

What can you tell me about the history of drilling oil wells in Belize?

Marty Casado Sun, Oct 30, 2011 [History](#) 0 10320

The laws governing licenses for exploration of oil and gas are some of the most liberal in the world. Total footage of nearly 250,000 ft were drilled and about 6,000 line miles of seismic surveys were conducted. Besides this, aeromagnetic, gravity, and geological mapping were done.

Photogeomorphological interpretation, morphological studies from toposheets, and landsat imagery studies also were carried out. Shallow seismic surveys for the sea bottom were carried out in parts of southern Belize offshore. Forty exploratory wells and eight shallow stratigraphic holes were drilled. The depths of the exploratory wells ranged from 3,500 ft to 16,000 ft. A number of wells never reached the target depth (see Table 1), and in most of the wells production casing was not lowered and conventional testing not done. The depths of the shallow wells, which were for structural information, ranged from 1,990 ft to 2,843 ft in an area covering a few square miles. In the northern Belize, where 24 wells were drilled there are live oil shows in many of the wells. One of the wells in the DST gave a 60 ft oil column of 32 degrees API.

Shell was the first company to obtain an exploratory license as far back as 1938 and carried out geological surveys on the ground and photogeological studies with the help of aerial photographs obtained from a contract with Fairchild Aerial Surveys Inc. The outbreak of World War II in 1939 saw the end of exploration by Shell Gulf was awarded a license obtained through one of its subsidiaries in 1949. The license covered the entire country and its territorial waters comprising 12,600 sq miles. Six years later in 1955 Gulf drilled the first wildcat at Yalbac on an "anticline" which is exposed and defined by photogeological studies.

In 1956 and 1957 Gulf, which entered into a partnership with Shell in 1957, drilled four more wells in northern Belize. In 1958 Gulf transferred its ownership to Bandini Petroleum Co., which in turn assigned its rights to Phillips. In the same year, Gulf drilled four more wells, and Phillips began its exploration activity in southern Belize by drilling two wells on land in 1959.

In 1961, Phillips drilled the deepest well in Belize, in the southern offshore, named 1 Palmetto Caye 1. The fourth well, also in the offshore, was drilled in the same year. In the next year, Phillips drilled three more wildcat wells, which turned out to be wells drilled

for stratigraphic-structural information. Phillips drilled its eighth test well in southern Belize on land in 1963.

In 1967, Shell now called Belize Shell Development Co., in agreement with Phillips, drilled two wells in the offshore on two islands. Gulf, Phillips, and Shell carried out surface geological, photogeological, aeromagnetic, gravity, and seismic reflection work. Other notable companies which contributed significantly are Anschutz, Exxon, Chevron, and Placid.

Anschutz drilled its first exploratory well in northern Belize in 1972. Six more wells were drilled in northern Belize in 1972 and 1973 by Anschutz, whereas Chevron commenced drilling an offshore well in 1974. In 1977 Exxon drilled two wells in southern Belize, one offshore and another on land. Exxon drilled one more well on land in southern Belize, and Anschutz drilled two offshore wells. Placid drilled four wells on land in northern Belize during 1981-82. The present position is that most of the offshore area up to the territorial waters is held by Central American, Pan American, Anschutz, and Petromar.

There are two areas covering about 840 sq miles vacant in the offshore, the northern one forming part of the advertised areas of northern Belize. The advertisement appeared in Oil & Gas Journal in four of the issues of March and April 1982. All the advertised areas have been awarded to some oil companies (see Fig. 1). Very soon a few areas are likely to fall vacant, and these would be open for bidding.

Regional geology. Belize, which forms a part of the Yucatan platform, fits into the North American plate.

The Polochic fault which separates the Caribbean plate from the North American plate bisects the Gulf of Honduras near the southern boundary of Belize. Belize comprises broadly three geological provinces: the Maya uplift, the Belize basin in the south, and the Corozal basin in the north (Fig. 1).

The Belize basin is the eastern extension of the Central Guatemalan basin referred to by different authors as the "South Plateau basin" and "Chapayal basin." The Belize basin extends further east into the Bartlett trough. The Corozal basin is the eastern continuation of the North Peten basin. The Corozal basin also is believed to be the western continuation of the Yucatan basin in the Caribbean.

According to one view, the May Uplift and the Cayman Ridge are structurally related. The reflection seismic work suggests the presence of a north-northeast trending arch,

apparently the continuation of the Maya uplift which appears to separate the Belize basin from the Corozal basin.

Stratigraphy. Southern Belize : The stratigraphy of the Belize basin indicates that Jurassic clastics overlie the "basement" comprising the Paleozoic rocks. The Cretaceous is predominantly a carbonate section with dolomites and limestones and very little evaporites. Clastics are also present in the Cretaceous. The Tertiary includes a lower clastic section and an upper carbonate section.

Northern Belize: The Corozal basin comprises a carbonate section with anhydrites in its lower part. The lower carbonate section is essentially a dolomite, whereas the upper section consists of dolomite and limestone. There is a thin clastic section overlying the "basement." Both paleontology and palynology indicates a Maastrichtian age for rocks a thousand feet from the surface. There appears to be very little Tertiary and Quaternary.

Structure. The Maya Mountains are described by earlier workers as a "horst."

The total sedimentary section is more in the Belize basin, and the Tertiary is quite thick compared to the Corozal basin. There are clastics in both Mesozoic and Tertiary. There are practically no evaporites, but thin salt is present. Basic lava flows of probable Late Cretaceous age are present in the section. There appears to be a deep trough filled with sediments bordering the coast in the offshore. Seismic sections show structures to be gentle, but drilling of wells showed a surprisingly different picture. There is undoubtedly repetition of the section in some wells and an enormous thickening of the section over a short distance indicating the presence of faults with large throw. According to one view the Laramide folded belt of Guatemala extends into southern Belize. So far, however, no folding and thrusting is reported from the outcrops in the southern flanks of the Maya Mountains.

Compared with the Belize basin the structure of Corozal basin is simple. There seems to be a high separating the basin into two -- the western and the eastern parts. The western part of the basin dips gently northwards and northwestwards into the Peten basin. The eastern part dips very gently eastwards. The entire basin is sliced by easterly heading north-northeast to south-southwest trending faults, which according to the photogeomorphological and Landsat imagery interpretation, have left lateral strike slip movements.

One view is that the strike slip movements are post-Laramide. Folds in this basin are either associated with the strike slip faults or are drag effects of the normal faults. This

basin appears to have experienced only epeirogenic movements after the element of granites which were Late Palaeozoic and Early Mesozoic. The structures are thus likely to be Late Tertiary in age and naturally are younger than those of the Belize basin.

Petroleum geology. The oil shows in the Belize basin are in the dolomite section below the Tertiary clastics.

This dolomite is believed to be the equivalent of the Coban formation. The fact that this basin is the eastern continuation of the Southern Peten ' basin of Guatemala where commercial oil is found, the oil shows on the surface and subsurface, and the presence of favorable reservoir facies and cap rock and anticlinal structures strongly suggest that once exploration activity picks up discovery of oil would not be a far cry away.

Most of the wells drilled in the Corozal basin have live oil shows in the anhydrite-dolomite section. Very few dead oil stains are found in wells above this section, suggesting that there is no escape of oil and that anhydrite has been an effective cap rock. Wells drilled in this basin are largely based on either gravity anomalies or geomorphological features, or at best on the poor seismic data. So it is possible that wells were not located on the highest part of the structures.

In one case, at least, it was agreed that the well was drilled just at the oilwater contact. In another well there were oil shows for about 1,100 ft below the first anhydrite, which appears to be a regional cap rock. Another well drilled east of this across a fault had about 600 ft of live oil shows but in a lower stratigraphic horizon.

The main problem in Corozal basin is that seismic data are very poor. Any serious exploration in this basin cannot be undertaken without first getting good seismic data. The poor quality of seismic data is due to the near surface conditions like the Karst, presence of marshes, jungles, numerous streams and creeks, and to some extent subsurface conditions. The sonic velocities show good contrasts, and, so once suitable parameters are chosen, it should not be difficult to obtain good records. The stratigraphy shows a quite good number of breaks-basement-basal clastics, alternations of anhydrite and dolomites and dolomitelimestone. These interfaces should be good reflectors.

Once structures are delineated by good seismic there is no doubt that oil would be discovered in commercial quantities in this basin. Incidentally, this basin is the Eastern continuation of the North Peten basin of Guatemala where oil is reportedly found.

Conclusion. Belize has one of the most liberal petroleum laws. It has a stable and

democratic government, and the people are law abiding citizens. External threats do not exist any more. Belize thus has one of the most congenial investment climates. All geological conditions required for accumulation of oil are present. The country is very near the United States, which happens to be (1) the biggest consumer of oil in the world, (2) the largest importer of oil from the Middle East which is so far away, and (3) technologically the most highly advanced nation in the world of petroleum. It is in the interests of both the United States and Belize that U.S. companies should find oil in this country where already a large investment of the U.S. citizens

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