



**THE 4TH GEOLOGICAL CONFERENCE
OF
THE GEOLOGICAL SOCIETY OF TRINIDAD AND TOBAGO**
June 17-22, 2007, Hilton Trinidad & Conference Centre
Port-of-Spain, Trinidad and Tobago

“Caribbean Exploration – Planning for the Future”

ABSTRACT

**RESERVOIR DISTRIBUTION AND PRODUCTION IN MOBILE SHALE BASINS –
EXAMPLES FROM THE CRUSE FORMATION OF SOUTHERN**

CURTIS ARCHIE 1 and GRANT W ACH2 *

*1 Petrotrin, Pointe-a-Pierre, Trinidad & Tobago, West Indies; 2 Dalhousie University,
Halifax, Nova Scotia, Canada*

The proximity of faults and shale diapirism appears to be a factor in production from the reservoirs of the Upper Miocene- Lower Pliocene Cruse Formation (figure 1 and 2) offshore and onshore in the Southern Basin of Trinidad. Subsurface and outcrop examples from the south coast of Trinidad will be used to demonstrate the effects of shale instability on the distribution and production from reservoirs deposited in mobile shale basins.

Outcrop studies (Siparia Point) indicate that the Cruse shale was deposited within an unstable prodelta setting, with subsequent rapid deposition of tidally-influenced deltaic sands directly above. The outcrops along the coast of the Columbus Channel are on the south flank of the Southern Range Anticline that is broken by cross faults. Onshore several paleo and active mud volcanoes affect the Cruse Formation. Offshore the crest of the Southern Anticline is marked by active mud volcanoes.

Distribution of sands is enigmatic. Sporadic drilling success and the inability to effectively correlate sands between wells, for example the Bonasse Field suggests potential point source of sands and disruption of reservoirs through shale diapir intrusion, or slumping along unstable prodelta margins.

The "middle" Cruse reservoirs are generally the best producers, a good example being the Soldado Main Field with the greatest production from the Cruse Formation. In the Forest Reserve Field some reservoirs are in close proximity to shale diapirs with indications of low production. Next to large faults, such as the Los Bajos Fault, there is problematic production. For example at Point Ligoure (the reservoirs tend to be initially overpressured leading to initial high production rates that tend to decline relatively quickly. It is unclear whether these production anomalies are due wholly to fault compartmentalization or if shale diapirism plays a role.

Sediment loading is a factor leading to shale mobility. The early Orinoco delta system produced very high basin sedimentation rates. Outcrop and subsurface examples from the Cruse Formation illustrate deformation along an unstable shallow shelf and upper slope setting within the mobile shale province. Shale instability leads to random distribution of reservoir sands and heterogeneities within the reservoir sands. Water content of clay minerals also appears to contribute to instability with evidence of montmorillonite in samples from the Cruse Formation.