echinoid-mollusk wackestone facies. Farther seaward, in water depths greater than 60 ft (18 m), the open-marine environment is represented by the planktonic foram wackestone.

Intraparticle, interparticle, and fracture porosity are present in the thick limestone section along the Stuart City shelf margin. Intraparticle porosity, in places reaching 20%, is common, although permeability in facies with intraparticle porosity is low. Facies with interparticle porosity greater than 5% have good permeability up to 10 md. Permeability in any facies may be enhanced by the presence of thin fractures which were common in several cores. Only four facies, however, have greater than 5% porosity and 5 md permeability—the algae-encrusted miliolid-coral-caprinid packstone, mollusk grainstone, rudist grainstone, and coral-stromatoporoid boundstone. Rudist grainstone is potentially the most consistent in terms of porosity and permeability, thickness, and lateral extent.

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Potential for Production of Geopressured Geothermal Energy, Texas Gulf Coast

Tertiary strata of the Texas Gulf Coast include several terrigenous depositional wedges, some of which thicken abruptly at their downdip ends as a result of contemporaneous movement of growth faults and underlying salt. The Frio Formation is one of these wedges.

Broad regional studies, followed by detailed local investigations, were pursued in order to delineate prospective areas for production of geopressured geothermal energy. A prospective area must meet the following minimum requirements: reservoir volume of 3 cu mi (12.5 cu km), minimum permeability of 20 md, and fluid temperatures of 300°F (149°C). Several geothermal fairways were identified as a result of the Frio study. Only the Brazoria fairway, however, meets all of the specifications for a geothermal prospect.

In the Brazoria fairway, located in Brazoria and Galveston Counties, Texas, several hundred feet of deltaic sandstones have fluid temperatures greater than 300°F (149°C). Permeabilities within these reservoirs are greater than 20 md; this high permeability is related to secondary leached porosity, which developed in the moderate to deep subsurface.

The geothermal-test-well site is located within the Austin Bayou prospect, Brazoria fairway. The reservoir will consist of 250 to 300 ft (75 to 90 m) of sandstone with core permeabilities between 40 and 60 md and fluid temperatures from 300 to 350°F (149 to 177°C). The sandstone-shale section within the Austin Bayou area is represented by seven progradational depositional sequences. Each sequence is composed of a gradational vertical succession characterized by low-porosity prodelta and distal delta-front shale and sandstone at the base grading to porous distributary-mouth-bar and delta-plain sandstone and shale at the top. The older depositional sequences represent the distal half of a lobate delta, and the later events represent the entire deltaic complex.

More than 10 billion bbl of water are in place in these sandstone reservoirs of the Austin Bayou prospect; there should be approximately 400 Bcf of methane in solution in this water. Only 10% of the water and methane (1 billion bbl of water and 40 Bcf of methane) will be produced without reinjection of the waste water into the producing formation. Reservoir-simulation studies indicate that more than 50% of the methane can be produced with reinjection.

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World's First Geopressured Geothermal Test Well, Brazoria County, Texas

In July 1978, the General Crude Oil and Department of Energy 1 Pleasant Bayou geopressured geothermal test well was spudded near the Chocolate Bayou field, Brazoria County, Texas, on a site identified through regional and detailed geologic, engineering, and environmental studies. The well was expected to find thick, permeable, deltaic sandstone units from the Frio Formation between 13,500 and 16,500 ft (4,050 and 4,950 m) below sea level. Temperature of the gas-saturated brine was predicted to be higher than 300°F (149°C), and formation pressure to range between 10, 000 and 13,000 psi (68,950 and 89,635 kPa). The well has been completed and initial testing has begun.

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Hydrocarbon Potential of Central Gulf of Alaska

The geologic evolution of the Gulf of Alaska sedimentary province includes active trench deposition during Mesozoic–early Tertiary time and prograding shelf and glacial sedimentation during the remainder of the Cenozoic. Through interaction between bounding oceanic- and continental-plate movements, these beds have been deformed by repeated high-angle reverse and transcurrent faulting and folding. The stratigraphic succession within the province includes uppermost Mesozoic and a composite total of 40,000 ft (12,000 m) of Tertiary rocks. Major rock types are clastic sedimentary and volcanic rocks.

Compressional forces and wrench-faulting tectonics have generated sharp, elongate, structural folding of the Tertiary sediments in the Yakataga area (Kayak Island to Icy Bay). These structures generally trend either northeast-southwest or east-west and are bounded on the southeast or south by high-angle reverse faulting. Three apparent ages have been observed in these structures: early Miocene (post-Poul Creek–pre-lower Yakataga), late Miocene (middle Yakataga) and early Pliocene.

Post-Paleocene sediments in the Gulf of Alaska were derived from a Mesozoic arc complex and are generally poor in quartz and rich in feldspars and rock fragments. The sandstones are texturally immature and mineralogically unstable. Diagenetic alterations of framework grains resulted in the formation of (1) early calcite or zeolite cement, (2) clay rims and coats, (3) zeolite and