High Island State Tract 60-S Field
Jefferson County, Texas, Gulf Of Mexico

James V. Richards
Consultant, 10000 Memorial, Houston 77024

INTRODUCTION

State Tract 60-S Field is an excellent example of an oil and gas field that was difficult to identify utilizing normal subsurface and seismic methods but which was readily delineated through the application of a 3-D seismic survey. The field area lies 13 miles west of Sabine Pass, Texas approximately 2 miles off the Gulf of Mexico shore line in Jefferson County, Texas.

GEOLOGIC SETTING

The State Tract 60-S Field currently produces both oil and gas from multiple lower Miocene sands at various depths above 9000 feet. The sands carrying the hydrocarbons appear to be deposited over a gently formed salt or shale ridge that may extend southward from the Clam Lake Dome located to the north onshore. This feature exhibits an anticlinal shaped structure that is bounded by small north to south trending faults which gives the field the appearance of a horst and graben system with the down-thrown fault block lying on the crest of the ridge. Most of the oil and gas produced from this field is trapped on the east and west up-thrown horst blocks. Only a small portion of the reserves have been produced from the graben or down-thrown block in the field.

Paleontological studies of the productive interval show the samples to contain Siphonina davisi and Lenticulina hansoni foraminifera. The sands are fairly thin bedded in some cases and exhibit obvious oil water contacts. Porosities from core samples are often in the 30% range, and permeabilities climb into several darcys. The stratigraphic unit consists of an alternating sand and shale sequence.

HISTORY

It is noteworthy to mention that five dry holes were drilled on the 60-S anomaly prior to the field discovery. The Shell Oil Company No. 1 State Tract 59-S was drilled in December of 1982 and encountered numerous shows and accumulations of hydrocarbons in at least 10 sands. However, for economic reasons, the well was plugged and abandoned without a completion attempt.

It is surmised that the Shell well was located on what was then thought to be the crest of a gentle anticlinal closure and no other attempts were made to drill a second well. Gulf Oil had made an earlier attempt in 1965 which resulted in a dry hole. It was shown to be off structure when other conventional seismic interpretations were made. Spartan Petroleum drilled a nearby dry hole in 1985 in St. Tr. 52-S.

Trying to exploit the hydrocarbons found in the Shell well, Genesis Petroleum Company drilled a test well to the south in State Tract 59-S in 1983, but the well was structurally low. Another attempt by Imperial in 1986 also resulted in failure and further exploration ceased until 1988. Figure 1 illustrates an early structure map constructed from 2-D seismic after the Genesis well was drilled. At that time, the structure appeared as a simple low relief anticline with random peripheral faulting. The interpretation in Figure 1 exhibits the reason for drilling the Imperial location, but the well lengthened at depth and was found to be low to the Shell well. It was apparent that a re-interpretation of the area was needed and Weeks Exploration took on the project by shooting additional 2-D across the St. Tract 60-S anomaly.

FIELD DISCOVERY

In 1988, new interpretation by Weeks Exploration indicated minor faulting on each side of the old Shell abandoned well. The Weeks No. 1 St. Tr. 60-S well was drilled in a response to this interpretation, and the well bore encountered several oil and gas pay zones after going up-thrown on a small 25 to 50 foot fault at a depth of 7,210 feet. Oil was found in the lower Miocene G, I, and J sands and gas was encountered in the K sands. The well was completed as a single Miocene K-sand gas discovery flowing 3,050 mcfd and 29 barrels of condensate per day.

However, on a second attempt, Weeks drilled the No. 2 St. Tr. 60-S well as a dry hole and the bottom of the well bore remained down-thrown to the initial discovery. The No. 3, No. 4, and No. 5 wells in St. Tr. 60-S, and the Weeks No. 2 St. Tr. 51-S wells were then drilled successfully along the fault-line. The No. 4 well tested 523 barrels of oil per day from the lower Miocene I sand.