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Water Injection Scheme in E2.0 Sand of Nigerian Kolo Creek Field—Optimization through Geological Modeling

The Kolo Creek field is a 5 × 10 km (3 × 6 mi) size, faulted, rollover structure with the E2.0 reservoir as the main oil-bearing sand. The reservoir is a 200 ft (66 m) thick, complex, deltaic sandstone package with a 1.9 tcf size gas cap underlain by a 200 ft (66 m) thick oil rim containing some 440 × 10^6 bbls STOIIP. The sand is penetrated by 34 wells, 25 of which are completed as producers. Nine of the producers have been closed-in for excess gas production.

During the first two years of production (1973 to 1975), a 7% (350 psi, 2,400 kPa) decline from the initial reservoir pressure was associated with a cumulative oil production of 4.5% (20 × 10^6 bbls) of STOIIP. To date, 16% (72 × 10^6 bbls) of STOIIP has been produced with an attendant 16% (800 psi, 5,500 kPa) drop in pressure. A reservoir engineering study, based on the early pressure decline, led to the implementation of a water injection scheme for which, so far, 5 injection wells have been drilled. Immediately prior to the initial phase of the scheme, cores were taken in two wells. These cores, side wall samples from other wells, and the detailed correlation made possible by the denser well pattern have resulted in a realistic geological model. It will be demonstrated how this model will influence the optimal location of future injection and production wells based on the structural and sedimentological characteristics of the reservoir.

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Regional Geomorphic Expressions of Subsurface Structure on Poorly Consolidated Surface Sediments, Coastal Mississippi

Formational contact and stream channel directional data totaling 5,356 measurements were taken from topographic and geologic maps of coastal Mississippi to determine the relationship of drainage and outcrop patterns to the Wiggins uplift. Data were compared to structural models developed by Moody and Hill in 1956 and by Miller in 1982, and to orientations of faulting and axes of structure. The Rayleigh test for uniformity reveals that neither orientations of drainage channels nor orientations of the trace of the unconformable contact between the Pascagoula and Citronelle formations exhibit a random distribution.

The effects of structure on the outcrop pattern can be seen by (1) the mean orientation of formational contact, which is nearly coincident with part of a wrench fault structural model, and (2) the greater areal extent of Tertiary outcrops in this region than in comparable regions of Louisiana Alabama. The predominant orientations of drainage channels exhibit: (1) a greater degree of coincidence with the predominant orientations of formational contacts than with any other single factor; (2) a significant coincidence with the axis of the Wiggins uplift; (3) a directional relationship to the structural axes that conforms to the relationship of wrench structures predicted in the structural models; and (4) poor alignment with the faulting described by Fisk in 1944 which are thought to also be wrench structures. It is suggested that anomalies in the courses of Red Creek, Black Creek, and the Pascagoula River are related to the Wiggins uplift and other associated wrench structures, and further, that structures described by Fisk in 1944 are locally deformed by the Wiggins uplift.

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Sedimentology of Cretaceous Kuskokwim Group, Southwestern Alaska: A Borderland Complex

The southern portion of the Albian to Coniacian Kuskokwim Group was deposited in a continental borderland setting formed during accretion of exotic terranes to continental Alaska. This borderland was characterized by a broad, deep shelf with local highlands and confined basins. The Kuskokwim Group includes braided stream, marginal-marine, shelf turbidite, and borderland basin depositional facies. These facies are analogous to those of rocks deposited on the Neogene continental borderland of southern California.

The detritus which makes up the Kuskokwim Group was at least partly derived from highlands within the continental borderland, perhaps including islands. Sediment was transported by braided streams and deposited along shorelines. The detritus was then redeposited on the borderland shelf in submarine fans. Middle fan, outer fan, and basin plain facies have been recognized. Some fan turbidites may have been reworked by wave action during major storms, as suggested by the presence locally of sandstone beds with hummocky cross-stratification. Much of the Kuskokwim Group is characterized by thin-bedded T_{CDE} siltstone-shale turbidites. These may represent deposition in areas of the borderland which were far from a sediment source. Detritus was also deposited in borderland basins, defined by submarine channel complexes composed of sandstone, conglomerate, and classic turbidites.

The Kuskokwim Group depositionally overlies diverse tectono-stratigraphic terranes of continental, magmatic arc, and oceanic affinity, indicating that those terranes were juxtaposed by the time of deposition. The continental borderland character of the Kuskokwim Group indicates that deposition occurred in a tectonically active environment. This may have been a fore-arc environment analogous to the present Kodiak-Shumagin shelf, or a transform environment analogous to the Neogene southern California borderland.

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Biostratigraphic and Paleoenvironmental Results from Neogene Radiolarians, U.S. Mid-Atlantic Coastal Plain and Continental Margin

Biostratigraphic and paleoenvironmental studies were carried out on radiolarians from over 50 core and outcrop localities from the U.S. mid-Atlantic coastal plain and continental margin. These deposits consist of sandy diatomaceous silts and clays, and represent depositional environments ranging from inner shelf (onshore localities) to upper continental slope (offshore localities).

The limited radiolarian assemblage (approximately 50 species) lacks many stratigraphically important low latitude forms but nevertheless allows the recognition of zones (i.e., those of Riedel and Sanfilippo in 1978). Radiolarians occur at onshore localities in New Jersey, Delaware, Maryland, and Virginia representing ages from early Miocene (*Stichocorys wolfii* zone) to middle Miocene (*Diartus petterssoni* zone). Late Miocene deposits are devoid of radiolarians at all the coastal plain localities studied. However, certain deposits of presumed Pliocene age in Virginia contain a sparse radiolarian assemblage. Offshore wells (such as COST B-3 and ASP 15) appear to have a longer Neogene radiolarian record, ranging from earliest Miocene (probable *Cyrtocapsella tetrapera* zone) to Pliocene age.