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-

tional environments interpreted as being fluvial-deltaic (Pleistocene), estuary and lagoon, and a barrier island complex (both Holocene). The clay-mineral assemblages of the Corpus Christi Bay cores were compared to those from similar environments in Aransas Bay, adjacent to the north, and were found to be different.

In the Corpus Christi Bay area, the uniform distribution of clay-mineral species in the cores studied strongly suggests a more or less constant detrital source from the Nueces River over a period of approximately the last 35,000 yr. Available data on the clay mineralogy of sediments in the Nueces River drainage system, which flows into Corpus Christi Bay, indicate that kaolinite is the dominant clay mineral of lower Eocene sediments, and that montmorillonite is found in upper Eocene through Pleistocene sediments. We conclude that the clay-mineral assemblage found in cores in the Corpus Christi Bay is detrital, and that diagenetic clays are of minor significance.

KINSLAND, GARY L., Univ. Southwestern Louisiana, Lafayette, LA

Basement Structure of Gulf Coast: Interpretation of Gravity Anomalies Supported with Structural, Magnetic, and Seismic Data

The filtered gravity map of the 48 contiguous states by Hildenbrand et al illustrates the relationships of anomalies in the Gulf Coast more clearly than previous (unfiltered) presentations. Gravity anomalies are recognized, which lead to the following hypotheses. (1) The passive margin of a late Precambrian to early Paleozoic rift underlies the Ouachita foldbelt from the Marathons through the end of the exposed Ouachitas in Arkansas. (2) A late Precambrian to early Paleozoic transform passive margin underlies the buried Ouachita-Appalachian connection in Arkansas, Mississippi, and Alabama. (3) A continuation of the rift passive margin underlies the Appalachians. (4) An early Mesozoic rift passive margin underlies southern Mississippi, south Louisiana, and coastal Texas. (5) This Mesozoic margin has at least two transform offsets in southern Louisiana and southern Mississippi. (6) The Sabine uplift, the Monroe-Sharkey uplift, and other features along the Atlantic coastal plain are buried portions of a late Paleozoic island-arc complex. (7) The Florida platform is accreted Africa–South American continental material. These hypotheses are supported by structural, magnetic, and seismic data obtained over some of the features.

KONTROVITZ, MERVIN, and JOHN H. MEYERS, Northeast Louisiana Univ., Monroe, LA

Morphology and Dioptrics of Some Ostracod Eyespots

On the Gulf Coast, as in other areas, ostracods have been much used in interpreting paleoenvironments. Such use may be enhanced by study of the ocular structures, including eyespots. Eyespot morphology appears to relate to light levels, which in turn are related to water depths. Thus, a new means of reconstructing water depths may be available.

Eyespots from two species of *Echinocythereis* from modern sediments along the Gulf Coast were studied using polished sections and electron and light microscopy. The inner surface of an eyespot is undulating and has a central convex portion and posterior concavities, each with a small radius of curvature compared to the convex outer surface. Light is converged most strongly by the central area and is focused in the underlying eye space. Astigmatism occurs as light passes through the areas away from the center, in which case the focus is beyond the eye cavity in the absence of a tapetal layer. Comparison of a modern and an extinct (Eocene) species of *Echinocythereis* indicates similar morphology and presumably similar functioning. A potential exists for discerning modern morphology as related to water depth and applying such knowledge to fossil forms and their environments.

LANDRY, RANDAL J., Centenary College of Louisiana, Shreveport, LA

New Reference Locality for Saratoga Chalk, Howard County, Arkansas

The Saratoga Chalk (Navarro Group, Gulf Series, Upper Cretaceous) crops out in a narrow band trending northeast-southwest through Howard, Hempstead, Pike, and Clark Counties, southwest Arkansas. The Saratoga Chalk is a fossiliferous, hard, sandy chalk, somewhat glauconitic in composition, with thin beds of marly chalks and chalky sands scattered through the formation. Lying disconformably on the Marlbrook Marl, the basal contact is quite distinctive owing to a persistent break in lithology and faunal types. The overlying Nacatoch sandstone disconformably overlies the Saratoga Chalk.

The outcrop, located in Sec. 32, T11S, R27W, approximately 0.5 mi (800 m) west of the Saratoga townsite, provides a complete, easily accessible exposure of the Saratoga Chalk (here 24 ft or 7 m thick) within 1 mi (1.6 km) of the type locality. This new reference locality will complement the poor exposure of the formation at the type locality at Saratoga, Arkansas.

LEDGER, E. B., Stephen F. Austin State Univ., Nacogdoches, TX, and T. T. TIEH and N. W. ROWE, Texas A&M Univ., College Station, TX

Catahoula Formation as Uranium Source Rock in East Texas

The Oligocene-Miocene Catahoula Formation of the Texas Gulf coastal plain is a fluvial and lacustrine volcaniclastic unit composed of "normal" fluvial material mixed with distal rhyolitic air-fall ash. In the lower Texas Gulf coastal plain, it consists of stream-transported detritus from the volcanic source area in Trans-Pecos Texas and adjacent Mexico. This volcaniclastic component has altered to release uranium to mineralization processes in the lower Gulf Coast, but there has not been uranium production in the middle and upper Gulf Coast.

To evaluate the potential of the upper Texas Gulf coastal plain for uranium ore deposits, a geochemical study was undertaken. The Catahoula Formation was analyzed for U, Th, K, Rb, Sr, Zr, and Ti to estimate the nature of volcanic glass and its abundance and alteration. Concentrations from three key outcrops were compared. They were also compared to samples from a volcanic area in Trans-Pecos Texas, which is chemically appropriate as a source for the volcanic material in the Catahoula Formation.

In the lower Texas Gulf coastal plain, where uranium is produced, the glassy volcanic material has been pervasively altered, but in the upper coastal plain much glass remains. Because glass alteration is necessary for uranium release and concentration, the potential is low for large, shallow uranium ore bodies in the upper Texas Gulf coastal plain.

LEWIS, J. O., 10919 Wickwild, Houston, TX

Seismic Signature of Serpentine Plugs in Maverick Basin, Texas

Basalt necks occur on the surface of Uvalde and Kinney Counties in southwest Texas. These basalt necks are the "serpentine plugs" that produce from the Taylor section in the subsurface of Zavala County. Many plugs are present in both the surface and subsurface.

Geology of the serpentine plugs indicates that most of the volcanic activity occurred as post-Austin subaqueous extrusions. Formations below the volcanic material show no structural deformation. Formations above the Cretaceous show evidence of the pile of volcanic material in few places. The most significant evidence of structure and faulting is within the Taylor section.

Strategically placed seismic lines will give obvious evidence of the existence of a serpentine plug.

LOCK, BRIAN E., Univ. Southwestern Louisiana, Lafayette, LA

Channels in Resedimented Chalks, Cretaceous Gulf Coastal Province of Texas and Mexico

Extensive roadcuts on U.S. Highway 90 in the vicinity of Langtry in west Texas display superb exposures of well-bedded chalky limestones comprising the lowest 27 m (89 ft) of the Austin Chalk equivalent. The limestone occurs as highly persistent beds averaging about 40 cm (15 in.) thick and separated by shale partings averaging 2-3 cm (about 1 in.). Limestone-shale contacts are very sharp. Nannoplankton indicate a Turonian to Santonian age and an outer shelf source; sedimentary features suggest redeposition by moderately low-density turbidity currents in a midfan setting characterized by distinctive distributary channels with channel-mouth bars and levees.