

### CHAPTER III: STRATIGRAPHY AND STRUCTURE

The stratigraphy and structure of Texas are subjects of major importance to the oil and gas industry and to all who secure financial returns from it. They are the factors that effectively control the accumulation of oil and gas.

The average individual in the East Texas area has been but little, if at all, concerned with conditions of sedimentation and erosion during the time of Woodbine sand deposition and the times immediately before and after, or with questions pertaining to the geologic ages during which structural movements took place there. All of those factors have nevertheless had a direct bearing on the monetary income of practically every person in that region. The structure and stratigraphy of every local area in Texas are the factors from which the potential possibilities for the production of oil and gas are determined.

It is the generally accepted theory that oil and gas accumulate in structures, or traps, where some barrier prevents their further migration and causes their concentration in pools or fields. Oil and gas are, in the majority of instances, associated with water in the reservoir formation, and the three substances are segregated according to their specific gravity. The gas, being lightest, collects in the upper portion of the reservoir and is immediately above the oil, which in turn is underlain by water. In cases where no oil is present, the gas is encountered immediately above the water. The accumulation of oil and gas therefore takes place in a localized area where, due to some trap or obstruction, further migration is prevented, and the force of the water behind the oil and gas in that particular horizon exerts the pressure necessary to keep them confined in the reservoir. This force, or pressure, of the water is known as the hydrostatic head and is roughly equivalent to 43 pounds per square inch for each hundred feet of depth below the surface outcrop of the formation. This may be illustrated by the Woodbine sand in the East Texas field. The Woodbine sand outcrops in the vicinity of Dallas, and water enters the porous stratum in that area and seeps through the pore spaces in the sand as it dips into the East Texas basin and then up against the flank of the Sabine uplift. The hydrostatic head, or bottom hole pressure, in the Woodbine sand where it is encountered at a depth 3,600 feet lower than the surface outcrop in the vicinity of Dallas would therefore be approximately 1,548 pounds per square inch.

The accumulation of oil and gas in appreciable quantities can take place only in a porous horizon where it is effectively sealed against their further migration. In attempting to locate and develop areas of production, therefore, at least a fundamental knowledge of the conditions under