the stratigraphic column as a thin sheet sand with local variation in internal physical and biogenic sedimentary structures. Overall bed-form orientation would be slightly flood dominant, and the flood-tidal delta sands would be sealed on top and bottom with fine-grained, organic-rich sediments. Modern flood-tidal deltas are excellent sources for beach nourishment projects and, given sufficient burial, ancient flood-tidal deltas could make good petroleum reservoirs.

HOPKINS, J. C., Univ. Calgary, Calgary, Alberta, Canada

Sedimentology of Quartzose Sandstones of Lower Mannville and Associated Units, Medicine River Area, Central Alberta

Quartzose sandstones of the lower part of the Mannville Group in east-central Alberta are generally referred to as the Ellerslie Formation (Member). They are considered to be the deposits of a Lower Cretaceous fluvio-deltaic complex which overlies the "Pre-Cretaceous" unconformity in western Canada. In west-central Alberta, other quartzose sandstone units can be present beneath the Ellerslie. Some workers have included these units within the Mannville, others have attempted to map them separately. The result has been general confusion.

The trend and origin of different sandstone bodies can be compared in the Medicine River area. Here, two unconformity-bounded units—the UJ2 and UJ3 of Ter Berg (1966)—fill a deep valley cut into Lower Jurassic and Mississippian strata, and are overlain by the Ellerslie.

Ellerslie sediments blanket the area and are productive from quartzarenites in a number of isolated pools. Productive sandstone bodies encompass a variety of small estuarine, shoreline, and tidal ridge deposits, none of whose trends relate to the configuration of that old favorite, the eroded surface of underlying Mississippian strata.

Comparison of quartzose sandstone units in the Medicine River area with similar sandstone units elsewhere in Alberta, Saskatchewan, and Montana, indicates that the Ellerslie was deposited in a vast inland sea into which several large deltas prograded. UJ2 and UJ3 sandstones are similar to those of the Success and Morrison formations of Saskatchewan and Montana, respectively.

Similar sandstone deposits can be anticipated along the eastern margin of the Alberta trough, in south and central Alberta. Where quartzarenites are present, they will have resisted diagenetic porosity destruction, and will form attractive reservoirs.

HORNE, J. C., M. O. HAYES, and P. J. REINHART, Research Planning Institute, Inc./Colorado, Boulder, CO, and C. H. RUBY, Geoconsultants International, Inc., Kenner, LA

Niton Field: An Estuarine Sandstone Reservoir

The Niton field is a classic stratigraphic trap caused by the updip migration of hydrocarbons along a gentle southwesterly regional tilt (50 ft/mi, 9.5 m/km) into reservoir sandstones of the Basal Quartz Formation. These reservoir sandstones were deposited during the Late Jurassic to Early Cretaceous transgression over an unconformable surface on Jurassic sediments. As sea level rose, the topography on the unconformity gave rise to a number of tide-dominant estuarine valleys, 3 to 5 mi (5 to 8 km) wide at their mouths.

Two major factors related to this depositional setting exerted the greatest control on the distribution of Basal Quartz reservoir potential sandstones in the Niton field. (1) The topography of the unconformity governed the lateral extent of estuarine sand bodies deposited during the transgression. Maximum thickness of the sand bodies occurs either (a) along the long axes of paleovalleys, or (b) at entrances to the paleovalleys. (2) Diagenetic patterns of cementing were related to the original environments of deposition. The occurrence of swamps on the topographically high areas generated acidic ground waters which leached carbonate and silica from underlying sediments. This leached material was reprecipitated as silica cements in sediments overlying topographic highs and as calcite cements in tidal-flat sequences of the estuary fringes. These cements reduced porosities and permeabilities sufficiently to produce updip and capping seals to reservoir sandstones. Open marine sandstones deposited at the mouths of estuaries were only lightly cemented and, therefore, became the primary reservoir sandstones.

By comparing the depositional setting of the Niton area with modern analogs along Holocene transgressive coastlines, it is apparent that similar stratigraphically controlled sandstone bodies should exist along depositional strike in other drowned estuarine river valleys.

Thus, by comprehending the depositional and diagenetic setting of the Basal Quartz Formation, the energy explorationist has a predictive tool that can be used to discover new areas of reservoir potential sandstones.

HORVATH, PAUL S., Gulf Oil Corp., New Orleans, LA

How to Improve Your Exploration Success Ratio: A Case Study

This paper stresses the importance of integrated studies utilizing all available data and is intended to show how we can learn from experience. It can be demonstrated through studies of 51 producing fields in offshore Louisiana that in some places wildcat wells were not optimally located, thereby resulting in dry holes. By applying this experience, we can avoid unnecessary dry holes, extend our fields, and discover additional fields.

Field studies determined the type of traps present, the timing of the traps, and where seismic hydrocarbon indicators appear to work. Integrating these field studies with other studies and evaluations reveals that we must not only have detailed seismic control and use the latest technology, but also thoroughly evaluate and integrate the geologic and geophysical data if we expect to be successful in our drilling program. In this regard, we must use technology such as True Amplitude Recovery seismic data, waveform analysis, and modeling, as each could contribute to our exploration program. Examples, compiled to support this statement, reveal that in selected cases the locations of wildcat wells were not optimally located and so resulted in dry holes, although they could be considered near misses. In other cases, it was found further development of fields may be possible if the drilling of outpost or field extension wells would occur. To help avoid these dry holes, discover additional fields, and extend existing fields, a suggested exploration program is submitted.

HOUSEKNECHT, DAVID W., Univ. Missouri, Columbia, MO

Influence of Grain Size and Thermal Maturity on Intergranular Pressure Solution and Quartz Cementation in a Quartz-Rich Sandstone

Detailed cathodoluminescent petrography and scanning electron microscopy reveal that grain size and thermal maturity have significantly influenced intergranular pressure solution and quartz cementation in the quartz-rich Hartshorne Sandstone of the Arkoma basin. Mean grain size of Hartshorne sandstones ranges from very fine to medium-grained. In any stratigraphic section, a negative, linear relationship exists between grain size and volume of silica dissolved via intergranular pressure solution. In contrast, either a positive, linear relationship or no significant relationship