RMS-SEPM Luncheon Talk, February 25th, 2014

Lithofacies, Depositional Systems, and Reservoir Characteristics of the Burro Canyon (Cedar Mountain) - Dakota Interval, Southwest Piceance Basin, Colorado

Rex Cole, Professor of Geology

Department of Physical and Environmental Sciences

Colorado Mesa University

Grand Junction, CO

(email: rcole@coloradomesa.edu)

ABSTRACT: A surface and subsurface investigation of the Burro Canyon-Dakota interval (Aptian-Albian to earliest Cenomanian) was conducted along a 60-mile transect from the Utah-Colorado border to near Delta, CO. Emphasis was on lithofacies variations, interpretation of depositional settings and trends, identification and correlation of sequence boundaries, and characterization of sandstone bodies from a reservoir perspective. The outcrop database includes 11 outcrop sections (total footage = 2,450, with foot-by-foot gamma-ray measurements) and 904 paleocurrent measurements. Most of these sections are in the canyons of the Colorado and Gunnison Rivers. The subsurface database includes description of nine cores (total footage = 1,531' with 87 porosity-permeability measurements), and interpretation of 292 wireline logs. Other information includes petrographic data for 50 outcrop and core samples, organic-geochemical data for 141 samples, and biostratigraphic (palynomorphs) data for 56 samples.

In the study area, the Burro Canyon Formation ranges in thickness from 0 to 130 ft and consists of three main lithofacies: (1) fine- to coarse-grained sandstone and conglomeratic sandstone; (2) sandy, granule-pebble conglomerate; and (3) green, calcareous mudrock, which occasionally contains carbonate nodules. Sandstone and conglomerate are concentrated in the lower half of the Burro Canyon, whereas mudrock dominates the upper half. Sand and gravel deposition was by low-sinuosity braided-river systems that flowed within northeast-oriented incised valleys. The upper mudrock interval was deposited in a flood-plain setting with local lacustrine influences.

The Dakota Sandstone ranges in thickness from 50 to 150 ft in the study area, and has five major lithofacies: (1) fine- to coarse-grained, cross-stratified, channel-form sandstone and conglomeratic sandstone; (2) very fine to medium-grained, cross-stratified to ripple stratified, partially bioturbated, channel-form sandstone; (3) very fine to fine-grained, well-sorted, partially bioturbated, tabular sandstone, with horizontal lamination and hummocky cross-stratification; (4) burrowed to bioturbated, fissile mudrock; and (5) bioturbated, fissile, carbonaceous mudrock with thin coal interbeds. The lower third of the Dakota was deposited in a lower coastal-plain setting, the middle third in a deltaic-estuarine setting, and the upper third in a shallow-marine setting. Reservoir-analog sandstone bodies in the lower Dakota were deposited by high-sinuosity, fluvial-estuarine channel systems flowing to the north-northeast. Sandstone-body heterogeneity in the Dakota is much greater than in the Burro Canyon.

Speaker Biography: Rex Cole, Ph.D, P.G. is a geologist with 38 years of professional experience in petroleum geology, mineral exploration, oil-shale research and development, industrial training, project management, and teaching. He is currently a Professor of Geology at Colorado Mesa University (previously Mesa State College) in Grand Junction, Colorado. Previous employers include Unocal Corporation, Multi-Mineral Corporation, Bendix Field Engineering Corporation, Southern Illinois

University-Carbondale, and Asarco Corporation. His primary expertise is the sedimentology and stratigraphy of siliciclastic depositional systems. His current research interests involve reservoir characterization of the Burro Canyon, Dakota, and the middle to upper Williams Fork formations in the Piceance and Uinta basins. He is also engaged in mineralogical and geochemical research on the Mancos Shale. He obtained an A.S. degree (geology) from Mesa College, a B.S. (geology) from Colorado State University, and a Ph.D. (geology) from the University of Utah. He is also a registered professional geologist.

RMS-SEPM Main Page

RMS-SEPM Luncheon Page

RMS-SEPM Luncheon Abstract Archive