

tidal channels, and shoals. Facies D was deposited behind the barrier complex in hypersaline lagoon, evaporitic intertidal-flat, and supratidal-falt environments. Facies E represents deposition on a prograding fluvial plain. A modern analog for the late Miocene barrier-lagoon-tidal flat complex exposed in Sespe Creek area is the coastal zone between San Felipe, Baja California, and the present mouth of the Colorado River.

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Fortescue Field—Stratigraphic Trap in Gippsland Basin, Australia

The Fortescue 1 well, drilled in the Gippsland basin in June 1978, was a dry hole. However, the results of a detailed stratigraphic analysis and interpreted seismic data provided sufficient information to predict the possible occurrence of a stratigraphic trap on the flank of the giant Halibut structure. Three months later, the West Halibut 1 well encountered oil in the Latrobe group 16 m below the depth used as the oil-water contact for the Halibut field. Following wireline testing in both the water- and oil-bearing sandstone units, two separate pressure systems were recognized in the well. Three additional wells, Fortescue 2, 3, and 4, were drilled to delineate the limits of the field, the complex stratigraphy, and the pore fluid contacts. Detailed well log correlations, stratigraphic interpretations, and interpreted seismic data indicated that the Fortescue reservoirs were a discrete set of units stratigraphically younger and separated from those of Halibut and Cobia fields. Analysis of pressures confirmed the presence of two separate pressure systems, proving none of the Fortescue reservoirs were being produced from the Halibut platform. Geochemical analysis of oils from both accumulations supported the above results, with indications that no mixing of oils has occurred. Because the Fortescue field is interpreted as a hydrocarbon accumulation which is completely separated from both Halibut and Cobia fields, and was not discovered prior to September 17, 1975, it qualified as new oil under the federal government's existing crude oil pricing policy.

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Mass-Movement Processes in Fine-Grained, Hemipelagic Basin: Santa Barbara Basin, California Borderland

Mass-movement features defined by high-resolution and air gun seismic profiling are located at nine specific sites in silty clays and clayey silts on slope and slope apron settings. Two basic scales of processes occur: eight small-scale mud flows and slumps 2 to 8 m thick and 4 to 15 sq km in area extent; and a large compound feature about 100 sq km in areal extent and 2 to 25 m thick in the northeast part of the central basin. Mud flow and slump deposits sampled with box and piston cores have liquid limits (% dry basis) of 50 to 120, plasticity indices of 15 to 60, and water contents (wwb) of 40 to 65%. The compound feature has liquid limits of 75 to 105, plasticity indices of 25 to 45 and water contents of 55 to 85%. Envelopes of values of plasticity indices versus liquid limits for different mud flows, slumps, and the compound feature show good separation, perhaps indicative of varying sedimentation rates. Mud flows and slumps exhibit a swirled x-radiography signature, fluid escape features, inclined and folded layers, and dramatic matrix-supported random fabrics with round clasts as large as 4 cm. Distorted laminations, minor faults,

small folds, and homogeneous sections typify different areas of the large compound feature. Suspended sediment transport, centered on the compound mass movement feature, provides faster sedimentation rates which may partly explain the feature. Only a relatively small part of the basin, the deep flat area which slopes gradually to the south, is somewhat immune to mass movement.

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Organic Maturity and its Geologic Bearing in Tertiary of Spitsbergen

Vitrinite reflectance measurements on coals and dispersed organic matter in the Spitsbergen Tertiary are reported. Maturity profiles through the Tertiary sequence (950 m) show gradual increase ranging from  $R_o = 0.40$  at the top to  $R_o = 0.68$  at the base. The maturity level along the economically important coal horizon at the base of the Tertiary sequence shows considerable regional variation ranging from  $R_o = 0.41$  to  $R_o = 1.1$ . Maturity is highest in central and southern parts of the basin and decreases toward the western and eastern flanks.

Isoreflectance lines are interpreted in terms of isopachs. The main conclusions are: the area of greatest sediment-accumulation migrated eastward during deposition owing to tectonic activity related to the early opening of the Norwegian-Greenland sea. During the subsequent post-orogeny uplift and denudation of Spitsbergen, approximately 1.0 to 1.5 km of the Tertiary deposits were eroded.

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Sedimentary Facies Analysis, El Dorado Field, Kansas, Micellar Chemical Pilot Project

The Permian 650-ft sand, one of several productive sands in the El Dorado field, has yielded 36.5 million bbl by primary and secondary methods, with 71 million bbl remaining. During initial stages of the micellar-polymer tertiary recovery pilot project drilling in 1974, a Phase I geologic analysis, using seven cores, identified distributary channels and associated smaller splay channels as productive facies. The western edge of the pilot area was determined to have the best channel sandstone development. A two-layer geologic facies model was proposed.

Oriented cores were included in the drilling of 24 wells in Phase II. North and northeast flow directions were indicated for the channel sandstones. The influence of intertidal redistribution of sands, particularly in the northern lease area, was recognized, as were inactive channel fill mud plugs which reduced the total thickness of the channel sandstone reservoir.

During Phase III four observation wells were cored. These wells were drilled at intervals of 90 ft (27 m) diagonally from earlier wells in the north and south block. Micellar injection for the pilot was completed in early 1979 and polymer injection followed.

Limited computer simulation tests suggested that a one-layer model yielded fluid flow results similar to a multi-layer model and also indicated that the oil bank would bypass one of the observation wells. Cores analyzed in Phase III indicated no reason to expect that the observation well should not produce the amounts of hydrocarbons indicated by log analysis. Detailed description of cores and construction of cross sections in