
OIL IN THE GULF OF MEXICO

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ABSTRACT

The discovery of oil in October, 1947, ten and one-half land miles from land in the open waters of the Gulf of Mexico, off Terrebonne Parish, Louisiana, has served to focus the attention of the American oil industry on the oil and gas bearing potentialities of that portion of the continental shelf lying within the Gulf of Mexico. This well, drilled by Kerr-McGee Oil Industries, Incorporated, on Block 32, Ship Shoal Area, and completed as a flowing producer of oil at a shallow depth from tertiary sands lying above a piercement type salt dome, established as a fact what for many years has been assumed—the presence of oil in paying quantities under the coastal waters of the Gulf of Mexico. Since its completion, two other oil fields, three gas-distillate and one dry gas field have been discovered in the Louisiana tidewaters.

A continental shelf is the sea floor beneath the belt of marginal shallow waters which surround a continent. The usual definition limits the shelf to a water depth not exceeding one hundred fathoms or six hundred feet. It is the seaward portion of a great shelving plain which intervenes in the region of the margins of the continents between the continental high areas and the oceanic depths. There has been exploration for oil and gas and it is now being produced in fields a short distance off the coast of California and in a number of fields in the bayous, bays, and marsh lands of the Texas and Louisiana Gulf coasts. However, there had been no intensive, concerted, and systematic effort to explore the continental shelves of the United States until the present campaign off the Louisiana Gulf coast started about four years ago.

There has been some geophysical exploration of the continental shelf area off the west coast of Florida and, at this time, there are reported to be approximately six million acres of coastal waters under oil and gas lease. In the past the coastal waters of Alabama and Mississippi have been explored geophysically to a small extent. There is now no active exploration campaign in progress off either the Alabama or Mississippi coasts. The Texas continental shelf area has, in the past, been explored geophysically to some extent and there are oil and gas leases in force in the open waters of the Gulf off the coast. There is some geophysical exploration now in progress off the Texas coast and an intensive campaign is in prospect as soon as the state regulatory bodies have formulated rules and regulations which will permit the orderly search of unleased areas. The continental shelf off the Louisiana coast has had by far the most intensive geophysical exploration, and as a result there are more oil and gas leases, more known prospects, and more wells that have been drilled, in the process of drilling, or proposed for drilling, than in any other part of the continental shelf of the Gulf of Mexico.

It is common knowledge that oil in the Texas and Louisiana coasts is produced almost exclusively from salt dome structures. These domes vary

in character from very shallow, piercement type domes to large, deep-seated salt masses. It has been assumed for many years that the salt beds from which the domes derive their salt extended beyond the coast line under at least a part of the continental shelf. Seismic work in the past four years off the Louisiana coast has demonstrated that salt domes of the same general type and character as those found on land extend out to a distance of at least thirty miles from the coast line. Exploration work is now being carried on at distances greater than thirty miles from the coast line. The United States Navy has released gravity data which it has recently obtained. These data indicate the presence of salt domes out to and possibly beyond seventy-five miles from the coast line. All other information available at this time tends to indicate that salt domes, and consequently structural conditions favorable for the accumulation of oil and gas, are present at great distances from the Louisiana and Texas coast lines and that the limiting factor in the development of these favorable prospects may be the industry's ability to devise methods and equipment for drilling wells in the relatively deep waters of the ocean where they occur.

The drilling of wells in the open waters of the Gulf of Mexico presents problems of real magnitude. The methods employed are undergoing constant change but are still very expensive and are definitely limited in their use by water depths. Most of the drilling to date has been done off the Louisiana coast where there are large areas of relatively shallow water. As drilling is extended around the perimeter of the Gulf of Mexico, as it surely will be, water depths, because of more steeply sloping ocean bottoms, will assume a much greater importance than they have to date off the Louisiana coast. For years wells have been drilled in the bayous, bays, and swamps of the Texas and Louisiana coasts from drilling barges which are sunk in shallow water while drilling is in progress and then floated and moved to a new location. Because of wave action, undertow, currents, and water depths this conventional drilling barge can not be used without hazard in the open waters of the Gulf of Mexico. Almost without exception, wells drilled to date in unprotected waters have been drilled from platforms or a combination of a platform and floating barge. Platforms have been built on wooden or steel piling sunk in the ocean bed. Their dimensions vary in size from 206' by 110' to 38' by 70'. Some of the larger platforms have two decks.

The Block 32 No. 1 well is producing from formations which appear to be of late or post-Miocene age. The total effective saturated sand thickness is 180 feet. The sand is very soft and unconsolidated in character. The porosity averages about 30%. In places the permeability exceeds 20,000 milli D'Arcys. Much difficulty was encountered in completing the well because of the soft, unconsolidated nature of the sand. The well would sand-up immediately when opened. It was found necessary to bring the well in on low rates of flow during which, at times, the sand content was as high as 30%. After the well had been flowed for a few days at low rates, the formation appeared to stabilize partially and the rates of flow could be increased. When the well was flowing at the rate of 40 barrels per hour, 40 cubic feet of gas were being produced with each barrel of oil.

It is believed that with improvement of present methods and equipment it will soon be practicable to drill wells in water depths up to 150 feet in the unprotected waters of the Gulf of Mexico. That area of the continental shelf lying off the Louisiana and Texas coasts, covered by water to a depth of 150 feet, is approximately 30,500 square miles. Assuming the same density of possible producing structures in the ocean area as occur on the land coastal belt—and the work to date off the Louisiana coast tends to confirm the density pattern—the possibilities are that on account of a thicker and more effective sedimentary section the recovery per square mile of area will exceed that of the coastal land belt. Therefore, it seems logical to assume that the total oil reserve in this new province will exceed that of the coastal land area.