DEVELOPING AND EXTENDING OIL AND GAS FIELDS WITHOUT USE OF COMPUTERS, REMOTE SENSING, SEISMIC, AND NON-CONVENTIONAL METHODS

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ABSTRACT

At Cross Timbers Oil Company geologists and engineers working together are extending stratigraphic oil and gas fields by using basic geological and reservoir engineering data. They utilize subsurface information and well performance data, reconcile conflicting information and use multiple working hypotheses in order to develop realistic reservoir models. Field extensions are then drilled, all without benefit of computers, seismic and remote sensing. Development of a Hunton gas field in Oklahoma and a Strawn sandstone oil field in Texas are described.

INTRODUCTION

In December 1952, Wallace Pratt published a paper in the AAPG titled, “Toward A Philosophy of Oil-Finding.” In it he stated: “Where oil is found, in the final analysis, is in the minds of men. The undiscovered oil field exists only as an idea in the mind of some oil-finder.” (Pratt, 1952, p. 2236)

The author would add to this by saying that extensions to producing fields are found in the minds of geologists and engineers who work as a team.

Most of the geologists who work either as independents or for non-major oil companies do not have access to sophisticated seismic data, remote sensing information and computer-derived maps; but some continue to extend fields and develop significant new reserves. They manage to do this by using only subsurface geological and engineering data. They have to overcome incorrect log analyses, avoid miscorrelations of the reservoirs due to use of wrong geological models and wrong scale logs, and avoid disastrous completion techniques used by previous operators. These errors are overcome by rational thinking.

Following are descriptions of two stratigraphically-controlled oil and gas fields that were extended by Cross Timbers personnel, using only basic geological and engineering concepts:

HUNTON GAS FIELD,
SOONER TREND OF OKLAHOMA

In Major County, Oklahoma (Figure 1), Cross Timbers Oil Co. is developing a large classic stratigraphic trap within Hunton Group carbonates (Silurian-Devonian) at a depth of 8000 feet. Regional dip at the Hunton level is monoclinal at a rate of less than two degrees (Figure 2). Devonian age Woodford Shale unconformably overlies the Hunton which is 250 feet thick and is truncated in the updip direction. The Woodford Shale is both a source and a seal for hydrocarbons in the Hunton. The area of interest lies in the western part of the Sooner Trend, a large stratigraphic oil field in Mississippian limestones and cherts. Many of the wells have been drilled into the Devonian carbonates, furnishing abundant subsurface control.

During a regional study of the Hunton in 1987, the author determined that a zone of porosity about 40 feet thick in Hunton dolomite subcrops updip beneath the Woodford and grades laterally into dense carbonates.

Covering much of three townships, the porosity zone, informally called the Hunton “C” Zone, forms a simple stratigraphic trap (Figure 2).

One well, the Ferguson No. 1 Reese (Figure 2), was completed from the zone in the 1960’s near the updip edge of the pay. Completion records show that the well was fractured and produced dry gas at a significant rate. Production records show that it produced about one BCF.