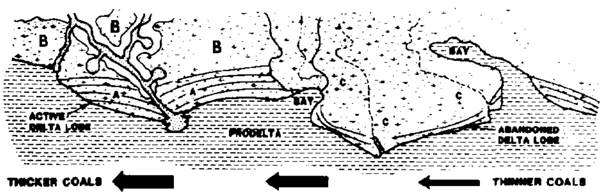
Springs Formation, a depositional model was developed to account for areas of variable thickness in coal accumulation. Coals within the formation developed along lower delta plain, upper delta plain–fluvial or on abandoned deltaic lobes and are referred to as Type A, Type B or Type C coals, respectively.

GENERALIZED RELATIONSHIP OF COAL THICKNESS TO DEPOSITIONAL SETTING



Depositional regression represented by extensive sheet sandstones are inferred to be delta-front deposits which reflect the cuspate to arcuate geometry of wave-dominated delta deposits. Widespread coal deposits up to 22 ft (6.7 m) thick that occur on top of the deltaic sandstones extend for up to 15 mi (25 km) along depositional dip and 36 mi (58 km) along depositional strike. They accumulated in lower delta plain environments as Type A coal seams. Thick coal seams that were deposited in upper delta plain-fluvial environments are less than 20 mi (32 km) in length and are more variable in thickness (1 to 17 ft, 0.3 to 5.2 m). They are referred to as Type B coal seams. Persistent but thin coals, less than 25 mi (40 km) in length and 1 to 8 ft (0.3 to 2.4 m) thick, that occur on top of delta plain–fluvial deposits and that are overlain by sheet sandstones are inferred to represent peat accumulation during delta lobe abandonment and are referred to as Type C coal seams. Coal seam discontinuities, represented by areas of reduced coal thickness or by wedges of sediment producing multiple benches or rider coals, are caused by sediment influx from distributary channels, fluvial channels, and splays. Analysis of the geometries and spatial distributions of coal seams is used to develop a detailed geologic model that can serve as a predictive tool for future coal exploration in this region and in other basins with similar depositional settings.

LEVIN, SAMUEL, Exxon Co., U.S.A., Houston, TX, and R. W. BALKUM, Exxon Co., U.S.A., New Orleans, LA

Computer-Assisted Exploration in a Deltaic Environment

Oil and gas exploration in a deltaic environment is complicated by apparent erratic sand distribution. The structure and isopachous maps, normally so useful to the explorationist, are often of little use by themselves in locating prospective drill sites. The relationships of source beds, reservoirs, and sealing beds are of far greater importance in identifying prospective areas.

The shallow Wilcox Group in central Louisiana was used in this study. The section is relatively unfaulted and thickens gradually basinward. Several good correlation horizons enabled the study team to subdivide the section into relatively thin intervals and to examine the development of sand distribution through time. These data together with the present-day occurrence of hydrocarbons in these intervals were the primary criteria used in establishing potentially prospective areas.

Due to the large number of wells and the numerous producing zones in the study area, it was impossible to manually generate the statistics, maps, and cross sections needed within a reasonable time. As a result, most graphic and statistical output was generated by the computer.

LINDSAY, ROBERT F., Gulf Oil Exploration & Production Co., Oklahoma City, OK

Anatomy of the Dolomitized Carbonate Reservoir, Mission Canyon Formation, Little Knife Field, North Dakota

The Mission Canyon is interpreted to be a regressive shoaling-upward, carbonate to anhydrite sequence deposited by a shallow epeiric sea. Upsection most of the formation is of subtidal origin, deposited as: (1) basinal "deeper water" carbonates, below wave base; (2) open shallow marine, which deposited major carbonate cycles of mudstone grading into skeletal packstone/grainstone; (3) transitional open to restricted marine, with minor carbonate cycles of mudstone grading into skeletal wackestone; (4) restricted marine of pelletal wackestone/packstone; and (5) narrow marginal, nearshore marine of skeletal wackestone interbedded with emergent intertidal deposits of skeletal, ooid-pisolitic packstone. Cratonward, the intertidal is interbedded with lagoonal limestones and both overlain by tidal flat to supratidal anhydrite beds.

The reservoir is structurally trapped within a northward-plunging anticlinal nose with less than 100 ft (30 m) of closure. Facies changes create stratigraphic entrapment southward. The seal is the overlying anhydrite beds.

Porous hydrocarbon-bearing beds are isolated within transitional open to restricted marine, restricted marine, and marginal nearshore marine facies. These lime-mud-rich beds underwent replacement by anhydrite to skeletal fragments, which was later leached, and the muddy matrix was dolomitzed to a porous calcareous dolostone.

Thin-section petrography and scanning electron microscopy studies of core samples and relief pore casts reveal four pore types. Pore types include moldic pores and dolomite intercrystal pores; namely, polyhedral, tetrahedral and interboundary-sheet pores, each pore progressively smaller in size. Pore throats are of two major sizes, the largest five times the width of the smallest.

LINDSETH, R. O., Teknika Resource Development Ltd., Calgary, Alberta, Canada, and VAGNER BERALDO, PETROBRAS, Rio de Janeiro, Brazil

A Late Cretaceous Submarine Canyon in Brazil: Seismic Stratigraphy

A continuous sequence of gently dipping clastics covers a deep submarine canyon which was cut into Upper Cretaceous sediments and subsequently filled with Tertiary clastics. Conventional seismic work provides some indication of the complex sequence which filled the channel, but the full detail of the depositional history is revealed in detail by inverting the seismic data to produce synthetic sonic logs. The results reveal classic patterns of sedimentation, illustrate several changes which occurred in the source and distribution of sediments which filled the canyon, and map the individual members in close detail.

LIPMAN, ERIC W., and RALPH L. LANGENHEIM, JR.,* Univ. Illinois, Urbana, IL

Missourian and Virgilian Brachiopod Biostratigraphy, Bird Spring Group at Arrow Canyon, Clark County, Nevada

The Arrow Canyon section of the Bird Spring Group has been proposed as a stratotype section for the base of the Pennsylvanian and of the Permian because of its apparently uninterrupted deposition across those boundaries, extensive invertebrate fauna, nearly total exposure, and readiness of access. Both fusulinid zonation and detailed petrographic studies have already been