

# FUTURE OIL POTENTIAL OF THE LOWER CRETACEOUS SUNNILAND FORMATION IN SOUTH FLORIDA

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## ABSTRACT

From 1943 through 1977, 161 wildcat wells have been drilled to the depth of the Lower Cretaceous Sunniland Formation or below in the onshore portion for the South Florida Basin. This drilling has resulted in the discovery of ten oil fields with original oil in place of 238,767,000 barrels, recoverable oil of 90,485,000 barrels, and an estimated recovery factor of 38 percent. Total wildcat footage drilled which penetrated the Sunniland was 1,935,000 feet. Each foot of this drilling has resulted in the discovery of approximately forty-seven barrels of recoverable oil in the 1943-1977 period. Depth of production is between 11,322-11,892 feet. Gravity of most of the oil is 25° to 26° API gravity and the gas-oil ratio is 100 cubic feet per barrel or less. The low gravity and low gas-oil ratio is believed due to the fact that this oil has been generated near the low temperature limits for oil formation.

The estimated length of the productive trend in the basin is approximately 145 miles, with an average width of about 12 miles. Productive acreage in the ten fields so far discovered is 18,380 acres out of an estimated 1,100,000 acres on the trend or about 1.67 percent. Between the Bear Island Field and the Forty Mile Bend Field there is an undrilled portion of the possible productive trend about 35 miles in length.

Three Sunniland maps, prepared principally from core studies, appear to be especially significant in delineating the higher-energy reef-forming hingeline between the shallow water low-energy chalky type beds, and the quiet deep-water dark micrites which lie to the southwest of the productive trend. These maps are: 1) effective porosity in feet, 2) dark carbonate percentage of total carbonate, and 3) dolomite in feet.

A study of these maps reveals the following:

(1) Almost all of the effective porosity is on the northwest-southeast hingeline where reefal build-up in the upper Sunniland has led to commercial oil accumulation.

(2) The presence of dark carbonates in the Sunniland is necessary for the production of oil. Short-range horizontal migration to low-relief reefal area is postulated. All of these oil fields discovered to date lie in areas where dark carbonates make up from 30 to 60 percent of the total Sunniland section. It is believed that where the dark-carbonate percentage is appreciably lower, the free-oil generating capacity is not present, and that in the dark carbonates, oil is present but is trapped in impermeable non-porous micrites.

(3) A study of an isolith map of total dolomite in the Sunniland reveals that it decreases rapidly both to the northeast and to the southwest from the hingeline. Dolomitization, which at least in part is believed to be secondary, appears to be important in furnishing the necessary porosity for production in some of the fields on the productive trend.

Some factors which are probably responsible for the low level of wildcatting in the basin are the depth to the Sunniland Formation, the low gravity of the crude, the very poor quality of seismic data, the low structural relief, and the modest size of the fields (average recoverable oil 9.5 million barrels each in ten fields) found to date.

In spite of these negative factors, if geologists key their exploration programs to the productive trend instead of drilling in the random manner in which much of the earlier exploration was necessarily done, many more very profitable fields may be found. The basin is relatively unexplored compared to other producing areas in the continental United States.

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