The Duperow cycles are widespread and constituent beds only 10-15 ft (3-5 m) thick can be traced completely across the Williston basin. Deposition occurred within a vast back-reef lagoon lying south of the Woodbend reef platform of southern Alberta and stretching to a sandy shore in South Dakota and northern Wyoming. This lagoon was periodically and rapidly flooded with normal marine water, permitting organisms to flourish; the sea then gradually shallowed as sediments filled the basin.

Desiccation produced extensive tidal flats and evaporitic sabkhas and was perhaps responsible for some dolomitization of the carbonates on shelves outside the basin.

The cause of such cyclic sedimentation might have been slow, steady subsidence of the basin with a superimposed climatic rhythm that may have speeded up reef growth and periodically choked off seawater from the basin. Perhaps this process operated coincidentally with sporadic eustatic sea level fluctuation or with abrupt periodic subsidence of the whole basin. The low bathymetric relief that permitted rapid flooding certainly would have aided in development of such cycles.

WILSON, KEVIN M., Consultant, Boulder, CO, and JACK B. THOMAS, Reservoirs, Inc., Boulder, CO

Depositional Environments and Diagenesis of D Sandstone, Wild Horse Field, Weld County, Colorado

Wild Horse field is located on the gentle east flank of the Denver basin, northwest of Fort Morgan, Colorado. Production was established during 1981 from a 12-ft (3.7 m) thick porous sandstone in the lower part of the D sandstone of Cenomanian age. To date, 10 producing wells have been completed. Proven productive area is 1,800 ac and estimated reserves are 1.2 million bbl oil equivalent.

D sandstone facies form complex reservoirs associated with regressive deltaic and marine sandstone deposited during a regional sea level drop 95 Ma. Traps are primarily stratigraphic in nature although fracturing has enhanced production. The D sandstones in the Wild Horse field area are interpreted to be the product of an episodic northwestward progradation of a lobate river-dominated delta system.

On the basis of differences of the internal structure, textures, mineral composition, and trace-fossil content, the D sandstone is divided into five lithofacies: shoreface, prodelta platform, delta front, delta plain, and transgressive marker sandstone. The producing sandstones occur in overlapping bars proximal and lateral to principal channels in a bay-filled sequence. Calibration of well logs using cores allows detailed subsurface mapping of producing facies for more efficient development of the field.

Original porosity has been reduced mainly by quartz overgrowth cementation. Porosity interconnection is present due to dissolution of framework grains and of the early diagenetic calcite cement. Pore-filling cements such as chlorite, kaolinite, and pyrite may produce formation damage if not treated during completion operations.

WIMAN, STEPHEN K., Resource Enterprises, Inc., Grand Junction, CO, GREGORY J. BELL, Gas Research Institute, Chicago, IL, STEPHEN H. PERLMAN, Consultant, Denver, CO, and A. DAVID DECKER, Resource Enterprises, Inc., Grand Junction, CO

Geologic Characterization of a Field Laboratory for Coalbed Methane Exploration and Development

Two coalbed methane wells have been drilled at Red Mountain Unit in the Piceance basin near Collbran, Mesa County, Colorado. The wells were drilled as part of the Deep Coal Seam Project, a multi-well project sponsored by the Gas Research Institute to develop, improve, evaluate, and communicate the technology required to produce gas from deeply buried coals. To better characterize the geologic parameters controlling coalbed methane production, research efforts have been directed at a single coal seam at a depth of 5,500 ft (1,800 m). The thickness of the objective or D seam coal, included in the Cameo coal member of the Williams Fork Formation, Upper Cretaceous Mesaverde Group, ranges from 16 to 20 ft (5 to 6.5 m) throughout the unit and is substantiated by nearby well control.

A continuous core, over 200 ft (61 m) thick, was recovered from the first well. Routine and special core tests were performed on samples from both the objective coal and overlying sandstone for the purposes of reservoir evaluation, log analysis, and stimulation design. Pressure transient testing of the objective coal in the first well confirmed the low permeability and/or high skin damage caused by deep invasion of drilling and completion fluids. Interpretation of in-situ state of stress measurements indicates that a conventional hydraulic fracture initiated in the coal will grow upward into the overlying sandstone. Geologic characteristics of the coal and bounding formations were incorporated in a stimulation design to maximize enhancement of the cleat or natural fracture system of the coalbed methane reservoir.

WINSTON, DON, Univ. Montana, Missoula, MT

Tectonics and Sedimentation of Middle Proterozoic Belt Basin, and Their Influence on Cretaceous Compression and Tertiary Extension in Western Montana and Northern Idaho

The Belt Supergroup was deposited in an intracratonic basin, occupied during much of its history by alluvial aprons that sloped down to a landlocked sea. Belt rocks are here analyzed in terms of 13 "sediment types," descriptive taxa in which the metamorphic overprint is filtered out and the original sedimentary aspects are emphasized. The lower Belt records maximum transgression of the Belt sea, during which turbidite sand and pelagic mud were deposited in the central part of the basin, carbonate mud accumulated on its eastern margin, and coarse conglomerate accumulated along its fault-bounded southern side. The Ravalli Group records extensive alluvial apron/mudflat progradation from the south and west. The middle Belt carbonate, representing a second large transgressive period, is characterized by terrigenous-carbonate cycles in the eastern part of the basin and by turbidite sand and mud, derived from the west, in the deeper, locally slumped, western part of the basin. The Missoula Group represents a series of northwest-facing prograded alluvial aprons alternating with transgressive mudflat and shallow-water deposits. The Garnet Range Formation, near the top of the Missoula Group, represents incursion of open marine waters into the Belt basin.

The Belt basin subsided as a group of at least four large crustal blocks, separated by three nearly east-west fault lines and a northwest-trending fault line. Differential subsidence of the blocks is recorded in abrupt thickness changes and soft sediment deformation along the fault lines. Cretaceous thrusting formed western and eastern thrust belts which are continuous across the blocks, but which are segmented and broken along the east-west lines. Tertiary extensional dislocations along the lines.

WOODWARD, JANE, ARCO Exploration, Denver, CO, FRED F. MEISSNER, Bird Oil Corp., Denver, CO, and JERRY L. CLAYTON, U.S. Geol. Survey, Denver, CO

Distribution and Significance of Hydrocarbon Source Rocks in Greater Rocky Mountain Region

Stratigraphic and geographic distribution of possible Rocky Mountain source rocks determine which stratigraphic sequences in each geologic province might be considered "hydrocarbon machines" or generation-accumulation cells. Knowledge of source rock facies distribution enables the explorationist to: (1) understand local, regional, and global depositional frameworks, (2) construct useful models of burial history and maturation patterns, (3) reconstruct the most likely migration pathways, (4) correlate these facies to hydrocarbons reservoired in known accumulations, and (5) efficiently explore for undiscovered accumulations. Source rock distribution must be integrated with evaluation of reservoir, seal, and trap distribution as well as with changes in heat flow, diagenesis, tectonics, hydrodynamics, and burial history through time.

The significance of Rocky Mountain source rock facies can be evaluated in terms of the number of accumulations and volume of reserves attributable to each. Unproven source rock facies are evaluated by highlighting their potential based on their geochemical characteristics.

WYATT, DANNY J., Champlin Petroleum, Houston, TX

Stratigraphy of Upper Morrison and Lower Dakota Group of Front Range, Colorado: New Play in Central Denver Basin?

Examination of surface sections along the Colorado Front Range from Walden to Beulah, Colorado, reveals that five sandstone units in the upper Morrison Formation (Upper Jurassic) and lower Dakota Group (Lower Cretaceous) may offer potential zones for exploration in the central Denver basin.

The upper portion of the Morrison contains sandstones of both straight and laterally accreting channel fill. The Lytle Sandstone of the Dakota Group is characterized by a trough-bedded, pebble conglomerate deposited in an extensive network of multiple, laterally equivalent channels. This system was replaced by the finer grained Dutch Creek Sandstone (new term), which was deposited in a high-sinuosity meander belt that produced widely spaced sand bodies characterized by flat beds and white clay chips. A period of transgression then followed with the deposits from this event being represented by the sandstones and burrowed siltstones of the Massey Draw Sandstone (new term). The overlying Plainview Sandstone was deposited in a regressive setting and thickens into occasional channel deposits that contain log fragments, carbonaceous debris, and trough-bedded sandstones. The channel grade laterally into slightly burrowed siltstones and fine-grained sandstones that increase upward in grain size and flow regime.

WYMAN, R. E., Canadian Hunter Exploration Ltd., Calgary, Alberta, Canada

Gas Resources in Elmworth Coal Seams, Alberta, Canada

Abundant coal seams occur in the Lower Cretaceous section of the Elmworth area. Gas desorbed from pressurized cores of coal indicate there are about 500 ft^3 of methane per ton of coal. In addition to being a significant source for gas in the deep Cretaceous basin in northwestern Alberta and adjacent British Columbia, the coal beds themselves contain about 50 tcf of gas in place. It is probable that some of this gas can be recovered through processes of diffusion from the matrix and Darcy flow in natural fractures. Where coal is adjacent to producible sands or conglomerates, mathematical modeling shows that at least half of the gas contained in the adjacent coal can be recovered. Additional gas may be recovered from isolated coal seams; further field testing will determine this potential.

NORTH AMERICAN COMMISSION ON STRATIGRAPHIC NOMENCLATURE

Report 10—New Articles of Organization and Procedure of North American Commission on Stratigraphic Nomenclature[1]

Donald E. Owen,[2] Norman P. Lasca,[3] and Edward H. Schultz[4]

Introduction

A complete set of new bylaws was adopted by the North American Commission on Stratigraphic Nomenclature at its 38th annual meeting, November 1, 1983, in Indianapolis, Indiana. These bylaws, printed below, replace the original bylaws (Moore, 1947), as later revised (Hutchinson, 1953). The new bylaws became effective at the close of the 1983 meeting. A summary of the minutes of the 1983 and 1984 annual meetings will be published as a Note at a later date.

ARTICLES OF ORGANIZATION AND PROCEDURE OF NORTH AMERICAN COMMISSION ON STRATIGRAPHIC NOMENCLATURE

I. Name

The name of the Commission shall be the North American Commission on Stratigraphic Nomenclature.

II. Purposes

The purposes of the Commission are to develop statements of stratigraphic principles, to recommend procedures applicable to classification and nomenclature of stratigraphic and related units, to review problems in classifying and naming stratigraphic and related units, and to formulate expressions of judgment thereon.

III. Members

1. The Commission shall be composed of members chosen as follows:

three representatives each as designated by the
- American Association of Petroleum Geologists
- Association of American State Geologists
- Geological Society of America
- United States Geological Survey
- Geological Survey of Canada

two representatives each as designated by the
- Canadian Society of Petroleum Geologists
- Geological Association of Canada

and one representative each as designated by the
- Asociación Mexicana de Geólogos Petróleros
- Sociedad Geológica Mexicana
- Instituto de Geología de la Universidad Nacional Autónoma de Mexico,

except that in event any of the named organizations does not designate the assigned number of representatives, members of the Commission otherwise chosen are empowered to invite participation by additional organizations or to designate Commissioners-at-large. Selection of organizations and number of Commissioners designated to be represented on the Commission shall by by a two-thirds majority vote of current Commissioners.

2. The terms of designated Commissioners within each organization shall be three (3) years, with staggered terms. Commissioners may be reappointed. In case of a vacancy, the agency that designated a Commissioner shall make a new designation to complete the unexpired term. For the purpose of determining the terms of Commissioners, a year shall be construed as the period from the end of one annual meeting of the Commission to the next.

3. Organizations represented by members of the Commission shall be requested to designate the successor of a Commissioner whose term will expire at least 60 days before the date of such expiration, either by reappointment of the Commissioner or by selection of a new Commissioner.

IV. Officers

1. The officers of the Commission shall be a Chairman and a Vice Chairman, who shall be elected annually by the Commissioners from their number. A Nominating Committee to be composed of three members in the third year of their terms, reasonably representing constituent organizations of the Commission, shall be selected by the current Chairman and Vice Chairman at the end of the annual meeting. The Nominating

[1]Report received, October 2, 1984; accepted October 15, 1984.

[2]Consulting geologist, P.O. Box 521057, Tulsa, Oklahoma 74152.
[3]Department of Geological Sciences, University of Wisconsin—Milwaukee, Milwaukee, Wisconsin 53201.
[4]Suncor, Inc., Box 38, Calgary, Alberta T2P 2V5, Canada.