anomalies occur over fields which are contained in stratigraphic traps.

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Structural and Stratigraphic Framework of Lower Mesozoic and Upper Paleozoic Strata, Northeast Texas

The lower Mesozoic and upper Paleozoic were investigated in a 19,430 sq km area centered about Ellis County, Texas, in an effort to define the pre-Cretaceous surface, determine the westward extent of Jurassic rocks, analyze thickness and lithic nature of the lowermost Cretaceous, delineate the extent of faulting, and evaluate the economic potential of the section studied.

The pre-Cretaceous surface dips east-southeast and consists of Paleozoic rock in the updip third of the study area and Jurassic rock in the downdip two-thirds. Regional dip increases southeastward into the East Texas basin, but is interrupted by Balcones and Mexia-Talco faults. According to seismic data, many of these normal faults extend into the Paleozoic section. They are Jurassic and younger in age and formed along preexisting lines of weakness in response to the structural development of the East Texas basin. Jurassic rock extends updip beyond the Mexia-Talco system in an onlap fashion, each carbonate formation becoming more clastic as it nears its own pinch-out. The overlying Hosston Formation was deposited in a fluvial to nearshore environment, in the study area, on the basis of reported lithologies and isopach form. The interval studied has economic potential as geothermal, ground-water, and hydrocarbon sources. Possible hydrocarbon traps include fractured Arkansas Novaculite, updip pinch-out of and porous facies within the Upper Jurassic formations, and traps against the downdip sides of faults in the Hosston Formation and underlying Jurassic formations.

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Depositional and Diagenetic Facies, Smackover Formation, Chunchula Field, Alabama

The Chunchula field lies on the northeastern edge of the South Mississippi platform and produces from dolomitic carbonates of the Smackover Formation. The Smackover section overlies the subaerial to marine Norphlet Sandstone and itself represents a general transgressive-regressive sequence of shallow-marine to supratidal facies similar to those found on the Great Bahama Bank today.

The Chunchula carbonate section is composed of at least three major units. The basal interval is the lowermost Smackover section and is composed of medium to coarsely crystalline dolomite and its upper boundary seems to be marked by a significant disconformity. The second unit is interpreted as upper Smackover and is composed of medium to coarse-grained dolomite in the central and western parts of the field, but becomes predominantly limestone along the northern and eastern edges of the field. The uppermost part of the carbonate section is a finely crystalline dolomite that represents part of a sabkha sequence and probably belongs to the overlying Buckner evaporite section.

Porosity development is restricted to the dolomitic units and seems to be preferentially associated with paleotopographic highs. The best reservoir intervals are composed of intercrystalline dolomite and pelmoldic porosity and have their maximum development in the southeastern part of the field.

Carbon and oxygen isotopes and strontium ion concentration data suggest that fresh or brackish fluids have played some role in the development of porosity in the Smackover carbonates.

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Depositional Environments and Porosity Evolution, El Abra Limestone (Cretaceous), Mexico

Reservoir quality in the middle Cretaceous Golden Lane oil field, Mexico, was enhanced by freshwater dissolution during subaerial exposure in the Late Cretaceous and early Tertiary. Study of the outcropping equivalent El Abra Limestone in the type area demonstrates the presence of repeated emergence and submergence and the formation of subaerial discontinuity surfaces.

Physical correlation has been established between El Abra quarry sections. This dovetails with a corresponding correlation of discontinuity surfaces to provide a series of reliable horizons on which to construct a shelf-edge model.

Near back-reef rocks are characterized by thin (3 m) shoaling-up sequences usually capped by thick (to 10 m) supratidal and island sequences. Storm washover deposits with strong calcrete overprint are interbedded with penecontemporaneously dolomitized supratidal rocks. Freshwater dissolution during emergence produced voluminous moldic and vuggy porosity, subsequently reduced by interlayered marine internal sediment and a radiaxial fibrous cement mosaic. Platform-interior rocks are characterized by thick subtidal deposits and 3 to 5 m shoaling-upward sequences attributable to tidal flat progradation in the lee of shelf-edge islands or the migration of tidal channels. Paleosols and karstic surfaces are present at the tops of several cycles. Moldic and vuggy porosity developed during subaerial exposure was reduced by vadose and marine internal sediment. Radiaxial fibrous cement mosaics are not present.

Porosity development in the El Abra type area is a result of synsedimentary emergence. Porosity was of local extent and largely occluded by processes active during succeeding sedimentary episodes. Post-El Abra freshwater leaching appears to have been minor. Contrasts in reservoir development between the Golden Lane and the comparatively tight El Abra type area may reflect differences in later exposure.

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Sedimentary-Exhalative Pb-Zn Deposition, Grum Deposit, Anvil Range, Yukon, Canada

The Grum deposit is one of eight stratiform shale-hosted massive zinc-lead-barite mineral deposits located in the Anvil Range, Yukon. Host sediments were deposited in a Lower Cambrian extensional basin within a trailing margin miogeoclinal wedge. During the Mesozoic, the ore deposits and their host sediments underwent lower greenschist grade metamorphism and complex deformation related to intrusion of the Cretaceous anvil batholith.

The Grum deposit consists of two sulfide horizons which were isoclinally folded into a first phase fold closure that was subsequently refolded into recumbent S-shaped second phase folds plunging to the northwest. The southeastern section of the deposit is disrupted by both steep and low angle faults.

Sulfide deposits occur at a stratigraphic transition between noncalcareous phyllites of the Hadrynian to Lower Cambrian Mt. Mye Formation and the Lower Cambrian to Lower Ordovician calcareous phyllites of the Vangorda Formation.

The Grum deposit is similar to other Anvil deposits and can be divided into four major ore facies. These occur in stratigraphic succession from a basal and marginal "ribbon-banded" graphitic quartzite (representing both sedimentary and hydrothermal inputs) upward through pyritic quartzites, massive pyritic sulfides, and finally baritic massive sulfides and sulfates. This zonation is well developed in one of the sulfide horizons at Grum, and could be caused by increasing fO_2 and pH or by decreasing temperature. A sericitized alteration envelope incompletely surrounds the ore horizons and is related to ore fluid influx. Deposition most likely occurred in localized sea-floor deeps from anoxic hydrothermal brines.

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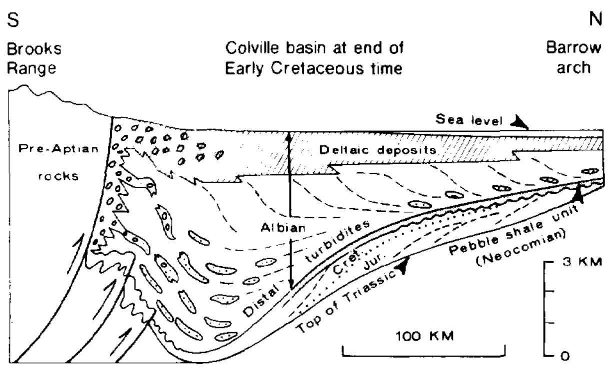
Depositional History and Seismic Stratigraphy of Lower Cretaceous Rocks, National Petroleum Reserve, Alaska and Adjacent Areas

Knowledge of depositional history of Lower Cretaceous rocks in the National Petroleum Reserve in Alaska is necessary for predicting the occurrence of potential sandstone reservoirs. These rocks range in thickness from 7,000+ m along the Colville basin axis to about 1,200 m on the Barrow arch. Lower Neocomian strata on the north flank of the basin consist of southward prograding marine shelf and slope deposits of shale and minor sandstone units. Uplift, erosion, and subsequent transgression on the northernmost flank of the basin resulted in deposition of the pebble-shale unit in late Neocomian time and termination of the northern provenance. Following this, the basin was downwarped, and little deposition occurred on the north flank until distal, deep-water deposits of the Torok Formation onlapped and downlapped the south-dipping flank of the basin in middle or late Albian time.



On the south flank of the basin, southern-source turbidites of the Okpikruak Formation (early Neocomian) accumulated in a subsiding foredeep and were subsequently thrust northward in late Neocomian or Aptian time. The Fortress Mountain Formation (early Albian), which consists of as much as 3,000 m of mainly deep-water deposits, unconformably overlies the Okpikruak and older rocks on the southernmost flank of the basin. Filling of the Colville basin occurred in middle to late Albian time as thick prodeltaic and deltaic deposits of the Torok Formation and Nanushuk Group, respectively, prograded across the basin from the south on the south side of the basin, but prograded principally from the west-southwest over most of the basin.

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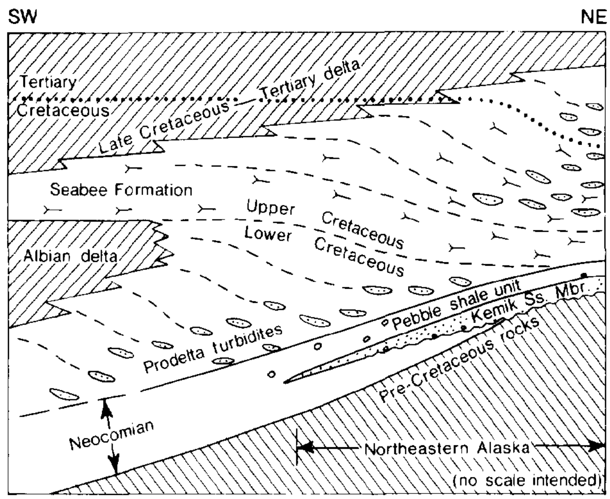
Cretaceous-Lower Tertiary Depositional Relations, Northeastern Alaska

Analysis of depositional environments and new paleontologic data indicate the need for a revised interpretation of Cretaceous and lower Tertiary stratigraphy in northeastern Alaska. A revision is important to the understanding of these rocks in unexplored areas to the north. In the Sadlerochit Mountains area, the late Neocomian transgressive Kemik Sandstone Member and pebble shale unit of the Kongakut Formation unconformably overlie Jurassic and Triassic rocks. The unconformity, which is present throughout northernmost Alaska, apparently grades to a conformable shelf sequence to the south. In the Sadlerochit Mountains area, Upper Cretaceous organic-rich shale and bentonite of



the Seabee Formation overlie the pebble shale unit; the intervening Aptian and Albian strata are either absent by nondeposition or are a thin, condensed section. Subsequent deposits of Late Cretaceous and early Tertiary(?) turbidites and shale were probably derived from east-northeasterly prograding deltas that are exposed west of the Canning River.

Cretaceous strata in the Sadlerochit Mountains area are about 700 m thick and contain no erosional unconformities. The comparatively thin section is attributed to the area being high (although still in deep water) relative to the Colville basin axis to the south, which was a sediment trap.

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Correlation of Thermal Conductivity with Physical Properties Obtained from Geophysical Well Logs

Thermal maturation studies of hydrocarbons in sedimentary basins require knowledge of the regional heat flow. Thermal conductivity data are necessary in deriving heat-flow estimates, but at present the only method available for obtaining conductivity values is by individual sample measurement in the laboratory. Many of the physical properties that are measured during geophysical well logging of petroleum boreholes are related to the same properties that determine thermal conductivity. The object of this study has been to derive an empirical relation in order to determine thermal conductivities from well-log data alone.