



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

**“Caribbean Exploration – Planning for the Future”**

**ABSTRACT**

**STRUCTURAL GEOLOGICAL OBSERVATIONS AND GEOCHEMICAL RESULTS OF  
TWO LATE CRETACEOUS OUTCROPS OF TRINIDAD**

***Laszlo Benkovics<sup>(1)</sup>, Dewi Jones<sup>(1)</sup>, Mo Etemad<sup>(1)</sup>, Alejandro Franco<sup>(1)</sup> Laurent de  
Verteuil<sup>(2)</sup>, José Antonio González<sup>(2)</sup>***

*(1) RepsolYPF, LAN Exploration, Houston (2) Latinum Ltd.*

In the Central region of Trinidad, West Indies, there are two well known exposed outcrops of Late Cretaceous age. These two units with their distinctive tectonostratigraphic characteristics are separated by a major strike-slip fault system. Geoscientists of the RepsolYPF Trinidad Exploration Unit performed field and geochemical sampling of these outcrops during the first half of 2006.

The first outcrop exposes the Naparima Hill Formation in a large quarry at San Fernando Hill. This outcrop is located to the southwest of the Central Range uplift and is interpreted to be a transpressional type positive flower or pop up structure. This interpretation is supported by surface geological observations and the subsurface data from nearby wells. The quarry provides a unique perspective of structural configurations as well as sedimentological information on the Naparima Hill Formation. The outcrop shows well stratified siliceous mudstone encased by layers of clay, with evidence of post depositional deformations.

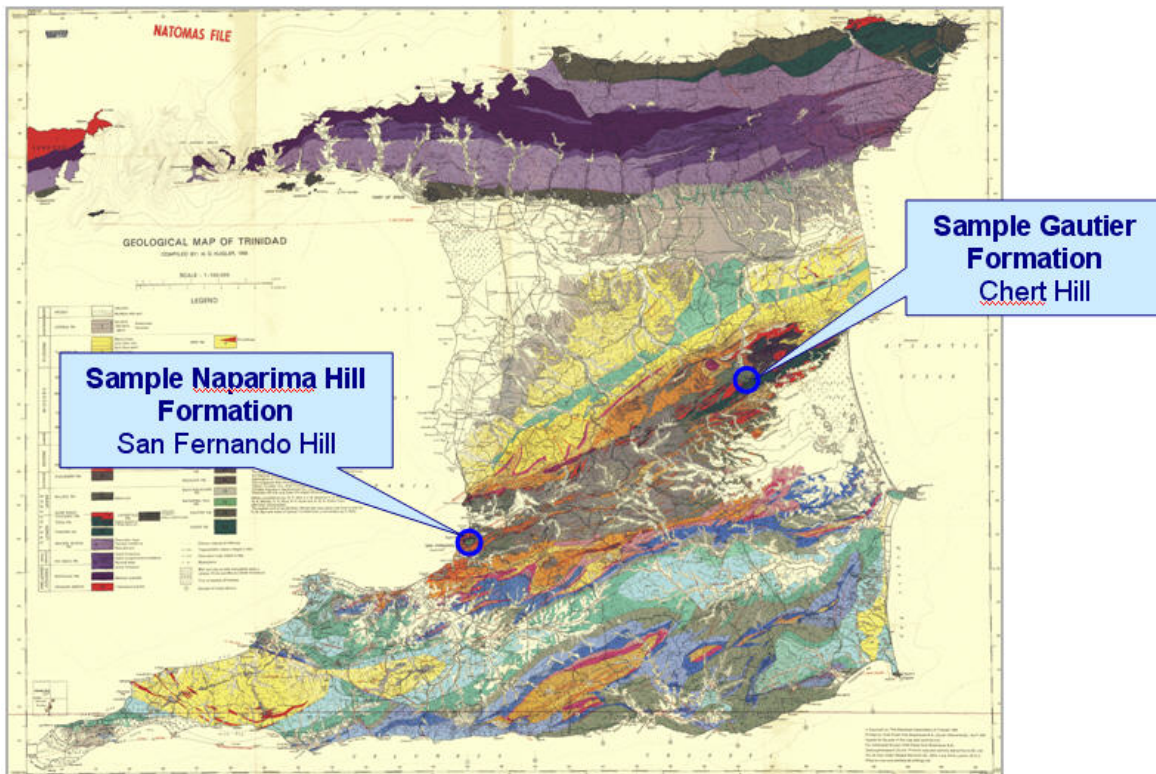
In the upper part of the quarry clear synsedimentary gravitational deformation can be observed. Locally, metre scale listric faults appear to be soling out into a common detachment surface. These rotational faults exhibit evidence of syndepositional growth.

The results from RockEval and visual kerogen analyses of shale dominated lithofacies from the San Fernando Hill Quarry, indicate good to excellent source potential with TOC values ranging from 3.8% to 5.0% and a predominance of amorphous type II kerogen. Very low RockEval Tmax values (427 °C) measured for this sample is interpreted to be the result of staining of migrated hydrocarbons, making the Tmax values unreliable. However, Ro measurements indicate uncorrected mean values of 0.85%.

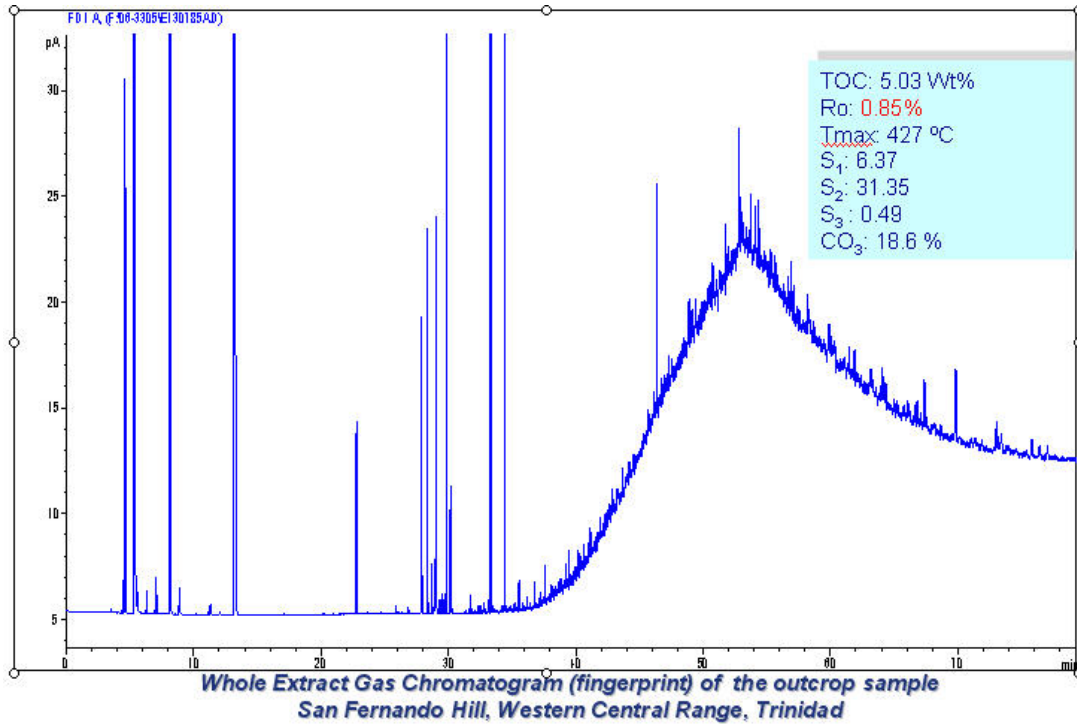
The second outcrop is the Chert Hill locality of Kugler, located in the Central Range Uplift and exposed along a river bed with difficult accessibility. At this locality the bedded cherts of the Naparima Hill Formation form a cataract that, at its base, is in fault contact with the underlying lower Cenomanian – upper Albian Gautier Fm. This is the only known surface outcrop of the Gautier Fm on the island. At this locality the Gautier is a dark grey to black finely bedded calcareous shale. We carefully collected a fresh sample of this Gautier facies at the Chert Hill locality. Geochemical analyses of this sample indicate excellent TOC values of up to 5.7%. However, the RockEval analysis indicates a much higher thermal maturity (Tmax of 481 °C), making the source potential difficult to assess. As in the San Fernando Quarry samples, visual kerogen analysis also indicates a predominance of amorphous kerogen.

The results from geochemical analysis indicate similar characteristics in many aspects for the two outcrops and appear to correlate with the sparse published subsurface data in the central region of Trinidad. Alternately, the differences between the observed thermal maturity values of surface and subsurface samples can be interpreted as evidence of the different tectonostratigraphic units.

**Fig. 1 Map showing location of outcrops sampled**



**Fig .2 Gas Chromatogram of sample from San Fernando Hill**



**Fig .3 Gas Chromatogram of sample from San Fernando Hill**

