Parke Dickey has pointed out that there is a nearly linear increase in total dissolved solids (TDS) content with depth in oil field waters in areas of northern Louisiana and southern Arkansas. Similar relations exist in parts of east-central Louisiana and central Mississippi. A reexamination of brine analyses in the region shows that these linear increases in TDS are primarily the result of linear increases in sodium and chloride concentrations with depth. Other dissolved components, such as Mg, Ca, Sr, Ba, HCO_3, SO_4, and trace constituents can show more complex variations in concentration with depth.

It is proposed here that the linear gradients for sodium and chloride reflect the ongoing, steady-state mass transport of these constituents upward from thousands of feet of depth to the near surface. Sodium and chloride concentrations at depths exceeding 8,000-10,000 ft (2.5-3 km) are maintained at constant high levels by the subsurface dissolution of halite. Low dissolved salt concentrations are maintained at the near surface by recharge of meteoric waters. The mass-transport processes that could produce such nearly linear profiles are limited to molecular diffusion, thermal diffusion (Soret effect), and eddy diffusion. Preliminary estimates of fluxes and mass-transport velocities that could result from these processes suggest sodium and chloride ions could be migrating upward at velocities approaching 1 cm/year.

Nonlinear but systematic variations in the concentrations of other components with depth may reflect the presence of local stratigraphic sources and sinks of material. Zones of depletion of dissolved calcium, for example, may represent areas of active precipitation of calcite. If the mass transport coefficients for these nonconservative components can be estimated, then limits can be put on the absolute rates of ongoing diagenetic processes.

Of considerable interest is the possibility that dissolved or entrained hydrocarbons are also involved in active vertical migration. The systematic study of brine chemistry promises to provide important clues to the understanding of processes and rates of fluid migration and hydrocarbon migration in the region.

HENNESSEY, RUSSELL B., Kistachie Resources, Shreveport, LA, and VICTORIA PROVENZA, Centenary College, Shreveport, LA

Formulation of Development Strategy for a Rodessa Gas Play in Eastern De Soto Parish, Louisiana

A study of the Lower Cretaceous Bacon limestone (first Rodessa porosity) on the eastern edge of De Soto Parish, northern Louisiana, involving thin-section study, and the correlation of conventional core analysis with resistivity log data, has led to the successful differentiation of two sedimentary units.

Paleostructural isopachs coupled with standard isopachs of the sedimentary units has led to a more complete understanding of the depositional geometry and entrapping mechanism(s) of the pay interval (zone A).

The Bacon limestone of the Rodessa Formation is productive in several fields in De Soto Parish and the surrounding areas. The techniques and strategies used in this study may aid in the more successful development of existing plays and in the exploration for new fields.

HUGULEY, DONALD LEE, JR., Penn Resources, Inc., Dallas, TX

Petrology and Depositional Environment of Mitchell Member, Rodessa Formation (Lower Cretaceous), West Bradley Field, Lafayette County, Arkansas

Previous studies of the Lower Cretaceous Rodessa Formation in southern Arkansas have interpreted it as nearshore, transitional marine. Many of the Rodessa members are hydrocarbon productive. Cores from the Sun Whittington wells and Lake Ronel Oil Co. wells in and near the West Bradley field, Lafayette County, Arkansas, were studied to identify a model for deposition of the oil-productive Mitchell sand interval. The Mitchell is sandwiched between the upper and lower Gloyd members of the Rodessa Formation. These two limestone members are productive in other areas of the Arklatex.

A thorough investigation of the sands, using core samples, geophysical log correlation, drilling reports, thin sections, scanning electron microscopy, and x-ray diffraction yields data necessary for establishing the nature of deposition. This information will promote interest and further development of the hydrocarbon potential of the Mitchell member in the Arklatex.

ISPHORDING, WAYNE C., Univ. South Alabama, Mobile, AL, F. DEWAYNE IMSAND, U.S. Army Corps of Engineers, Mobile, AL, and GREGORY W. ISPHORDING, Univ. South Alabama, Mobile, AL

Identification of Short-Term Changes in Sediment Depositional Rates—Importance in Environmental Analysis and Impact

Large-scale urban development projects may profoundly affect erosion and depositional rates in adjacent estuaries, bays, and lagoons. The magnitude of such changes, however, is commonly ignored because of a general belief that no reliable parameters exist that will allow differentiation in sediment cores of natural versus man-caused phenomena. Though conversion of forested or agricultural land to commercial or residential use may well cause sediment erosion and depositional rates to be accelerated by up to several orders of magnitude, regulatory agencies and municipal governments have largely avoided entering into litigation with land developers over damage to adjacent water bodies because of a perceived difficulty in quantifying the amount of increased sediment yield.

A marked change in the depositional budget of a watershed, however, does produce a discernible impact on the sediments. This is especially apparent in core samples collected in D'Olive Bay, Alabama, a small arm of Mobile Bay located adjacent to an area that has undergone extensive change from largely agricultural use to commercial and residential development during the past 15 yr. In cores collected in the bay, abrupt changes in (1) sediment size parameters, (2) heavy mineral and clay mineral ratios, (3) sulfur content, and (4) zinc, copper, and vanadium percentages were noted. Each of these changes occurred at the same depth and reflected a simultaneous increase in sediment influx into the basin and the onset of urban development in the watershed. Analysis of the core data also permitted accurate estimates to be made for the rate at which the bay is becoming filled, the volume of sediment deposited since the beginning of "impact," the sources within the watershed most responsible for the increased sedimentation rates, and the efficiency loss of the bay's sediment trap.

JACKSON, M. P. A., and STEVEN J. SENI, Bur. Econ. Geology, Univ. Texas, Austin, TX

Domes of East Texas

Data have been collected in the last 5 yr on the 15 salt diapirs that extend upward to shallow depths (4,000 ft or 1,220 m) in the East Texas basin. These salt diapirs penetrate Jurassic and younger units and have controlled their deformation in the central part of the basin. Both primary and secondary data have been gathered. Primary data are observations of dome shape, depth, structure, and resources. Examples of primary data are depths to cap rock and salt, cross-sectional area, axial ratio, crestal area and percentage of planar crest, axial plunge, tilt azimuth and distance, structural symmetry, side convergence, and overhang azimuth and percentage, as well as a new quantitative classification of dome shape. The structural styles of strata around each dome can be described in terms of the size of the rim syncline and drag zone around the diapir, angular relations between the strata and the salt, and style of faulting.

Secondary data include deductions and inferences based on the primary data. The growth evolution developed from the pillow stage, through the diapir stage, to the post-diapir stage. Unconformities resulted from erosional breaching of the dome in the past. The structural stability and hydrologic integrity of each dome have been assessed in terms of the age of the most recent deformation. Geomorphic and hydrologic evidence for dome uplift, subsidence, or brine leakage are included in a new classification of drainage patterns above domes.

KEIGHIN, C. W., and R. M. FLORES, U. S. Geological Survey, Denver, CO

Comparison of Clay Mineralogy of Late Quaternary Back-Barrier and Barrier Sediments, South Texas Coast

Mixed-layer illite-smectite and kaolinite are the most abundant clay minerals in five drill cores of Holocene and Pleistocene sediments from Mustang Island, Corpus Christi Bay area, Texas. The cores were bored from as deep as 60 m (197 ft) below sea level, and penetrated three deposi-