

COMBINATION ENTRAPMENT IN THE SMACKOVER FORMATION AT CHALYBEAT SPRINGS FIELD, COLUMBIA COUNTY, ARKANSAS

J. D. Robinson¹ and A. R. Troell²

ABSTRACT

Chalybeat Springs field, located in Columbia County, Arkansas, is a combination stratigraphic-structural trap in an oolitic calcarenite at the top of the Smackover Formation. Production is limited by the combination of a structural nose with porosity present on the flank. Downdip production is limited by water.

The field was found in 1972. Discoveries at Lick Creek in 1960 and Walker Creek in 1968 enabled revision of stratigraphic concepts that were applied correctly in exploration for Chalybeat Springs. Prior to 1968 the Reynolds oolite of South Arkansas was correlated with the Smackover "B" zone of North Louisiana. Consequently, the absence of structurally closed anticlines along the Lick Creek-Walker Creek trend kept the reservoir hidden. The discovery at Walker Creek revealed the stratigraphic separation between the Smackover "B" zone and the Reynolds oolite and led to the discovery of Chalybeat Springs field.

Jurassic strata of South Arkansas are a progradational sequence of facies involving the Smackover Limestone, Buckner shale and anhydrite, and Cotton Valley clastics. The combination of progradational deposition and contemporaneous structural movements produced the trap at Chalybeat Springs.

Entrapment occurs in an oolitic calcarenite lens associated with a tilted anticline. Updip to Chalybeat Springs the oolitic calcarenite undergoes a change to quartz sandstone with scattered oolites. Downdip to the field the oolitic calcarenite is replaced by facies transition to a skeletal lime mudstone. The overseal for the trap is anhydritic shale of the Buckner Formation and the floor or underseal is an interbedded limestone and sandstone interval termed the Phelps Sand Member.

The Smackover "B" zone is an oolitic calcarenite deposited on a beach which prograded seaward. Landward of the beach, red shales with anhydrite nodules were deposited on coastal mud flats. Seaward of the beach, lime muds with oysters and echinoderms were deposited in a marine subtidal environment.

¹Westland Oil Company, Houston, Texas.

²Amoco Production Company, Houston, Texas.