean. This model requires crustal shortening between the Chukchi borderland and Canada basin and transform faults north and south of the borderland. North of our seismic lines, the southern transform may be buried by Tertiary sediment of the North Chukchi basin.

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Paleoenvironmental and Diagenetic Analysis of Wichita Group, Palo Duro Basin, Texas Panhandle

The Wichita Group in the Palo Duro basin represents the Wolfcampian-Leonardian transition from carbonate to predominantly evaporite deposition. An interbedded series of dolomitic, anhydritic, and terrigenous clastic lithofacies reflect deposition in inner shelf and evaporitic tidal flat environments. An arid setting and restricted marine circulation over the broad expanse of the basin were conducive to the onset of early diagenesis, which masked much of the Wichita depositional framework.

Petrographic analyses revealed diverse lithofacies in the Wichita Group. Dolomitic lithofacies include (1) pyritic to argillaceous mudstones, (2) organic wackestones, (3) algal-intraclastic wackestones and packstones, (4) skeletal-peloid packstones, (5) coated grain-ooid grainstones, and (6) pisoid grainstones. Nodular-mosaic and massive to laminated anhydrite and terrigenous shales and siltstones complete the sequence. Noncyclic relationships are characterized by rapid vertical change, laminated to thin bedding, and gradational to sharp, commonly erosional contacts.

Wichita subfacies reflect deposition in a complex patchwork mosaic of evaporative supratidal, intertidal, shoal, and subtidal environments rather than a normal shelf to tidal flat transition. Close lateral association of these subenvironments in a low topographic setting yielded rapid facies migration in response to periods of increased terrigenous influx, storm erosion and redeposition, and normal tide and sea-level fluctuations.

Subaerial exposure and hypersaline brines initiated penecontemporaneous sulfate deposition and dolomitization. Two to three stages of dolomite cements were deposited. Primary sulfates provided a source for late poikilitic, blocky, and bladed anhydrite cement. Pseudocubic and bladed anhydrite replacement of dolomudstone is common.

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Fusselman-Cisco Play, Roosevelt Positive, Roosevelt and Curry Counties, New Mexico

The Roosevelt positive is bounded on the south by the petroliferous Northwest Shelf province; the Tucumcari basin lies to the north.

The current Fusselman-Cisco play was ignited in June 1978, by discovery of South Peterson-Fusselman field by Enserch in T5S, R33E. The discovery well had produced over 560,000 bbl of oil to January 1, 1984. In 1981, Energy Reserves Group extended Cisco production into T6S, discovering the East Tanneyhill-Cisco field, now part of South Peterson-Penn (Associated) field.

Present structural trends in the southern Roosevelt positive are northerly and contain all presently discovered oil and gas fields. Structures in the northern province trend westerly where shows have been encountered in the San Andres and Cisco. A paleostructural high projecting from the ancestral Central Basin platform trends across Roosevelt County to the northwestern part of Curry County. All known major fields producing from units below the San Andres are on the crest or flank of this paleohigh.

Pre-Pennsylvanian Paleozoic rocks are truncated around the edge of Precambrian knobs by an Early Pennsylvanian unconformity. Primary objectives are Fusselman Dolomite and Cisco limestone. Fusselman reservoirs in intercrystalline and vuggy porosity produce from truncation or anticlinal traps. Secondary porosity in the Cisco is created by leaching of forams and algal plates. Traps have been found on flanks and crests of anticlinal trends.

The province is considered a good seismic recording area. Although objective formations are relatively thin, high resolution seismic, synthetics, and modeling make reasonable stratigraphic interpretations possible.

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Influence of Basement Islands and Ridges on Smackover Deposition, Southwest Alabama

Pre-Jurassic basement highs, composed of igneous and/or metamorphic rocks, have influenced the deposition of Jurassic Smackover sediments in Clarke, Monroe, Conecuh, and Escambia Counties, Alabama. These basement islands and ridges provided a structural fabric on which Smackover sediments were deposited.

The following 3 basic structural settings illustrate the thickness variations and lithofacies distribution of Smackover sediments on the flanks and crests of these basement highs. Emergent features were never covered by Smackover seas, resulting in nondeposition of Smackover sediments over their crests. Flanking these features are finely crystalline and anhydritic dolomites capped by bedded nodular-mosaic anhydrite. The anhydrite grades upward into Haynesville continental sediments that also overlie the crests of these features. Semi-emergent features were above sea level for most of Smackover deposition. It was not until near the end of Smackover transgression that these islands and ridges were inundated. As the seas regressed, shoaling occurred on the flanks of these features depositing predominantly grain-supported limestones that were later dolomitized. The crests of these basement highs are covered by thin, low-porosity, grain- and mud-supported dolomites capped by bedded nodular-mosaic to distorted mosaic anhydrite. Nonemergent features were submerged through most of Smackover deposition. This enabled carbonates to accumulate as thick organic buildups and shoals over crestal portions of the basement highs. These thoroughly dolomitized and highly porous and permeable crestal sediments grade upward into nonporous, mud-supported dolomites capped by bedded nodular-mosaic anhydrite.

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Facies Relationships and Diagenesis in Smackover Formation—Huxford Field, Southwest Alabama

Huxford field, Escambia County, Alabama, was discovered in late 1982 by the Texaco 2 ATIC 35-6 well. Production was established from the upper Smackover Formation with an initial gauge of 1,070 BOPD