Paleobiogeography, here exemplified by trilobite distribution, may make an important contribution to delimiting potential areas for profitable exploration.

SLACK, PAUL B., Cities Service Oil Co., Denver,

STRUCTURAL GEOLOGY AND TECTONIC DEVELOPMENT OF NORTHEAST PART OF RIO PUERCO FAULT ZONE, SANDOVAL COUNTY, NEW MEXICO

The northeast part of the Rio Puerco fault zone is in the southwestern part of Sandoval County, New Mexico. Three major types of structural features are present within the area: north- to northwest-trending folds; northeast-trending faults of the Rio Puerco fault zone; and north-trending faults. Dominant movement along faults within the area is dip-slip.

Two major periods of deformation are evident, the Laramide orogenic movements of late Paleocene through Eocene age, and Basin and Range tectonism of middle Miocene to recent age. Laramide tectonism resulted from a north-trending right-shift force couple related to the northeast drift of the Colorado Plateau, and to vertical forces which led to the development of the Nacimiento uplift. The northwest-trending folds and the northeast-trending normal faults of the Rio Puerco fault zone formed in response to the right-shift force couple. The Rio Puerco faults are interpreted as tension fractures which developed at 45° to the trend of the force couple. A slight clockwise rotation of the southeast part of the Colorado Plateau is evident from tension fracture trends along the fault zone. Miocene tectonic activity was dominated by north-trending, east-dipping normal faults having large stratigraphic separations that were related to the development of the Rio Grand rift. Many of the southeast-dipping normal faults of the Laramide Rio Puerco fault zone were rejuvenated during the Miocene crustal extension.

SPOELHOF, ROBERT W., Colorado School Mines, Golden, Colo.

PENNSYLVANIAN STRATIGRAPHY AND TECTONISM ON SOUTHEASTERN SHELF OF PARADOX BASIN

Precambrian faulting juxtaposed resistant and nonresistant rocks to form an erosional highland around which lower Paleozoic sediments were deposited. Pennsylvanian faulting along the trends of the ancient faults affected the extent of Early Pennsylvanian karsting and the thickness and distribution of succeeding marine deposits. Fault movement ceased in the Desmoinesian.

Clastic and carbonate sedimentation in the area is cyclic. The cycles were produced by shifting centers of detrital sedimentation superimposed upon sedimentation patterns caused by eustatic sea-level changes.

The depositional environments recognized in the area include distributary channels with their associated distributary-front and overbank-detrital environments, and very shallow-water, open-marine carbonate environments.

The detrital distributary systems in the study area produced fan-delta deposits.

SURDAM, RONALD, Univ. Wyoming, Laramie, Wyo.

MODERN ANALOGS OF GREEN RIVER FORMATION

No abstract available.

TILLMAN, RODERICK W., Cities Service Exploration and Production Research, Tulsa, Okla.

MUDDY SANDSTONE ENVIRONMENTS, POWDER RIVER BASIN, WYOMING AND MONTANA: OUTCROP AND CORE STUDY

In the Powder River basin of Wyoming and Montana deltaic lobes have prograded from the east, northeast, and southwest at various times during the interval of time assigned to the Muddy Formation. Several recognizable sand-body types which yield hydrocarbons are associated with each of these deltas.

The major types of reservoir sands are delta-distributary channels, barrier islands and high sand tidal-flat deposits. Each of these environments of deposition can be recognized in outcrop and in slabbed cores. After the environment is identified in a core, log shape is useful to extend the environment laterally.

Examples from outcrops and cores from Wyoming and Montana illustrate the features which allow recognition of sands deposited in the various environments. In the barrier-island sands, such as those at Bell Creek field, low-angle crossbedding and a general coarsening upward from shale to silty sand to sandstone is present. *Thalassinoides* and a few *Ophiomorpha* burrows are locally present.

In the tidal-flat sandstones wave and current ripples predominate. Long vertical burrows designated as *Skolithos* are prominent and brackish deposits such as coal are locally interbedded. *Corophium*, a small U-shaped burrow, is present in some of the cleaner intertidal sand bodies.

Distributary-channel sandstones are typically medium to large scale trough crossbedded and locally have current ripples, climbing ripples, and interbedded clay drape in natural-levee deposits. Burrowing usually is limited to the upper part of the distributary-channel sands. Locally at the base of the channels is a conglomerate made up of clasts of marine shale. The uppermost part of the distributary-channel sands commonly are reworked and spread laterally as a thin transgressive beach or intertidal sand.

A subregional paleogeographic reconstruction can be made utilizing the probable areal distribution and trends of each of the genetic sand limits. Maps of this type aid significantly in improving the success ratio of both exploration and development drilling.

VANDEVENTER, BRUCE, and M. DANE PICARD, Univ. Utah, Salt Lake City, Utah

PALEOCURRENT ANALYSIS OF EARLY TRIASSIC MOENKOPI FORMATION, UINTA MOUNTAINS AREA, NORTHEASTERN UTAH

Paleocurrent measurements of 175 linear asymmetrical ripple marks were taken at seven sections of the Moenkopi Formation in northeastern Utah. Five of

the sections are on the south flank of the Uinta Mountains, where 123 measurements were taken. A total of 52 measurements was made at two sections on the north flank of the Uinta Mountains. Linear asymmetrical ripple marks were used exclusively because of their abundance at each section.

Analysis of the paleocurrent data indicates three major current directions during deposition of the Moenkopi: northwest, southeast, and southwest. These are interpreted as representing wave-drift, rip, and longshore currents moving on and along a generally northeast-southwest-trending shoreline that bordered a shallow marine shelf during the Early Triassic.

When the paleocurrent data of the north and south flanks of the Uinta Mountains are considered separately, the average northeast-southwest-trending shoreline of the south flank is interpreted to shift to a north-south trend on the north flank. This gradual shifting of the shoreline trend probably continued into Wyoming where Picard and High found a northwest-southeast trend in the Moenkopi equivalent (Red Peak Formation) in west-central Wyoming. The interpreted shoreline trend parallels the isopach trend of the Moenkopi Formation in northeastern Utah.

Interpretation of shoreline trends leads to the evaluation of the depositional environments, current directions, and paleogeography during the time of deposition. Economic interest in shoreline trend interpretation is high and will continue to be so in the future because of oil and gas exploration efforts.

WEIMER, R. J., Colorado School Mines, Golden, Colo.; C. B. LAND, Consultant, Bismarck, N.D.; and L. T. MACMILLAN, Colorado School Mines, Golden, Colo.

STRATIGRAPHIC MODEL FOR DISTRIBUTARY CHANNELS, "J" AND MUDDY SANDSTONES, ROCKY MOUNTAIN REGION

No abstract available.

WOLFBAUER, CLAUDIA A., U.S. Geol. Survey, Denver, Colo.

LITHOFACIES VARIATIONS IN GREEN RIVER FORMATION, WYOMING

The Green River Formation of Wyoming is a thick lens of sedimentary rocks which was deposited in a large playa-like complex. These sediments accumulated in three major depositional environments: (1) marginal (siliciclastic sandstone and siltstone); (2) mudflat (marlstone); and (3) lacustrine (oil shale, trona, fossiliferous limestone). In general, the basinward transition of lithofacies is from coarse-grained, cross-bedded, channel sandstones at the basin margins to algal and oolitic limestones to clastic and algal dolomitic marlstones and finally to oil shale and trona at the center of the basin. The lateral intertonguing of these lithofacies and the repetition of large- and small-scale lithologic cycles provide a basis for the reconstruction of the physical, chemical, and biologic evolution of Eocene Lake Gosiute.

Thin, but extensive, algal marlstone units reflect the basinward migration of Lake Gosiute's shoreline during periods of increased aridity. Widespread fossiliferous limestones suggest transgressive shoreline conditions. The occurrence of thin, extensive tuff beds establishes time-stratigraphic relations among the lithofacies. The correct interpretation of lithofacies changes in a closed basin can be an important tool for locating deposits of rich oil shale, trona, and perhaps oil- and gas-bearing channel sandstone reservoirs similar to those now being developed in the Uinta basin.

CALL FOR PAPERS AAPG 60TH ANNUAL MEETING APRIL 7-9, 1975, DALLAS

Papers are being solicited for the AAPG-SEPM Annual Meeting April 7-9, 1975, in Dallas, Texas. Any member of the AAPG or SEPM, or any other person sponsored by a member may submit a title and abstract for consideration by the Program Committee.

By the time of the Annual Meeting, the energy "crisis" will have been with us for almost two years. How well will we have met this crisis? What are the prospects to alleviate it in the future? The 1975 meeting will review the status of our energy requirements, the political and socio-economic problems, and the technical aspects of meeting our needs. Whereas the broad field of petroleum exploration and production is to be discussed, emphasis will be placed on problems concerned with making the United States more self-sufficient in meeting our energy needs. In keeping with this goal, papers are to be presented on (1) new and immature potential areas in the United States, (2) the search for pools smaller than the giants, (3) the potential of secondary and tertiary recovery, and (4) other sources of energy.

The SEPM Technical Program will include both special and general sessions on mineralogy, petrology, paleontology, stratigraphy, sedimentology, geochemistry, and deep-water carbonates.

"Frontiers of Exploration" is the general theme of the Convention, but papers on any subject will be considered. Please send tentative titles and write for abstract forms before August 1, 1974. Address requests for information to the appropriate program chairman: **Henry C. Nelson**, AAPG technical program chairman, Mobil Research and Development Corporation, Field Research Laboratory, P. O. Box 900, Dallas, Texas 75221; **Charles F. Dodge, III**, SEPM technical program chairman, Department of Geology, University of Texas at Arlington, Arlington, Texas 76010.

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