in Sabine, Webster, and Claiborne Parishes. The distribution of lignite in this depth range is governed primarily by the effects of the Sabine uplift on the Wilcox (Paleocene to Eocene) sediments in which the lignite is concentrated. Additional electric log analysis may reveal deep lignite deposits in other parishes affected by the uplift.

By using underground coal gasification (UCG) processes such as those developed at the Lawrence Livermore National Laboratory and in the Soviet Union, deep-basin lignite could produce low-btu methane suitable as a fuel, or carbon dioxide for enhanced oil recovery.

NOEL, JAMES A., G & P Exploration, Houston, TX

Geology and Geophysics of South-Central Zavala and Adjoining Parts of Dimmit Counties, Texas

Gravity, magnetic, and seismic surveys combined with subsurface geologic investigations resulted in very intriguing interpretations of an area east of Crystal City, Texas. The study area includes the south-central part of Zavala County east of the Nueces River and the adjoining parts of Dimmit County to the south. The Elaine field is included in the study area.

Gravity and magnetic residuals were calculated using the least-squares method, and the magnetic surveys revealed several serpentine plugs, which are confirmed by seismic interpretations. Although no geophysics work was done, subsurface study shows that Elaine field is the largest of these plugs. Seismic studies also show that the Austin Chalk, on whose surface the lava was extruded, is highly fractured and faulted. The Austin under the Elaine field is the lowest structural feature in the area.

The Anacacho was deposited on the lava surface, and in the Elaine area it has a reeflike appearance. Isopachs of younger sediments show that they are draped and differentially compacted over the plugs, and that the Elaine plug affects sediments as young as Escondido.

Production in the area is mainly from the San Miguel, but significant amounts of hydrocarbons have also been produced from Eagle Ford, Austin, Anacacho, and Olmos reservoirs.

PITTMAN, JEFFREY G., Southern Methodist Univ., Dallas, TX

Geology of De Queen Formation of Arkansas

Beds of the De Queen Formation are exposed in gypsum quarries within Pike and Howard Counties, Arkansas. The formation lies within the Lower Cretaceous Trinity Group that crops out in an east-west band across southwestern Arkansas. The De Queen Formation consists of a lower sulfate facies and an upper predominantly siliciclastic facies. The lower facies is approximately 40 ft (12 m) thick and is composed of interbedded gypsum, claystone, and limestone. This lower facies is equivalent to the subsurface Ferry Lake Anhydrite of the Gulf coastal plain. The upper facies is also approximately 40 ft (12 m) thick and contains interbedded clastics, limestones, and minor evaporites. Upper beds of the De Queen are equivalent to the lowermost beds of the subsurface Mooringsport Formation.

During Ferry Lake–De Queen deposition, a wide lagoon was located behind an extensive reef stretching around the Early Cretaceous shelf edge. This reef formed a barrier that restricted circulation and led to the deposition of the gypsum beds of the De Queen Formation and the Ferry Lake (later recrystallized to anhydrite during burial). Individual evaporite beds may be traced downdip from the outcrop across southern Arkansas into Louisiana and Texas. The regional extent of these evaporite beds reflects the variable geographic breadth of the lagoon during deposition of the Ferry Lake. Gypsum beds of the outcrop are the equivalent of the more widespread anhydrite beds of the Ferry Lake Anhydrite.

Faunal assemblages, sedimentary structures, and trace fossils (which include numerous dinosaur tracks) are important to the interpretation of depositional environments of rocks of the De Queen Formation. Much of the lower half of the formation was deposited in a shallow subaqueous setting, whereas depositional environments of beds within the upper half of the De Queen varied between subaqueous and exposed conditions.

PRESLY, MARK W., Valero Producing Co., Dallas, TX, and CHRIS H. REED, Reed and Strawn Exploration Consultants, Tyler, TX

Jurassic Exploration Trends of East Texas

Gas and some oil are produced from both clastic and carbonate units in the Jurassic of the East Texas basin. In the Smackover Formation, the reservoir facies are generally shallow marine carbonates that formed in shoal-water environments in the western and northern parts of the basin during late Smackover deposition. Productive intervals contain interbedded dolomites and oolitic grainstones. The dolomite beds are laterally persistent and contain the necessary porosity. Traps are found (1) over low-relief salt structures, (2) against faults and in fault closures, (3) in relatively shallow updip areas over basement structures, and (4) in the northeastern part of the basin, in Cass and Marion Counties, where there are deep basement ridges. In theory, there is potential for Smackover stratigraphic traps in many parts of the basin. However, increased exploration for such traps in East Texas will probably be sparked only after the first significant stratigraphic-trap discovery.

The Haynesville (Cotton Valley) limestone was deposited in carbonate-shelf environments in the western part of the basin and in shallow water along the western part of the Sabine platform. On the western edge of the East Texas basin, a distinct narrow carbonate shelf can be documented. The shelf edge has been encountered in McSwane and Branton fields as a narrow basement-supported feature. Landward, to the west, shallow lagoonal facies grade into evaporites and terrestrial red beds. In this western area, both structural and stratigraphic traps are present. In the eastern part of the basin, Haynesville production is distributed around the western edge of the Sabine platform. Reservoirs overlie both the platform and salt-supported highs just basinward of the platform. Several elongate north-south–trending gas fields have been established in this area. For the Haynesville limestone, continued development of known trends is still possible. In addition, this unit has not been extensively tested along the Mt. Enterprise fault system or in the central part of the basin.

Sandstones of the Cotton Valley Group on the Sabine platform produce gas with fracture stimulation at depths from 8,000 ft (2,450 m) to more than 10,000 ft (3,050 m). These sandstones can occur over an interval of as much as 1,400 ft (425 m); they generally have low porosity and permeability and are interbedded with gray to black shales, which probably serve as local source rocks. The underlying Bossier shales may also be a source of the hydrocarbons. Traps are stratigraphic with permeability pinch-out in individual beds. Gas-bearing Cotton Valley sandstones can be found almost anywhere on the Sabine platform, as well as other parts of the basin, but commercial production is typically dependent on the presence of multiple beds with significant porosities. The Cotton Valley sandstone can be a favorable exploration target for the future with the development of appropriate pricing and a strong market for gas.

In places across the East Texas basin, thin sandstone or siltstone beds punctuate intervals of thick Bossier shale. These sandstone beds commonly release gas under relatively high initial pressures. Traps are stratigraphic with permeability pinch-out in individual beds, and confinement of the gas by thick shale above and below. The shales are also probably source beds. The sandstones are considered coarser grained facies of submarine fan systems that accumulated along the margins of the Bossier marine basin. Much of the Bossier production that has been developed to date is in structural lows in Haynesville reservoir trends. Presumably, the Bossier fans preferentially filled these lows, because structural position of the lows between Smackover-Haynesville structural highs had probably been established by the time of Bossier deposition, and paleobathymetry followed structure.

ROY, EDWARD C., JR., Trinity Univ., San Antonio, TX

Stratigraphy and Sedimentology of Kincaid Formation, Midway Group (Paleocene), Upper Rio Grande Embayment, Texas

Sedimentary rocks of the Kincaid Formation crop out along the northern and western edges of the Rio Grande Embayment. Siltstones are exposed at the type locality of the Kincaid Formation along the Frio River in Uvalde County, Texas. On the east and south, the Kincaid Formation changes facies to richly fossiliferous carbonate rocks; however, basinward, it grades into a shale facies that contains interbedded units of fine-grained sandstone.