DOWN-DIP PINCHOUT IN THE MUSTANG ISLAND TREND

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ABSTRACT

It has long been known by geologists working in the Gulf Coast Area that the thick "Marginulina-Frio" series of sands, silts and clays has a zone of maximum sand development with sands splitting up and going out into shale both landward and gulfward. So many fields owe their accumulation, in part or sometimes wholly, to stratigraphic traps formed by sands pinching out updip that such pinchouts have been an ideal hunting ground for subsurface geologists for a generation.

Downdip the change is from a nearly solid sand section, typified by wells in east-central San Patricio County, to broken sands in the Marginulina and upper Frio and finally to shale with little or no sand. Most of this change takes place within about 20 miles for the upper and middle Frio sand section. It is probably nowhere as pronounced as the updip pinchout of the Tom O'Connor sand series in central Refugio County, although the actual amount of coastward disappearance of sand is as yet rather imperfectly known, due to the limited number of very deep downdip wells.

In the case of updip sand pinchouts, the normal regional dip of the beds, with local structural irregularities of greater or less amount, presents a perfect setting for stratigraphic trapping of oil. Obviously this is not the case where permeable sands go out coastward without interruptions of the regional coastward dip.

The present attempt at a study of the effectiveness of gulfward pinchout or shaleout of sands is necessarily preliminary, and any final or quantitative analysis will require much more work with cross-sections and isopachs using available information. It will also require that additional well data become available either in the Gulf or along the margins of it.

Greater precision in correlations within the downdip Frio and in distinguishing marine from non-marine sediments are desirable.

Since a local reversal of the regional coastward dip is the first essential for accumulation of oil or gas in a stratigraphic trap caused by a downdip pinchout, the extent of such local reversals is critical in an analysis of this trend. Subsurface mapping in such areas as McCampbell, Flour Bluff, Fulton Beach, West Fulton Beach and Mustang Island fields indicates that the fields are structural closures developed along the upthrown sides of major down-to-the-coast faults. Regional subsurface mapping between eastern Nueces County and southern Calhoun County shows the presence of several large faults, downthrown toward the coast and with fairly widespread associated reversals of the regional coastward dip. This presents a regional situation which appears to be favorable to accumulation of oil in lenticular sands, particularly those with a tendency to pinch out toward the coast.

Such fields as McCampbell, Flour Bluff and Mustang Island, however, have doming and others have closures against faults which constitute structural traps. Since all of the sands have local variations in thickness and some are highly lenticular, the natural tendency is to consider the structural closure to be the only reason for oil accumulation, with the regional stratigraphic factors more or less incidental. A more critical study of the timing of the movement, as by a study of isopach and structural maps in Mustang Island field, indicates that the major fault block may have been developing during the deposition of the upper Frio beds, and that the doming which is the most conspicuous feature of the present structure, was of somewhat later age. In the opinion of the writer, this contemporaneity of growth of the fault blocks with deposition of the sands which pinch out coastward, indicates that downdip pinchouts against regional reversals of dip may prove to be of an importance secondary only to the updip pinchouts

in the western Frio trend.

An analogous situation exists in the Wilcox trend, where the sands break up and finally disappear in going downdip, and where structural reversals associated with fault blocks are fairly common.