mation, which is exposed in southern Alaska and along the Alaska Peninsula. The megafossil *Buchia rugosa* was found in quantity in one dredge haul. This Late Jurassic pelecypod implies that the rocks were deposited in a neritic or shallow-water environment. These Jurassic strata are overlain unconformably by diatomaceous mudstone or sandstone as old as late Eocene or early Oligocene.

Geophysical work indicates that the Jurassic rocks were recovered from an acoustic basement complex that can be traced northwestward from near the western tip of the Alaska Peninsula to Siberia, a distance of nearly 1,250 km. The Mesozoic basement complex consists structurally of a series of interconnected ridges that underlie the outer shelf and crop out along the adjacent continental slope. Previous theories on the tectonic evolution of the Bering Sea implied that the continental margin should be underlain either by (1) deformed Mesozoic trench or slope deposits that were structurally accreted to the margin by oblique convergence between the Kula(?) and North American plates or (2) by disrupted fragments of Mesozoic slope beds deposited along a transform or strike-slip boundary that separated the two plates. However, rocks dredged from the margin now indicate that a belt of shallow-water Upper Jurassic sandstone underlies the Beringian margin between southwestern Alaska and eastern Siberia. This belt, which structurally may include younger rocks, subsided in early Tertiary time to form the existing Beringian margin. Collapse along the margin was more than 3 or 4 km; in some areas beneath the outer shelf, the Mesozoic framework may have subsided more than 10 km.

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Distribution of Salt Structures in Gulf of Mexico

Known collectively as "salt domes," slender diapiric stocks, broad massifs, anticlinal masses, low-relief swells, and pillowy lobes of Middle to Upper Jurassic salt dominate the structural fabric of large parts of the continental margins and deep basin of the Gulf of Mexico.

In the northern Gulf of Mexico, large salt structures are concentrated on the Texas-Louisiana slope west of the Mississippi fan and on the Rio Grande slope east of Brownsville, Texas. Salt stocks dot the continental shelf off Louisiana, around the DeSoto Canyon off the Florida Panhandle, and across the upper Mississippi fan between the Sigsbee and Florida Escarpments. At the foot of the continental slope, an almost continuous wall of coalesced salt structures abuts relatively undeformed strata of the continental rise along the Perdido and Sigsbee Escarpments marking the seaward boundary of the northern gulf salt-dome province.

In the central gulf, the almost featureless Sigsbee Plain is interrupted by the surface expressions of but a few of the more than 50 large salt diapirs that pierce thousands of meters of abyssal strata along a narrow belt parallel with the northwestern face of the Campeche Escarpment. Seismic reflection data between the Sigsbee Knolls and the Campeche Escarpment record the undulating surface and undeformed base of the mother-salt layer and indicate updip pinchout at the base of the Campeche platform.

In the southwestern gulf, knolls and open basins on the slope are underlain by masses of diapiric and nondiapiric material thought to be salt. Though similar to the northern gulf slope in topographic character and to some extent in internal structure, the Golfo de Campeche slope includes a considerable number of broad, linear hillocks composed of thick sections of slope and abyssal strata that were uplifted, folded, and faulted by tectonic events apparently unrelated to salt mobility.

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Facies and Reservoir Characteristics of Shelf Sandstone, Hartzog Draw Field, Powder River Basin, Wyoming

Hartzog Draw field is a stratigraphically controlled oil reservoir which produces from the Upper Cretaceous Shannon Sandstone at depths from 9,000 to 9,600 ft (2,700 to 2,880 m). The producing interval consists of a large, midshelf sand-bar complex deposited below effective normal wave base more than 100 mi (160 km) from shore. The productive interval in the bar complex has a maximum thickness of 65 ft (19.5 m), is over 21 mi (34 km) long, and up to 3.5 mi (5.6 km) wide. Over 170 wells have been completed on 160-acre (64 ha.) spacing since its discovery in 1975, and ultimate oil recovery may exceed 100 million bbl.

The reservoir is completely enveloped in shale, has a solution-gas drive, no water table, and no produced formation water. Even zones calculated from logs to have water saturations of over 65% do not produce water. Net pay is primarily a product of porosity, permeability, and thickness of the sandstone, and is directly related to sedimentary facies. Of six facies observed in cores, only the central bar facies—a high angle, trough-cross-bedded, glauconitic quartz sandstone—is a consistently high-quality reservoir. Two others, the bar-margin facies, a ripple to trough cross-bedded sandstone with abundant shale and siderite clasts, and the interbar facies, a rippled, interbedded sandstone and shale, generally are marginal-quality reservoirs.

Data from three cores indicate the central bar facies to have a significantly better average porosity and permeability (12.7%, 6.5 md) than either the bar-margin facies (8.1%, 3.7 md) or interbar facies (6.2%, 2.1 md). In addition, wells with a thick central bar facies appear to maintain higher reservoir pressures. Recognition of the facies, and understanding their distribution and interrelations are prerequisites to developing a program which will maximize oil recovery from the field.

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Independent Geologists—Endangered Species

During the last 5 years, while constantly complaining about a supposed lack of competition in the extractive industries, the U.S. Congress and administrative regulatory agencies have focused their power to make this

"lack of competition" real. Current examples are: (1) in the SEC, the constant effort to broaden the definition of a security and bring the attendant registration and disclosure requirements to bear on the most mundane joint ventures; (2) in the Congress and the SEC, the pressure to bring about accounting changes limiting independents' access to equity markets and encouraging sellouts and mergers; (3) in the IRS, grotesque definitions of joint ventures as partnerships, partnerships as corporations, and farmouts as income; (4) in the FERC, strained interpretations of gas contracts as "convenants running with the land" in order to introduce the principle of administrative confiscation of mineral rights without due process. The ponderous weight of the regulatory hand weighs most heavily on the independent geologist who has no legal or accounting staff.

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Engineering Geology in Deep Basin, Canada

No abstract available.

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Burial Dolomitization of Upper Devonian Miette Buildup, Alberta

Four discrete phases of dolomite are present within rocks which compose the south margin of the small, isolated Miette buildup. Detailed mapping, petrographic analysis, and chemical studies facilitate distinction of the following dolomite types: (1) an "early" phase of microcrystalline dolomite occurring as a diffuse matrix component of micrite limestones; (2) a pervasive phase of saccharoidal dolomite exhibiting a variety of features "inherited" from precursor limestones; the degree of dolomitization associated with this phase ranges from partial recrystallization of limestones from all depositional facies to complete dolomite mosaics which modify most primary textures and depositional features in the buildup margin; (3) a relatively minor phase of subhedral to anhedral microcrystalline to macrocrystalline dolomite confined to the buildup interior and associated with bitumen, clay, and iron residues along stylolites, and with characteristic green microcrystalline carbonate accumulations along solution surfaces; (4) a late phase of coarse, white dolomite associated with coarse calcite spar, which is related to brecciation of phase 2 dolomites of the buildup margin.

Paragenetic relations between the first three phases are best observed in partially dolomitized micritic limestones from the interior of the buildup. Vuggy porosity is associated with the pervasive dolomites of the buildup margin.

Petrographic observations, supported by geochemical and isotopic data, suggest different origins for these different phases of dolomite. Pervasive dolomitization postdates cementation and lithification of back-reef deposits; furthermore, there is little evidence of subaerial exposure, and evaporite-related solution features are absent. Alkaline, magnesium-rich fluids derived from adjacent and underlying basinal strata may have been responsible for the major phase of pervasive dolomitization.

Before dolomitization models can be applied to specific localities and to rocks displaying specific facies relations, careful petrographic, geochemical, and stratigraphic analyses are essential.

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Determination of Storm Overwash Periodicity from Stratigraphic Relations in Delaware Coastal Barriers

Atlantic coastal barriers of Delaware are characterized by relatively thick (>1 m) sandy washover units interbedded with thin silts and clays. The coarse-grained sediments represent overwash deposition during storm conditions, and are separated by lagoonal and marsh muds deposited during quiescent periods between storms. Washover deposits consist of fine-grained to coarse-grained, moderately sorted, negatively skewed sands. Internal sedimentary structures, consisting of lower units of small- and large-scale trough cross-bedded laminations and upper units of slightly landward-dipping parallel laminae, reflect the transition from lower to upper flow regime as storm intensity peaked. The fine-grained materials represent lagoonal and back-barrier marsh deposition, and consist of silts and clays containing characteristic faunal and floral components. The sand unit forms a sharp contact with underlying muds, whereas the upper boundary is a gradational sand-to-mud contact as back-barrier marsh deposition reestablished on the washover-fan surface. Thickness and lateral extent of washover deposits vary depending on magnitude of wave parameters and storm tide. Large fans may extend as far as 1 km landward, and exceed 1 m in thickness. Radiometric dating of organic material in marsh and lagoon deposits permits establishment of up to four major depositional events during the past 2,700 years. Back-barrier marsh mud sequences suggest a time of stability and low storm periodicity, whereas the greater part of the barrier washover sequences suggests a higher frequency of major storm overwash and upbuilding of the back barrier. Thus, storm-overwash periodicity may be the major determinant in establishment of lateral facies interrelations between coastal-barrier and lagoonal sequences in the stratigraphic record.

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Dinoflagellate Assemblages from Surface and Subsurface Nanushuk Group (Albian-Cenomanian), Northern Alaska

A multidisciplinary evaluation of potential hydrocarbon reservoirs in the Nanushuk Group (Albian-Cenomanian) of northern Alaska is being undertaken by the U.S. Geological Survey. The correlation of surface outcrops of the Nanushuk with subsurface units is based, in part, on marine dinoflagellate assemblages. Nanushuk dinoflagellates have been studied from four cored wells: Umiat Test Well 11, Simpson Core Test 25, Fish Creek Test Well 1, and Grandstand Test Well 1. Sam-