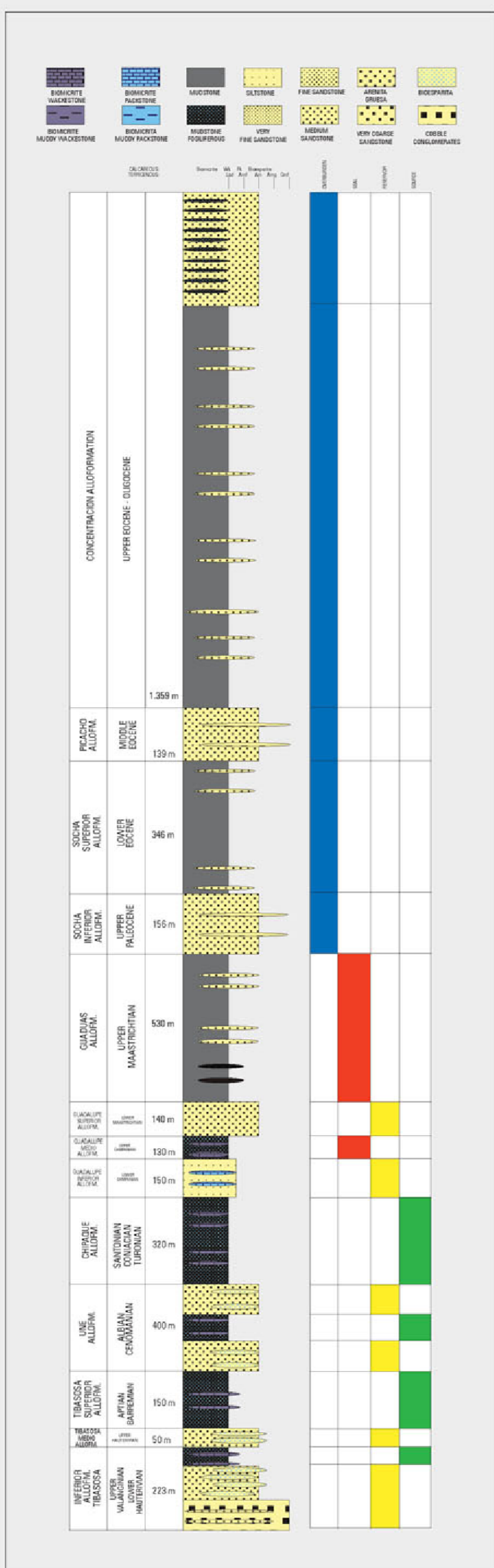
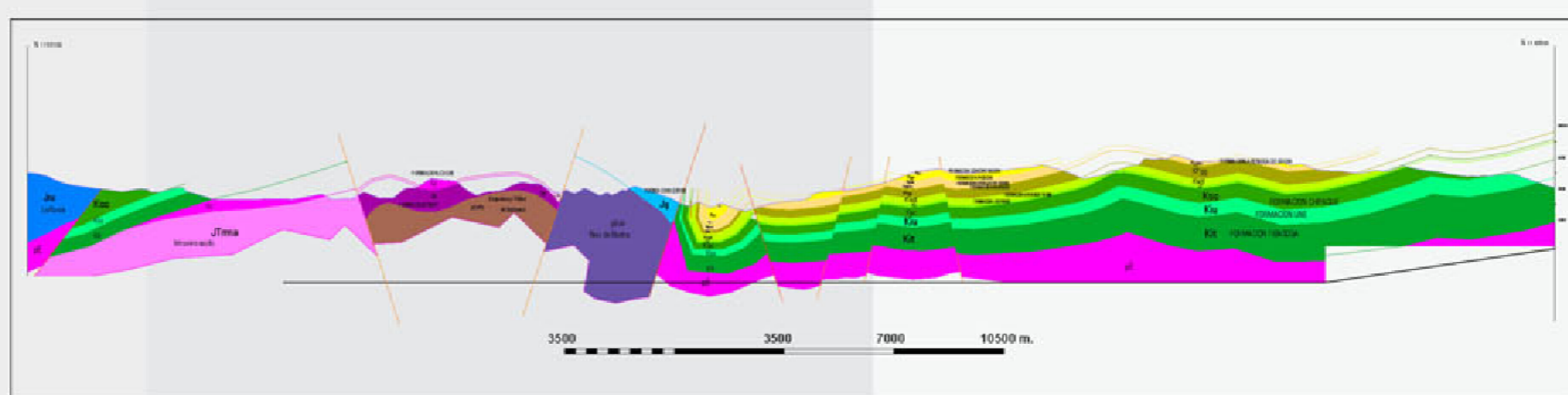


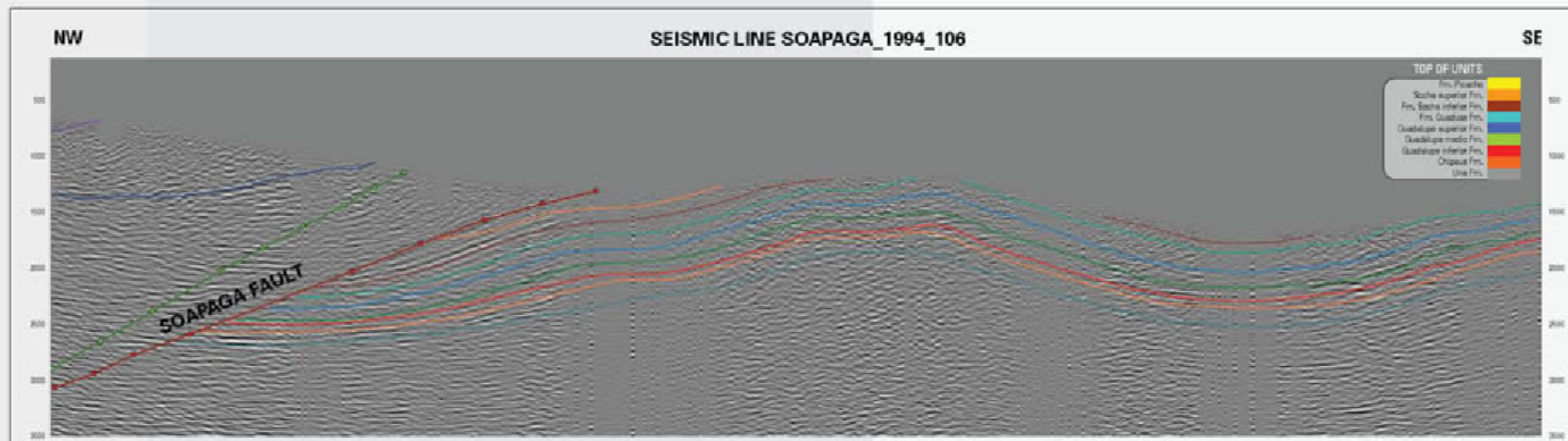
## Stratigraphy and petroleum system



## Geological cross section

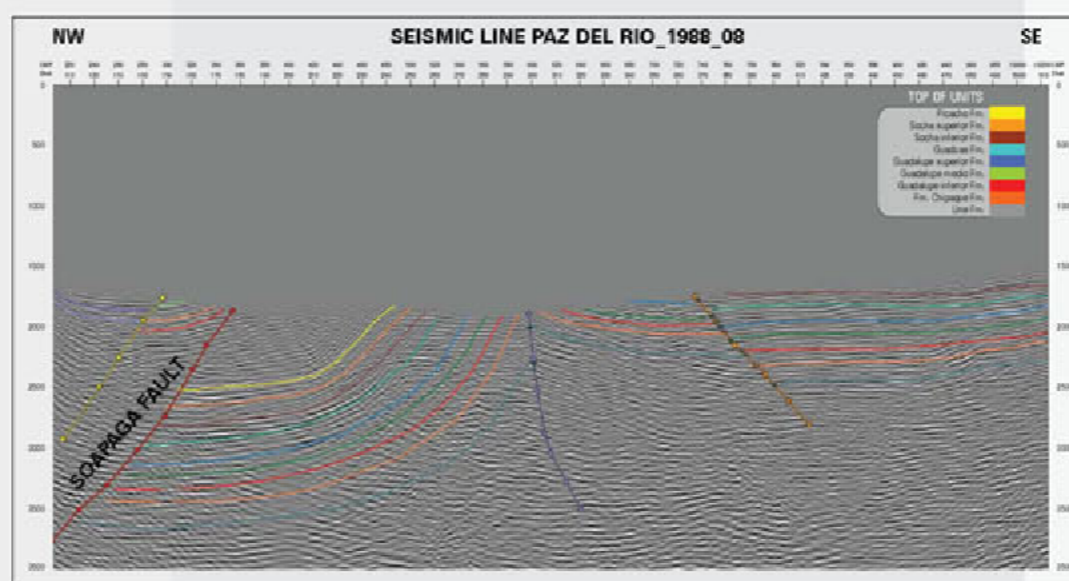


## Types of plays

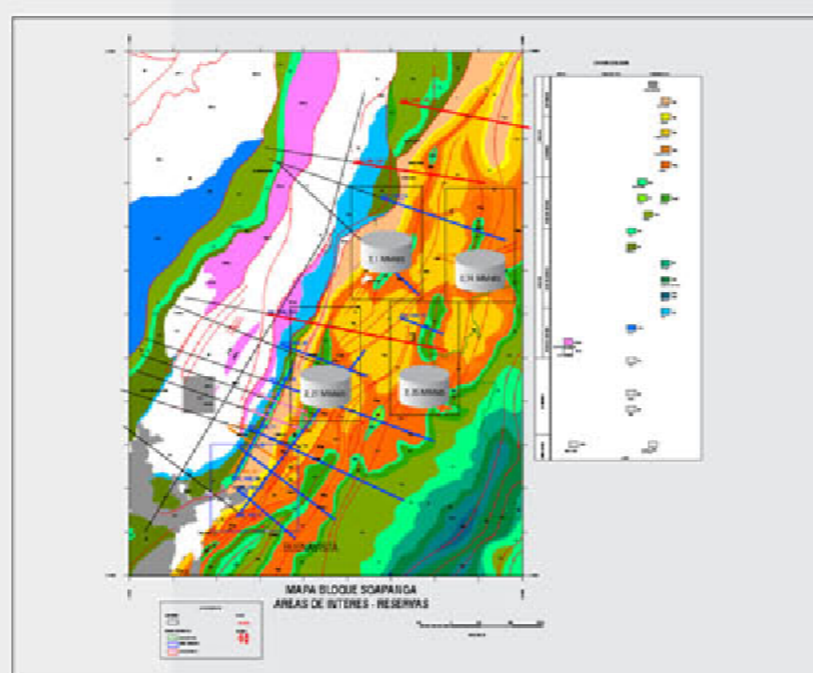


### TYPES OF PLAYS IN THE BASIN

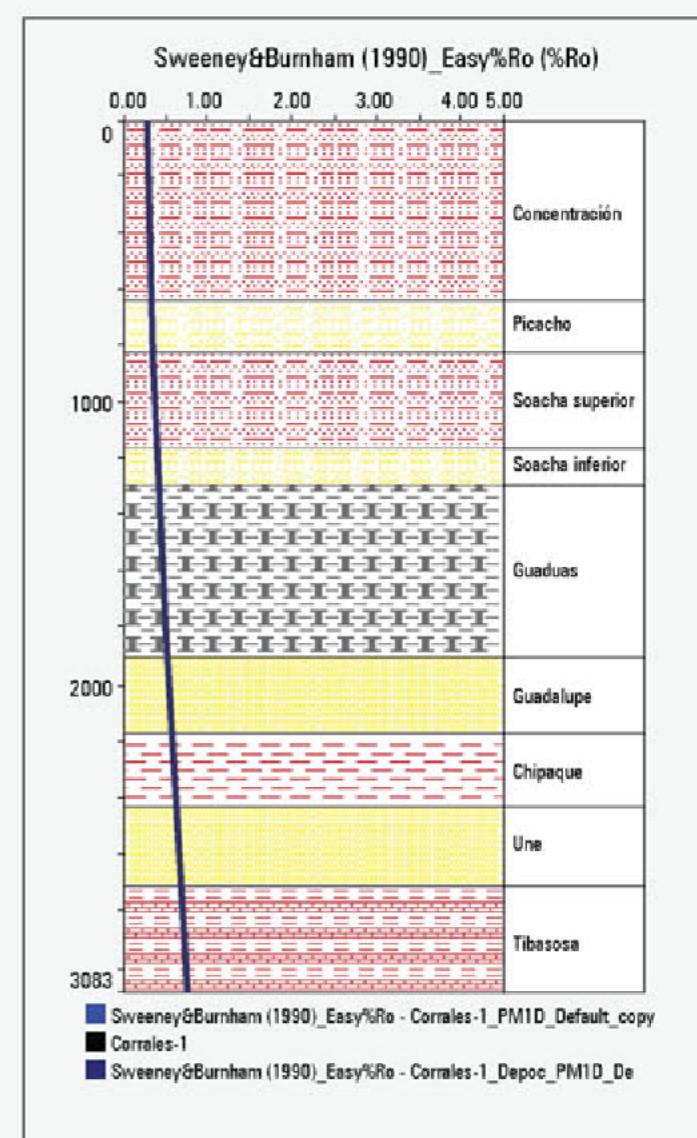
Two types of plays are identified in the area:  
**Sub-thrust related to the Soapaga Fault:** Includes the overturned flank of the southern sector of the Soapaga Fault, where oil seeps are found in fractured sandstones. However, it is necessary to verify the presence of seal rocks.  
**Structural traps related to folds in the footwall of the Soapaga Fault:** they are conformed by steep folds probably involving the basement. With this configuration, they could present areas of highly fractured hinges. The main stratigraphic objective is the sandstone-bearing Uña Formation, located approximately 1800 m below the surface. Other folds in the area involve minor amplitude and length an exhibit less steeper flanks.



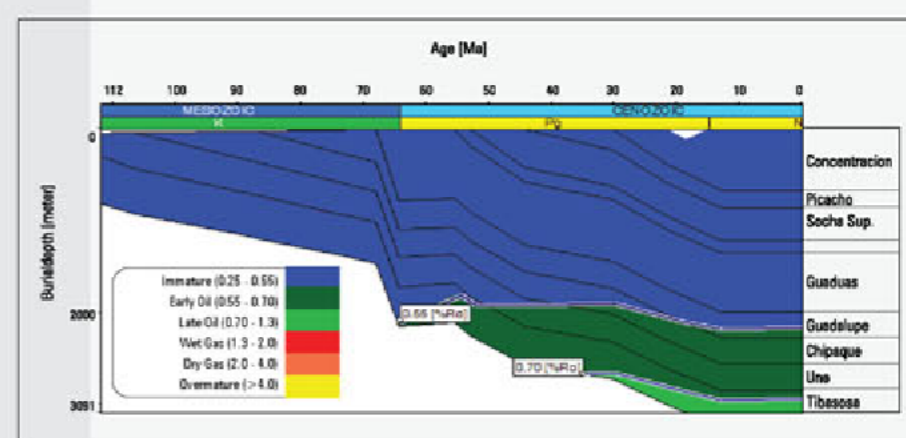
## Prospective areas-reserves



## Maturity model (%Ro) Corrales-1 well



## Burial depth model (Corrales-1 well)



## PETROLEUM GEOLOGY

### KEROGEN TYPE AND HYDROCARBON ACCUMULATIONS

There are multiple oil seeps, in Paleogene and Cretaceous units of the Soapaga Block, which indicates the presence of an active petroleum system. Geochemical data obtained in the Bolívar-1 and Corrales-1 wells and in outcrop samples show the presence of humic-terrestrial Type III kerogen for the Paleogene (Concentración, Socha Superior and Guaduas formations), and Type II kerogen of marine origin, for the cretaceous shales of the Chipaque, Uña (middle part) and Tibasosa formations. In the well Bolívar-1 commercial production of hydrocarbons of low API gravity (18°) was found in the lower Guadalupe Formation.

### MATURITY OF SOURCE ROCKS

The data obtained in wells and outcrops show that the maturity increases with the age of the units. The geochemical models indicate that the rocks enter into the oil generation window at

depths close to 6,500 feet. With the available data there is no evidence of organic matter over-maturation; however, the existence of low API gravity (< 20°) oil, such as the oil found in the Bolívar-1 well, suggest that the hydrocarbon could have been generated in an early maturity stage of the source rock, or also biodegraded in the reservoir with a relatively high maturity condition.

### PETROLEUM SYSTEMS

The cretaceous rocks present favorable lithologies and structures for the generation and accumulation of hydrocarbons. The reservoir units are composed by deltaic and coastal sandstones of the Guadalupe and Uña formations. The rocks with seal potential correspond to marine and coastal shales of the Guaduas, Guadalupe (middle part), Chipaque and Uña formations. These shales are interbedded with the reservoir sandstones.

The potential source rocks correspond to the marine shales of the Guadalupe (middle part), Chipaque, Uña and Tibasosa formations. The geochemical data suggest that the shales of the Chipaque and Uña Formations are in the early generation window of hydrocarbons (%Ro 0.55-0.7)

and the shales of the Tibasosa Formation in the mature generation window (%Ro 0.7-1.3) in the deepest parts of the studied area. Additionally, the crude oil and rock geochemical data obtained in well Bolívar-1, suggest the existence of a petroleum system formed by the Chipaque Formation as source rock and the Guadalupe Formation as reservoir. There is also the possibility of an additional petroleum system in Lower Cretaceous including the Tibasosa and Uña formations.

In the Paleogene sequence the reservoirs correspond to fluvial sandstones interbedded with mudstones (Picacho and Socha Inferior formations) The Paleogene mudstones of the Concentración and Socha Superior formations are potential seals in the area.

### ESTIMATED RESERVES

As a result of the prospectivity study, a volume of 17.4 Mmstb was estimated in the Soapaga Block, distributed in 4 main areas.