hydrocarbon-generating potential. Samples of the Woodford Shale were obtained from 18 wells drilled in the Anadarko basin by various operators, and polished sections of the shale were prepared and interpreted by the author while working at the Oklahoma Geological Survey. A minimum of 60 vitrinite reflectance measurements were recorded for each well. The Woodford was sampled at depths of from 5,060 ft (1,542 m) in the northeastern shelf to 20,308 ft (6,190 m) in the deepest part of the basin in Beckham County, southwestern Oklahoma. A systematic increase in mean vitrinite reflectance (mean R_O) with depth was observed. From northeast to southwest across the Anadarko basin mean R_O increased from 0.51 to 2.60%. An isoreflectance map for the Woodford Shale in the Anadarko basin was prepared using data collected during this study. The Woodford Shale should have generated commercial quantities of oil in those areas of the basin where the shale has a mean R_O of from 0.60 to 1.35%. In Kiowa County, Oklahoma, the Woodford Shale was sampled in a fault block bordering the Wichita uplift on the southern boundary of the basin. It has, in this well, an anomalously low mean R_O of 0.48%, possibly due to a shallow depth of burial throughout its history.

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Computer Applications System for Exploration: Offshore China Case History

Pennzoil has developed CASE (Computer Applications System for Exploration) to assist explorationists in mapping and evaluating large, offshore frontier basins. CASE is a user-friendly, interactive, exploration data base and mapping system. It allows explorationists to store vast amounts of data and to retrieve, for any area of interest, various combinations of data sets for mapping, analysis, and display. Geophysical data are routinely computer contoured and drafted on geographic, geological, and geophysical base maps. This technique allows the explorationists to rapidly and uniformly map and evaluate very large areas and to identify prospects for more detailed study.

In addition to seismic time-structure maps, computer-generated regional maps are prepared on depth-structure, isochron, isopach, interval-velocity, average velocity, gravity, and magnetic data. Computer-generated surfaces may be displayed with faults, also using a 3-D isometric presentation, or input to filtering programs.

CASE optimizes the explorationist's time, is cost-effective, and provides management with uniform, relatively high-quality maps for decision making.

Pennzoil developed CASE to evaluate about 80,000 line kms of geophysical data covering over 75 million acres (30 million ha.) in the South China Sea, the largest geophysical group shoot ever. Utilizing this system, a nucleus of about a dozen geologists and geophysicists, with a relatively small support staff, mapped and evaluated the offshore China data in a period of about one year. Case history examples are presented from this unprecedented and highly successful geophysical mapping and evaluation effort.

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Evaporitic Lacustrine Environments of Canadian Plains

The plains of western Canada contain dozens of saline and hypersaline lakes which range in size from small (<1 sq km) prairie "potholes" to relatively large (>300 sq km) bodies of water. The shallowest lakes exhibit playa characteristics, flooding with water during the wet season but drying up during the summer and fall. The sediments of these lakes are composed of a mixed suite of siliclastics, carbonates, and evaporitic minerals. The major detrital minerals are quartz, dolomite, feldspars, and clay minerals. The authigenic carbonate minerals are aragonite, normal calcite, and high-Mg calcite. Evaporitic minerals include mirabilite, thernardite, gypsum, and bloedite.

Spatially, the modern subenvironments in these basins usually exhibit a roughly concentric distribution, with a saline mud flat/sand flat occurring nearest the shore, followed by an ephemeral lake zone, and possibly a perennial lake. Although differing in scale and stage of development from basin to basin, all of the lakes have roughly similar near-surface stratigraphic profiles and facies distribution. The upper 25 to 50 cm consist of a thin (1 to 5 cm) crystalline crust overlying a thicker (5 to 50 cm) layer of mirabilite-thernardite-bloedite mush. Salt crust development, growth of large, euhedral mirabilite crystals, surface desiccation, and mineral dissolution all operate to create an extremely dynamic near-surface environment on a diurnal and seasonal basis. Underlying these upper units is a zone of relatively dense salt crystal with minor mud interbeds. This unit can range in thickness from < 1 m to > 40 m. Finally, underlying this dense crystal layer is a black, highly reducing, organic-rich, muddy clastic unit with variable salt crystal content.

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Inferred Eastern Extent, Overthrust Belt, Central Utah

Structural and stratigraphic relations in the Wasatch Plateau, the Gunnison Plateau, and the northwestern Cedar Hills suggest a new interpretation of the easternmost limit of thrusting during Late Cretaceous foreland deformation in central Utah. Steep to overturned dips in the Upper Cretaceous Indianola Group within this region are interpreted to reflect involvement of foreland basin clastics in thrust-related structures that deformed the flank of the foreland basin. A subhorizontal overlap assemblage of inferred Paleocene age indicates that the post-thrust erosion surface sloped gently eastward into the foreland basin.

Northeast-striking, southeast-facing homoclines of Indianola Group strata rest disconformably on Jurassic beds. However, favorable horizons within the Arapien Shale of the Jurassic sequence served as a zone of regional decollement, along which younger formations were detached and transported eastward with respect to underlying autochthonous units. The decollement zone was deformed internally by multiple thrusts and by east-vergent isoclinal folds subsequently complicated by local diapiric modifications. Most exposures of the Indianola Group are thus wholly or partly allochthonous. Folds involving Indianola strata apparently include: (1) fully detached ramp anticlines associated with subsurface thrust faults that underlie the southern Wasatch Mountains, Gunnison Plateau, and Sanpete Valley; and (2) partly detached frontal anticlines associated with blind thrusts that approach the surface beneath the Sanpete Valley and the western margin of the Wasatch Plateau. Structures inferred locally are consistent with documented patterns of deformation involving foreland clastics elsewhere in the overthrust belt and should influence exploration strategy in central Utah.

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Depositional Styles of Notikewan Member (Upper Gates Equivalent), Fort St. John Group, Northeastern British Columbia

The subsurface Notikewan Member (Spirit River Formation) of the Fort St. John Group is correlative with the upper 60 to 70