

Once Upon a Time... In the Colombian Foothills: Discovery of the Cusiana and Cupiagua Fields*

Bernard C. Duval¹

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¹IFP School, Rueil-Malmaison, France (bernard.duval@ifpen.fr)

Abstract

This case history from Colombia shows that frontier plays can also sit on your doorstep, in a province with a well-established geological framework and in spite of 17 previous unsuccessful wells. The point of departure was a farm-out opportunity on a block located on the easternmost margin of the Cordillera Oriental. A critical analysis of the petroleum system and the technical and business conditions can be summarized as follows. The negatives: Low porosity of the reservoirs, recent Andean trap-creating tectonics (5 Ma) with a chance to postdate the main charging events, difficult costly drilling (depth > 4,000 m). The positives: Presence of a Cretaceous source rock, stratigraphically equivalent to the world-class La Luna of the Maracaibo Basin, oil and gas shows encountered in past wells, an undisputable sizable 4-way closure. At the end it was decided to give a chance to the half-full glass rather than half-empty option and make a deal (Total and BP as farm-in partners and Triton the rights owner). The result was the amazing discovery of Cusiana, a giant accumulation with a 500 m column of hydrocarbons. A second structural feature was successfully drilled, giving birth to Cupiagua, another giant field. These two discoveries contained in excess of 1,400 MMB, with a production plateau of 500,000 bo/d.

Some important keys for success and messages for risk management can be derived from this case: The need for an optimistic and perseverant attitude, unforgiving risk analysis, positive view of past failures, genuine confidence between explorers and decision-makers, and reaching a consensus to invest huge amounts of money on such high risk projects.

References Cited

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- Cooper, M.A., F.T. Addison, R. Alvarez, M. Coral, R.H. Graham, A.B. Hayward, S. Howe, J. Martinez, J. Naar, R. Penas, A.J. Pulham, A. Taborda, 1995, Basin Development and Tectonic History of the Llanos Basin, Eastern Cordillera, and Middle Magdalena Valley, Colombia: AAPG Bltn., v. 79/10, p. 1421-1442.

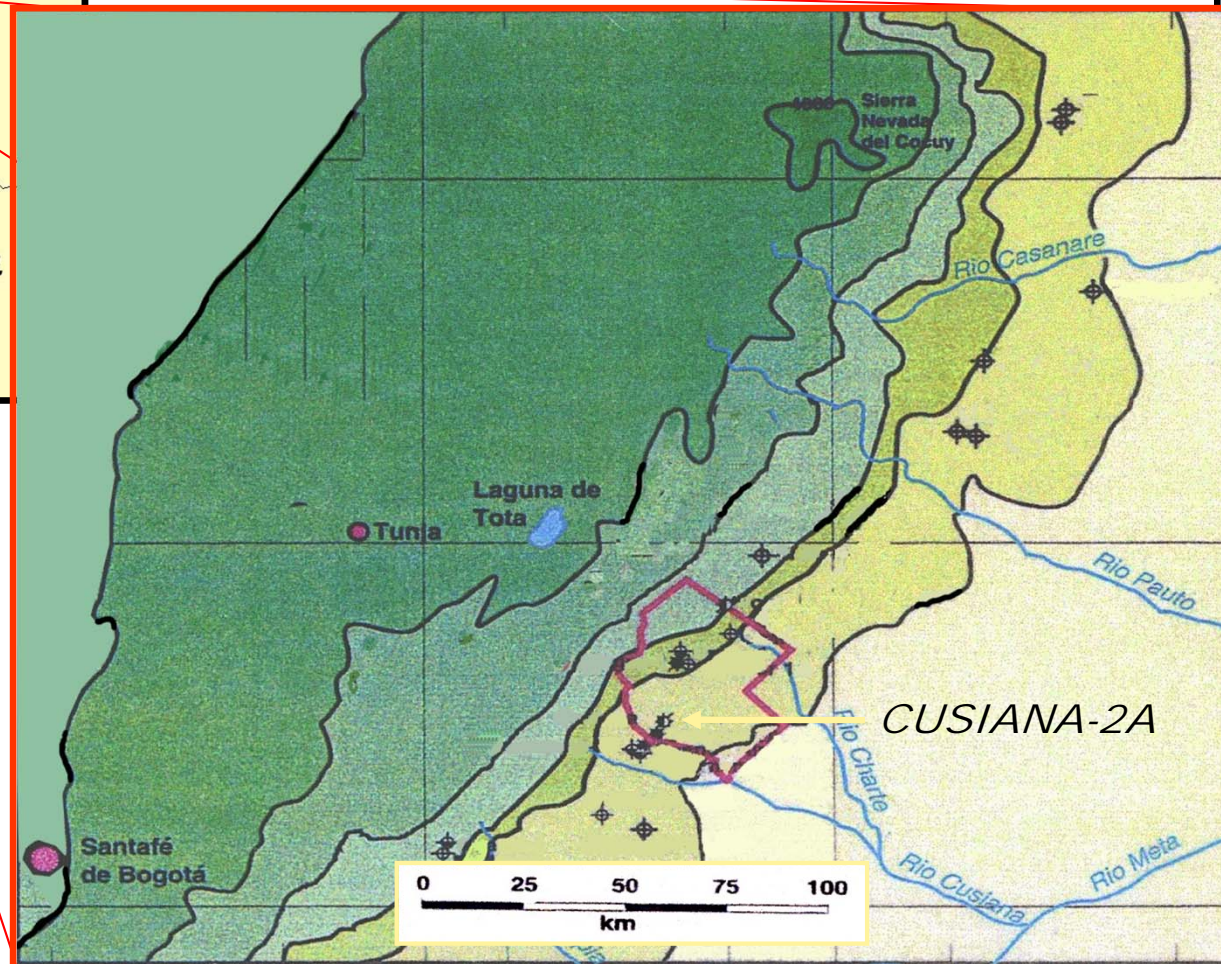
Once Upon a Time... In the Colombian Foothills

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Eastern Cordillera Foothill Play. Pre-Cusiana Exploration



Analysis of Past Programs

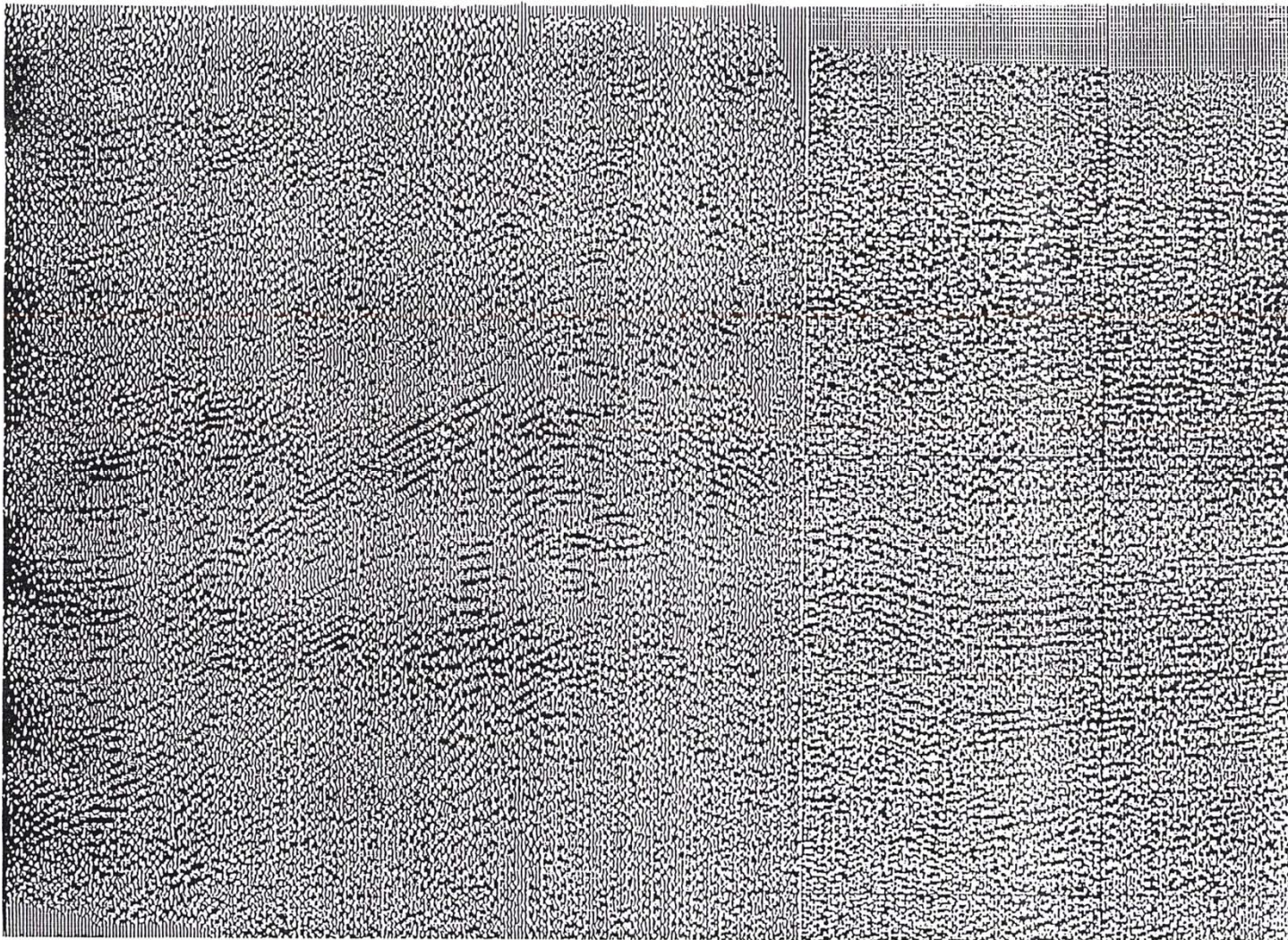
- 17 wells drilled by 13 companies (Conoco, Exxon, BP, Chevron, Ecopetrol...)
- A limited number of wells could reach the objective : depth (> 4000m), difficult drilling...
- Wells located with (very) poor quality seismic
- Those wells that did get down to the reservoir have all found some oil & gas shows, but no commercial production

Colombia: "Old" Seismic Line in the Foothills Area...

Can you see something?

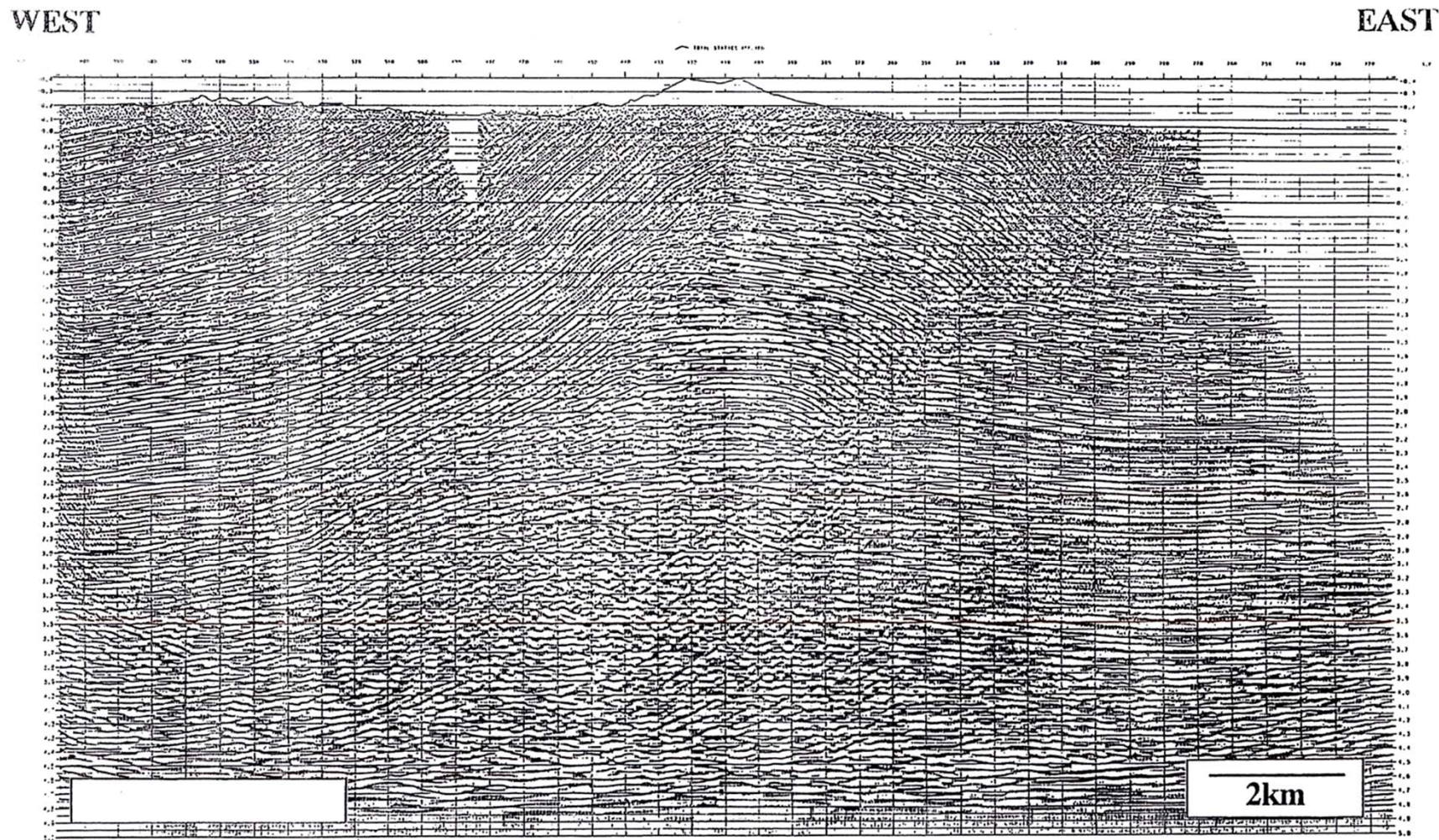
W

E



Colombia: "New" Seismic Line in the Cusiana Area

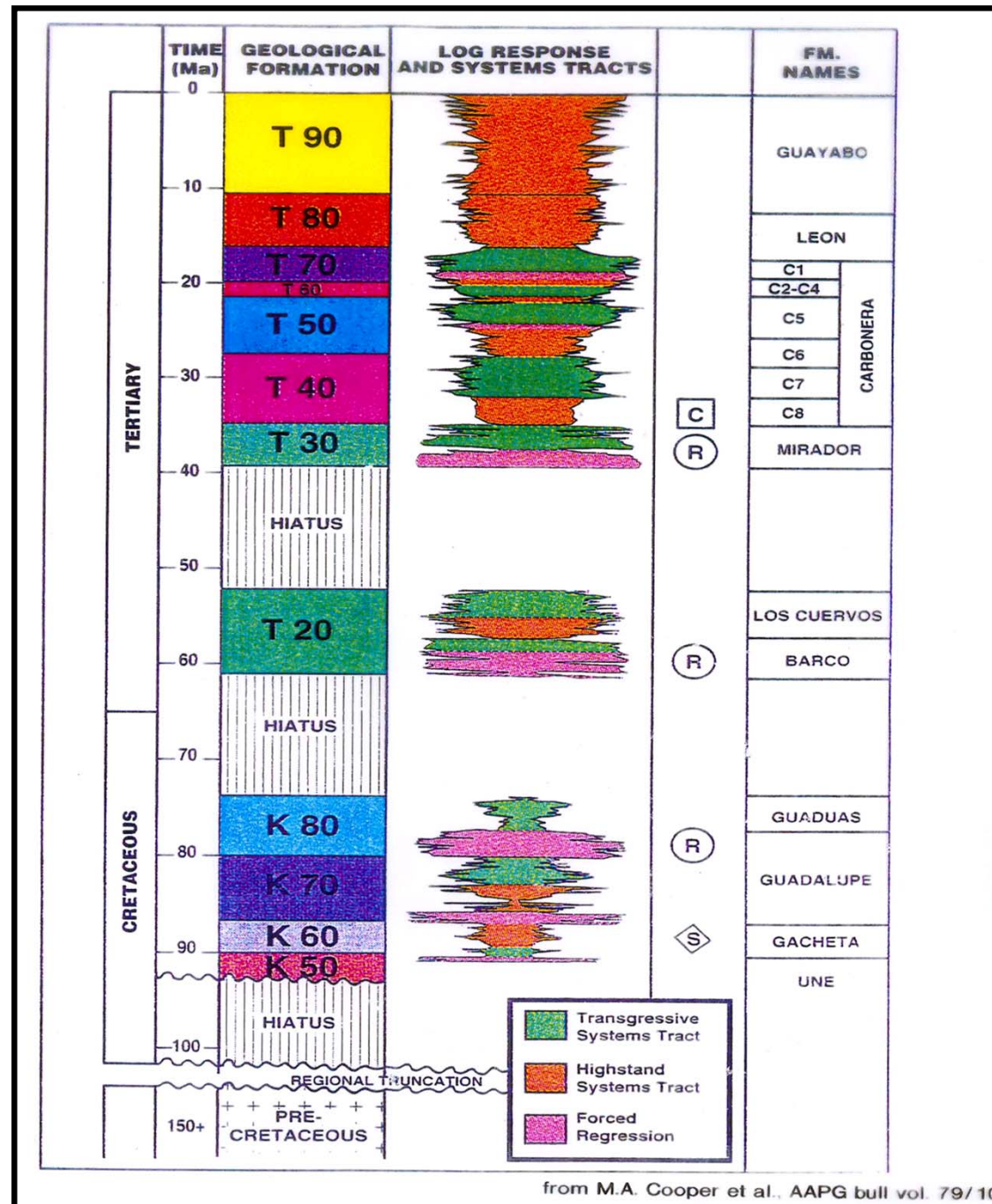
A much improved structural image



Analysis of Past Programs

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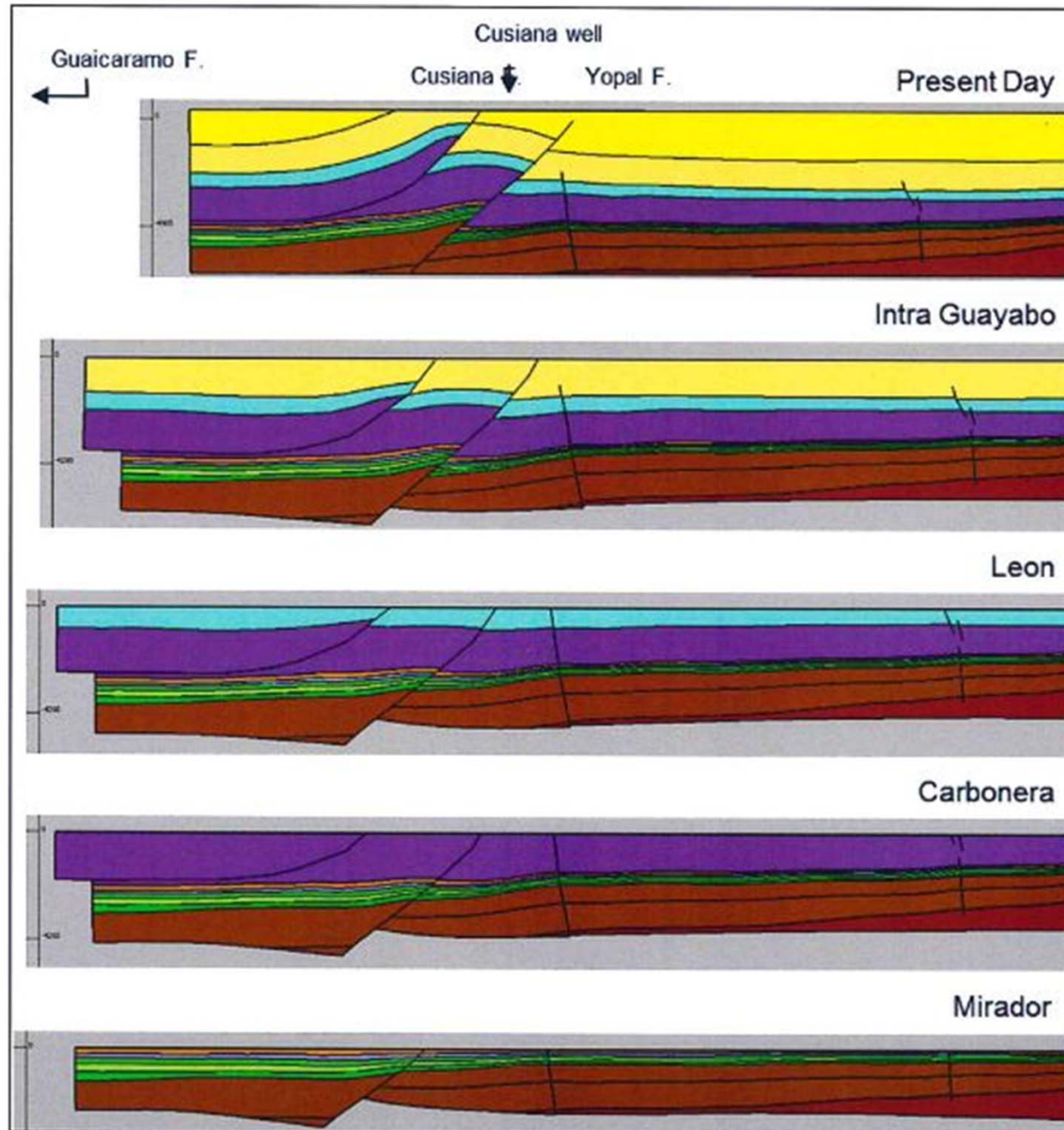
Cusiana Area Stratigraphy



Outcropping La Luna



« Late » Trap Formation



...continues until present

6MA

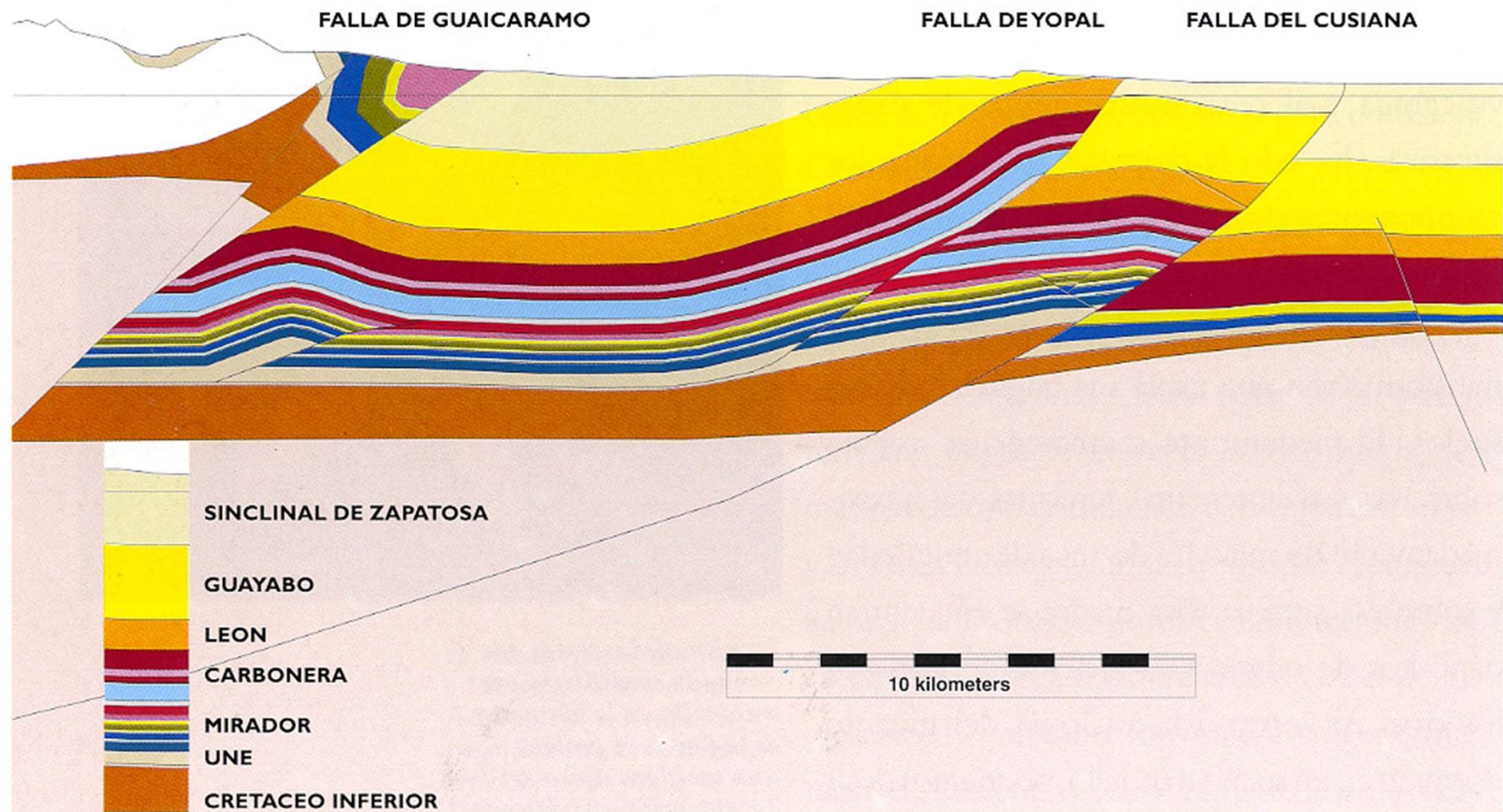
12MA

*generation-expulsion
starts here...*

20MA

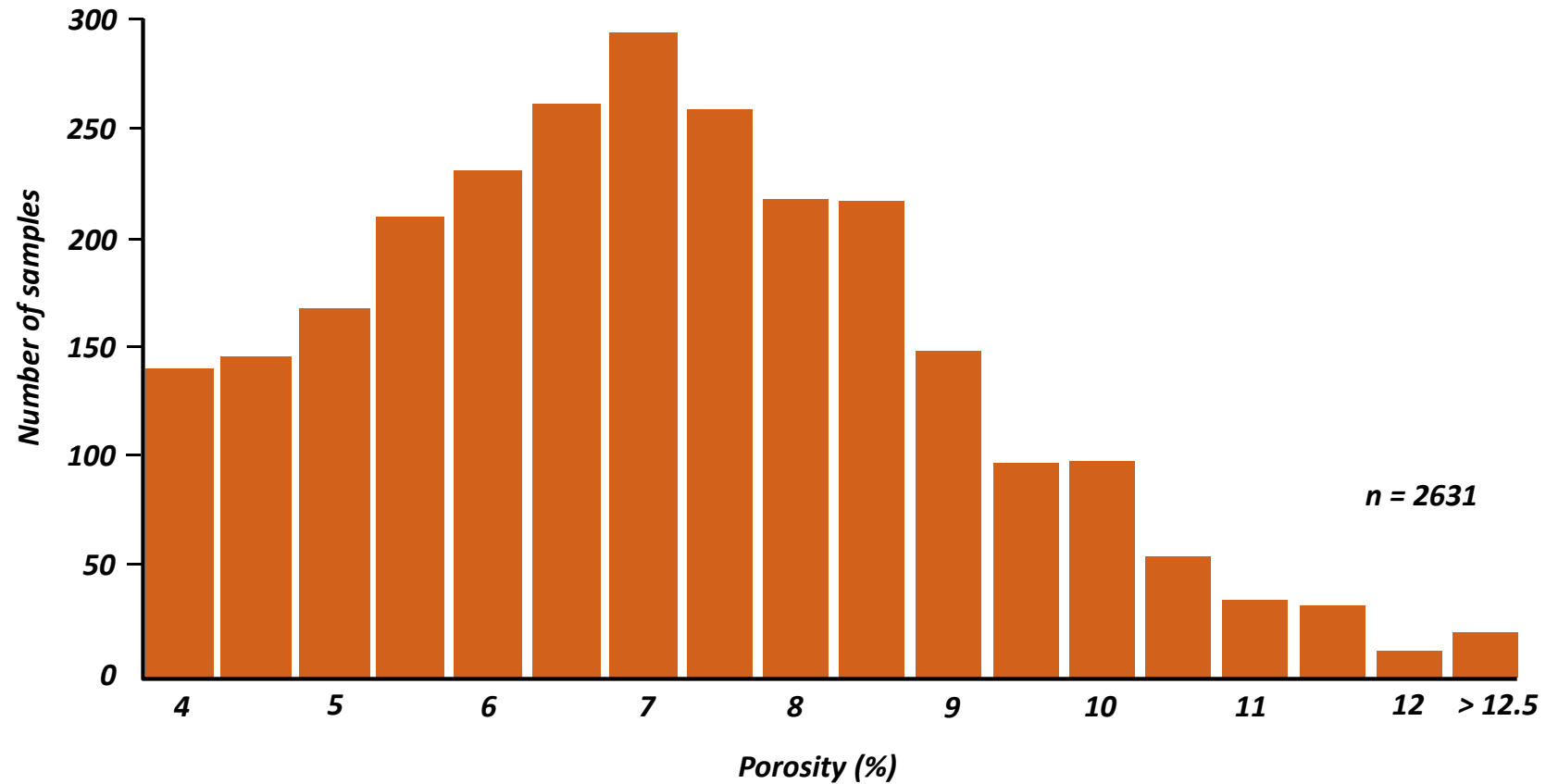
35MA

Cusiana Cross-Section



Porosity Measurements from Core Plugs (Mirador & Barco Sands)

Mirador / Barco Porosity Distribution



Eroded Anticline of the Foothills with Outcropping Mirador



Décision Criteria (1)

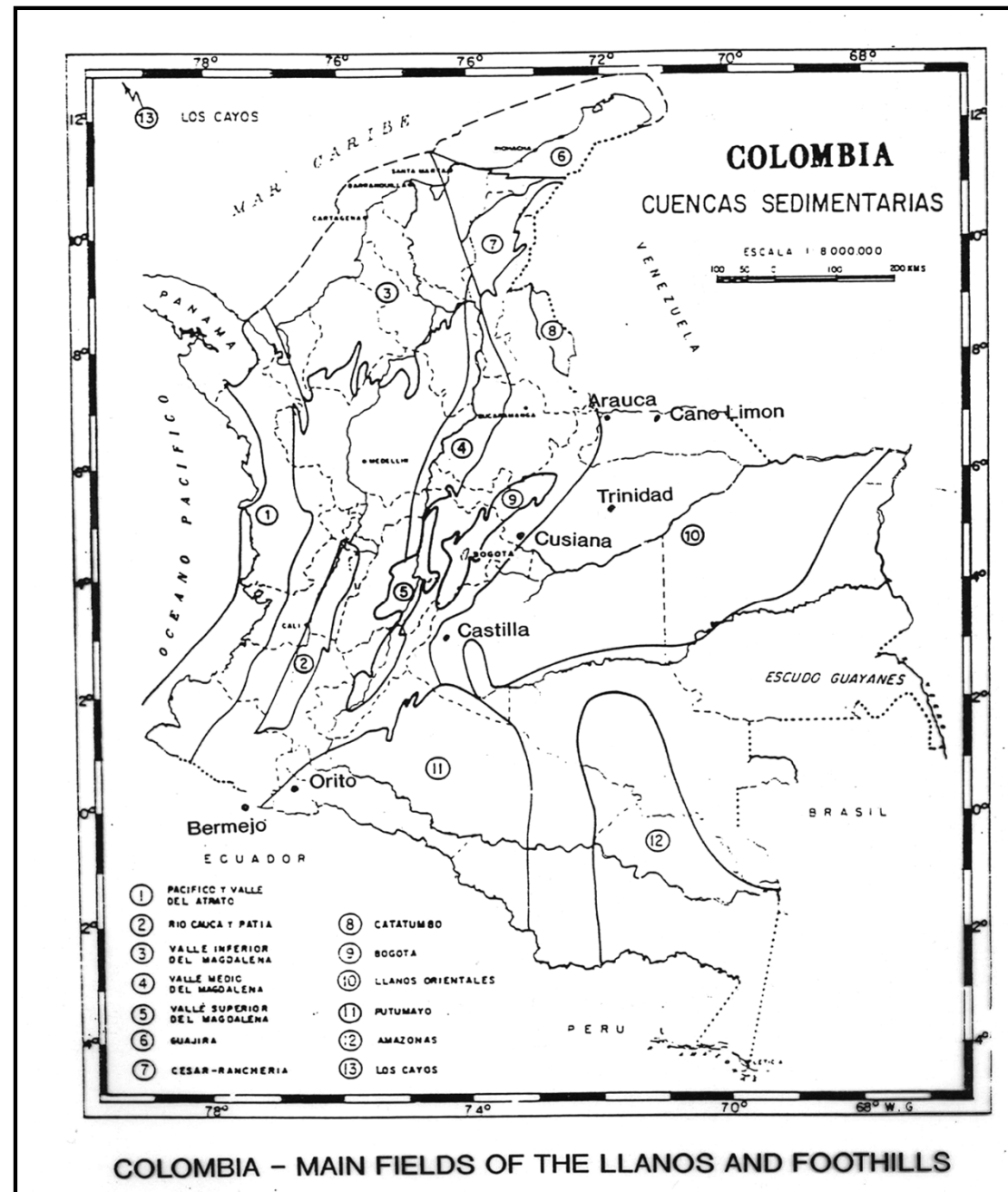
- **Pessimism (half empty glass)?**: shows present everywhere, hydrocarbons have gone through the system, but no HC concentration was possible because traps were absent at migration time?

Decision Criteria (2)

- **Pessimism (half empty glass?)** : shows present everywhere, hydrocarbons have gone through the system, but no HC concentration was possible because traps were absent at migration time?
- **Optimism (half full glass?)** : shows indicate a working petroleum system, and it only remains to find the right location (this anticline?)

Enlarging the Vision: a Regional Perspective

Here they are! !►►

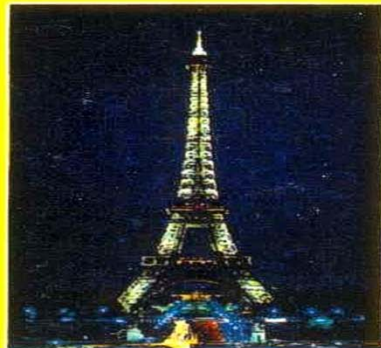


Décision Criteria (3). Technical Conclusion

- **Pessimism (half empty glass)?**: shows present everywhere, hydrocarbons have gone through the system, but no HC concentration was possible because traps were absent at migration time?
- **Optimism (half full glass)?**: shows indicate a working petroleum system, and it only remains to find the right location (this anticline)
- **The « silver bullet »**: 2 fields discovered over the Andean Foothills within the same tectonic context...600km away : the system worked somewhere in a similar context

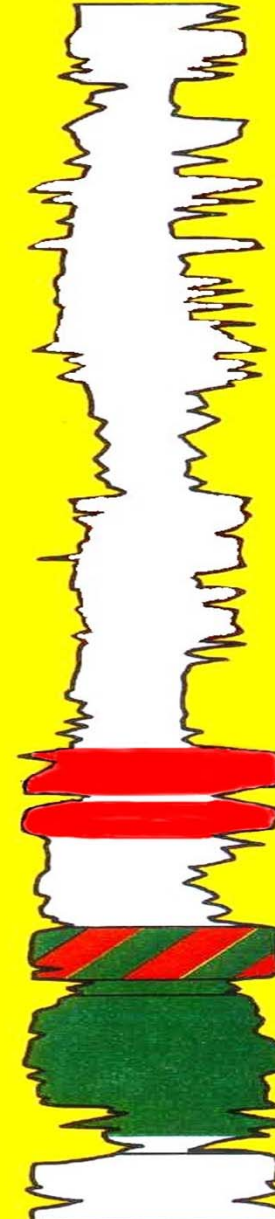
The Discovery

CUSIANA-2A

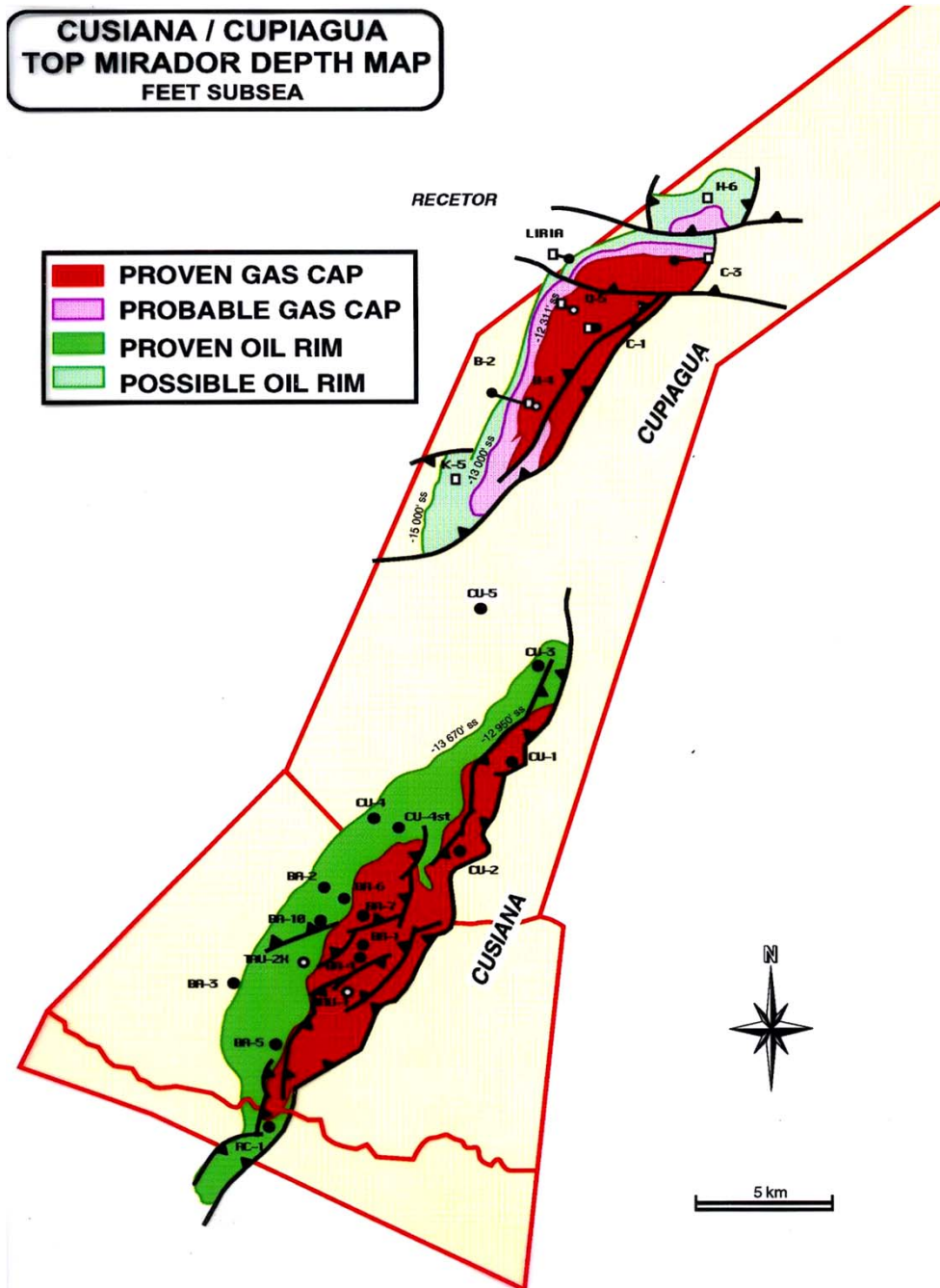


324 m

C A R B O N E R A	C 3
	C 5
	C 7
MIRADOR	
BARCO	
GUADALUPE	
GACHETA	



And a Surprising Twin Sister!!!



Cusiana-Cupiagua. The Plants



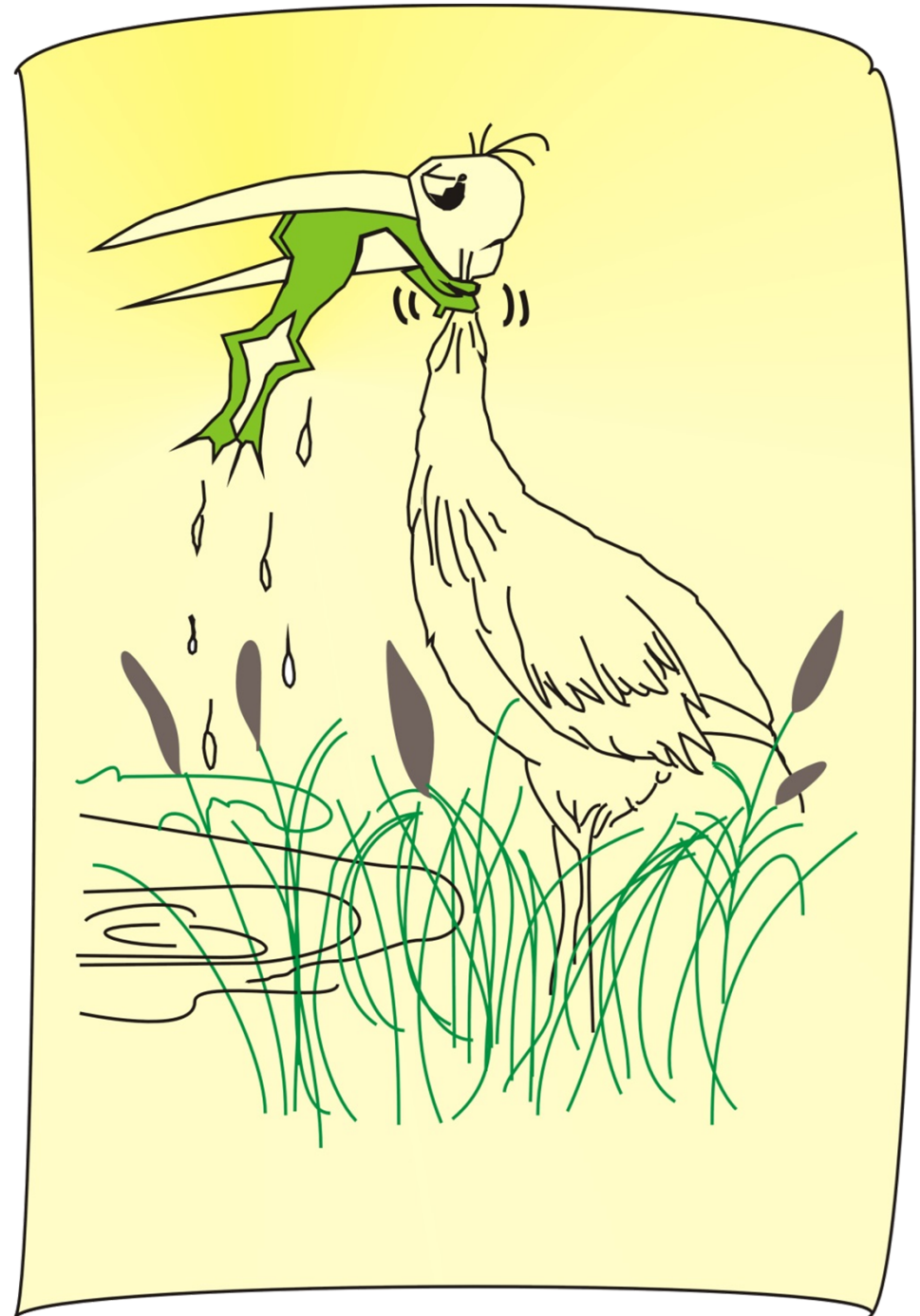
*Cusiana Field
Central Processing Facility
Design Capacity:
405 MBD & 1.5 BCFD*



*Cupiagua Field
Central Processing Facility
Design Capacity:
220 MBD & 1.3 BCFD*

A Final Word

***DON'T EVER
GIVE UP!***



Drilling Site in the Foothills

