



World Heavy Oil Congress 2009

HEAVY OIL IN COLOMBIA AND OTHER INVESTMENTS OPPORTUNITIES

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Advisor Technical Subdirection**

Isla Margarita –VENEZUELA- November the 5 th, 2009

- 1. Background**
- 2. Investment climate**
- 3. Heavy oil projects**
- 4. New opportunities: Open Round Colombia 2010**
- 5. Conclusions**

- 1. Background**
2. Investment climate
3. Heavy oil projects
4. Open Round Colombia 2010
5. Conclusions

The ANH is the administrator of the hydrocarbon resources of Colombia



Institution

Role



Ministry of Mines
and Energy

Energy policy-making



Administration of the
hydrocarbon resources



Operations along value chain

Colombia is located in a favorable tectonic framework



HC RESERVES

LAGO DE MARACAIBO

50,000 Km²
21,600 MM BBLs
10,000 MM BBLs pesados

BARINAS APURE

87,000 Km²
2,000 MM BBLs

FAJA DEL ORINOCO

55,000 km²
34,800 MM BBLs

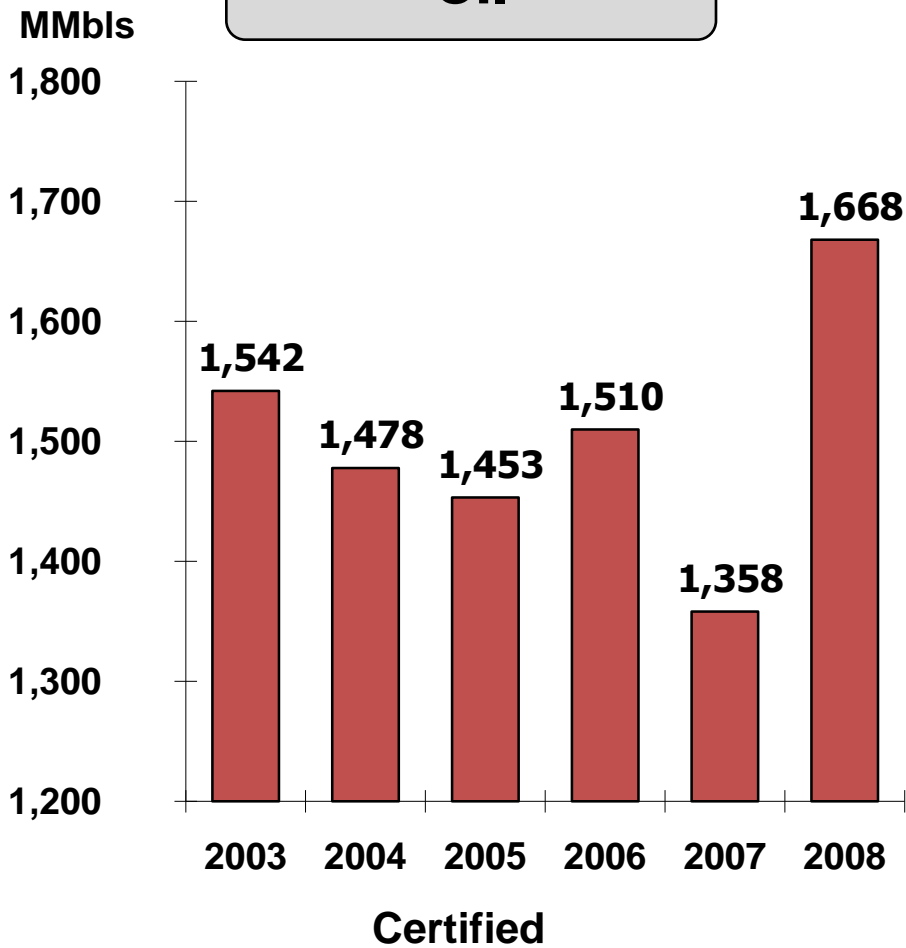
LLANOS ORIENTALES

220,000 Km²
4,000 MM BBLs

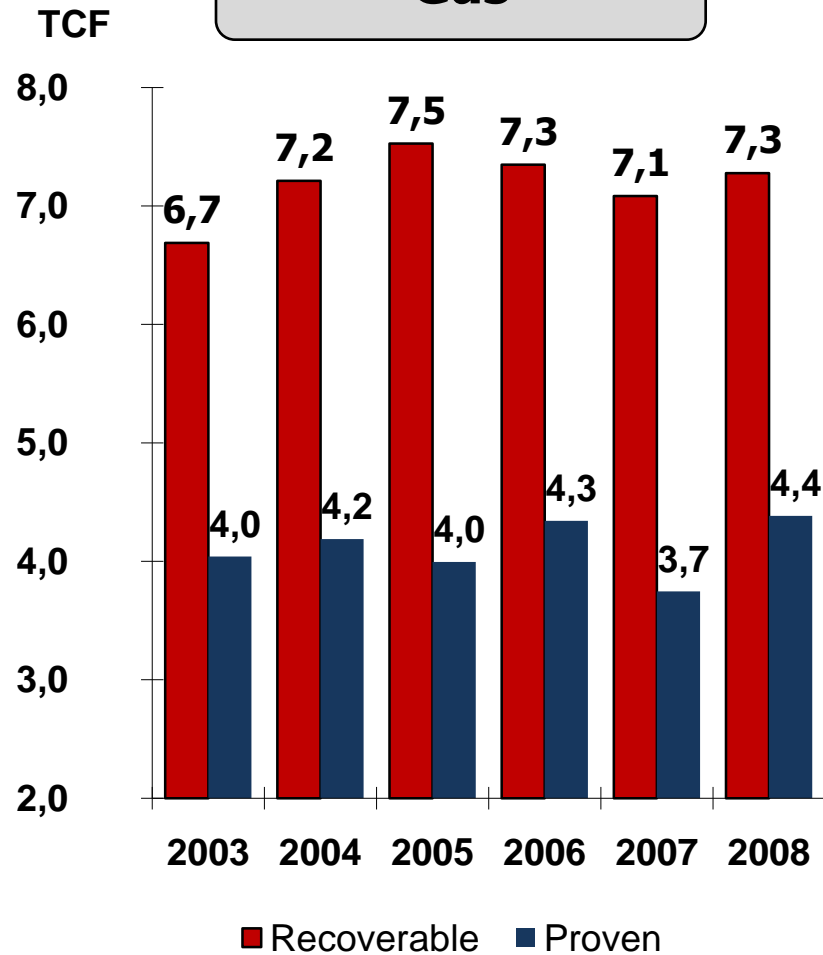
Fuente: Plan de Negocio 2004-2009 PDVSA.- Colombianet, Reseña historica de Ecopetrol

Reserves

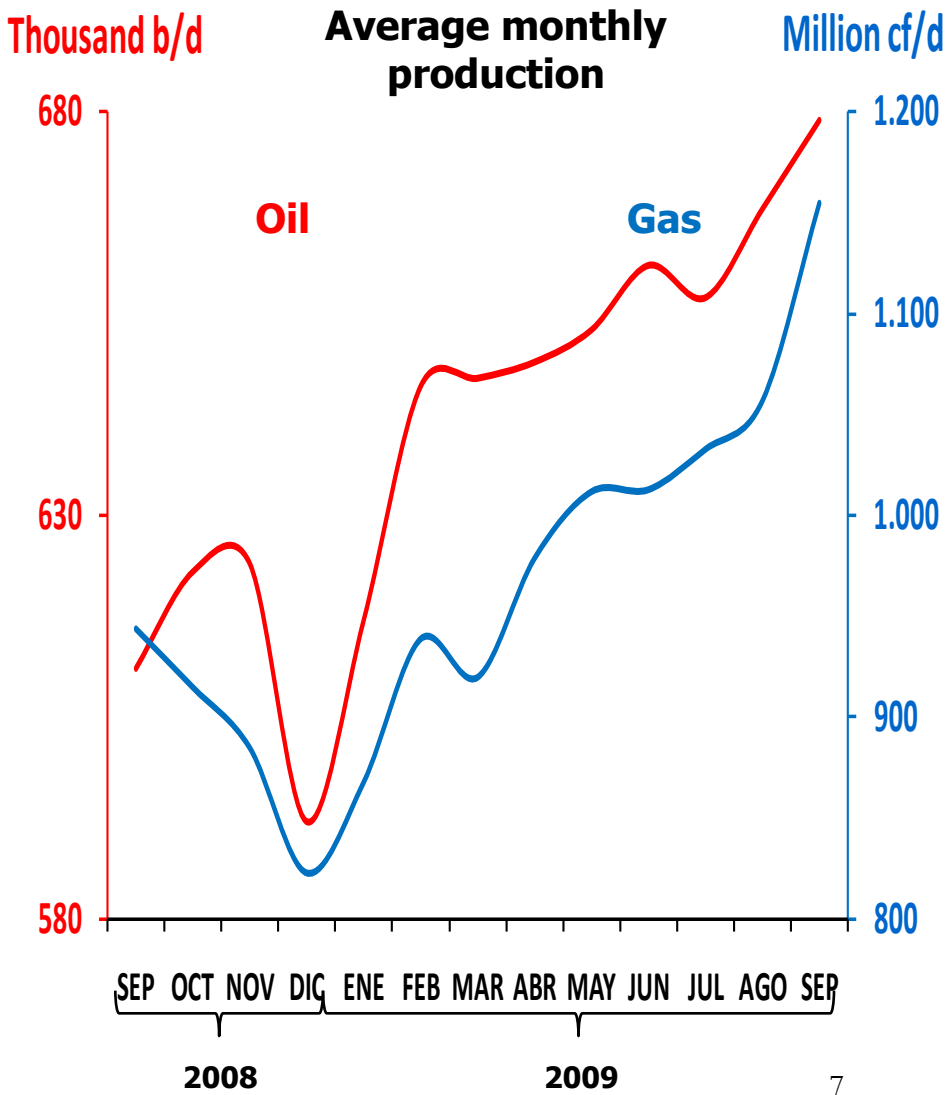
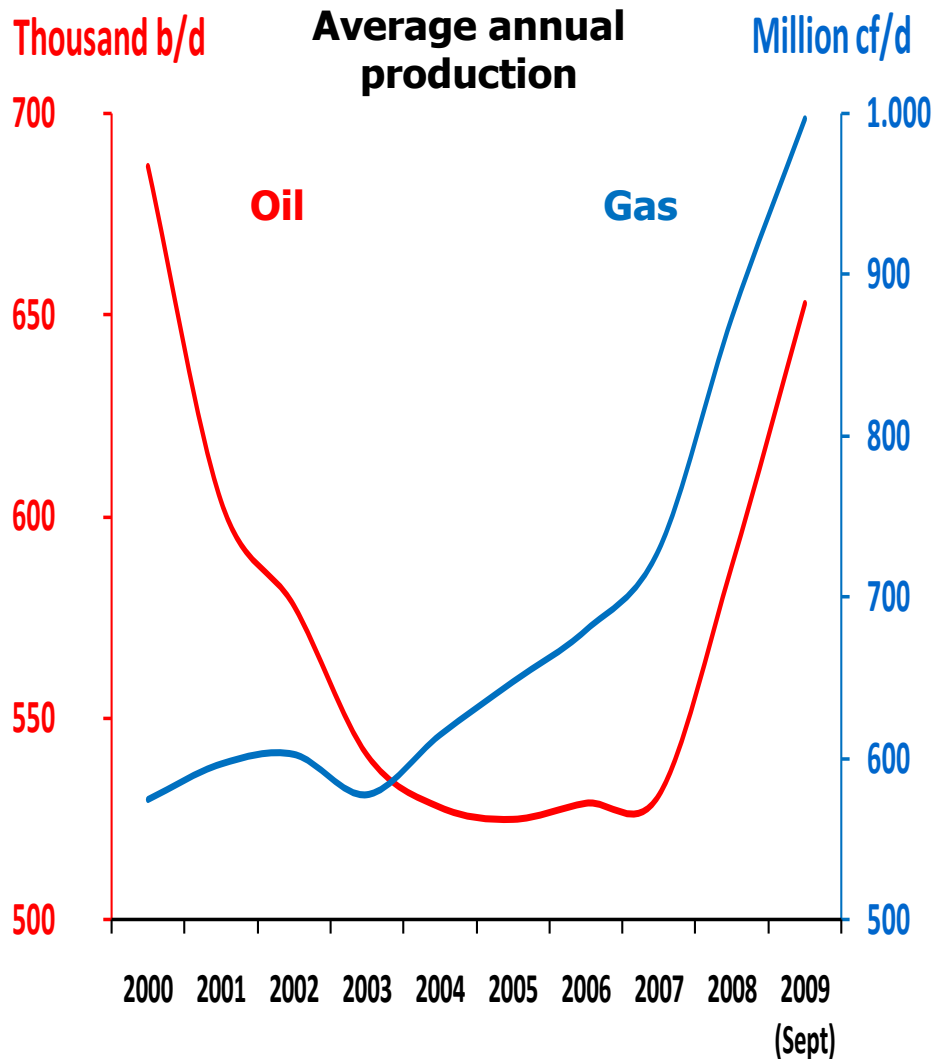
Oil



Gas



Growing production

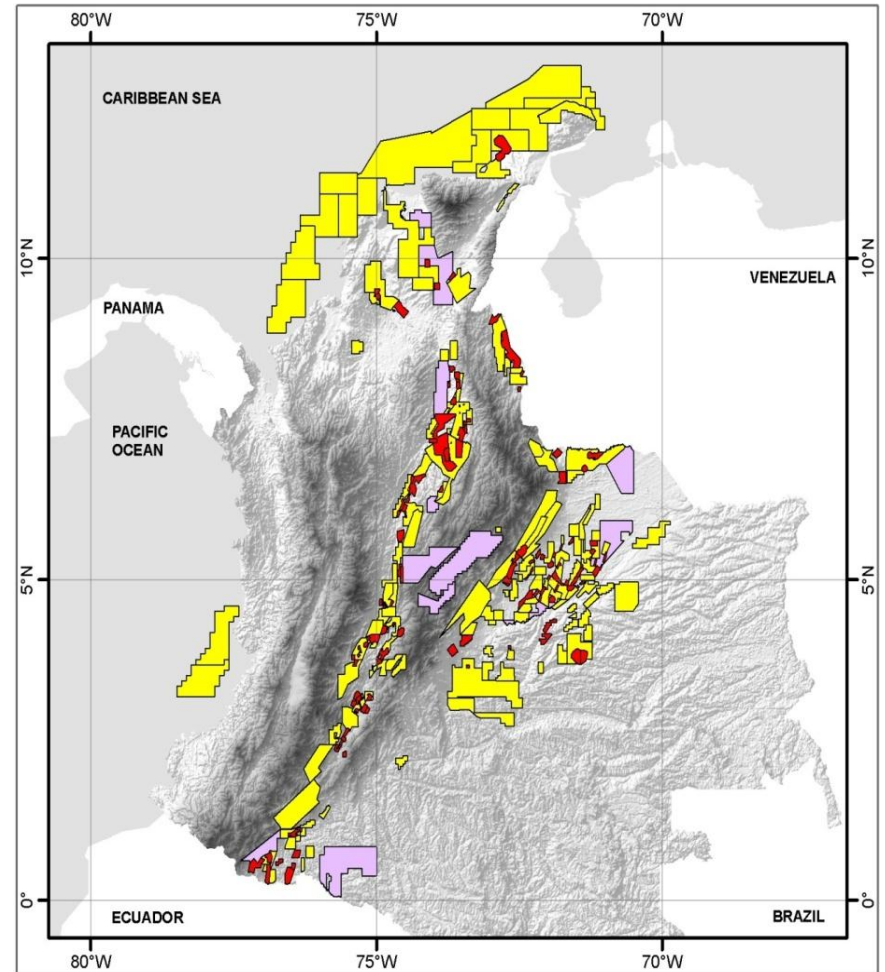
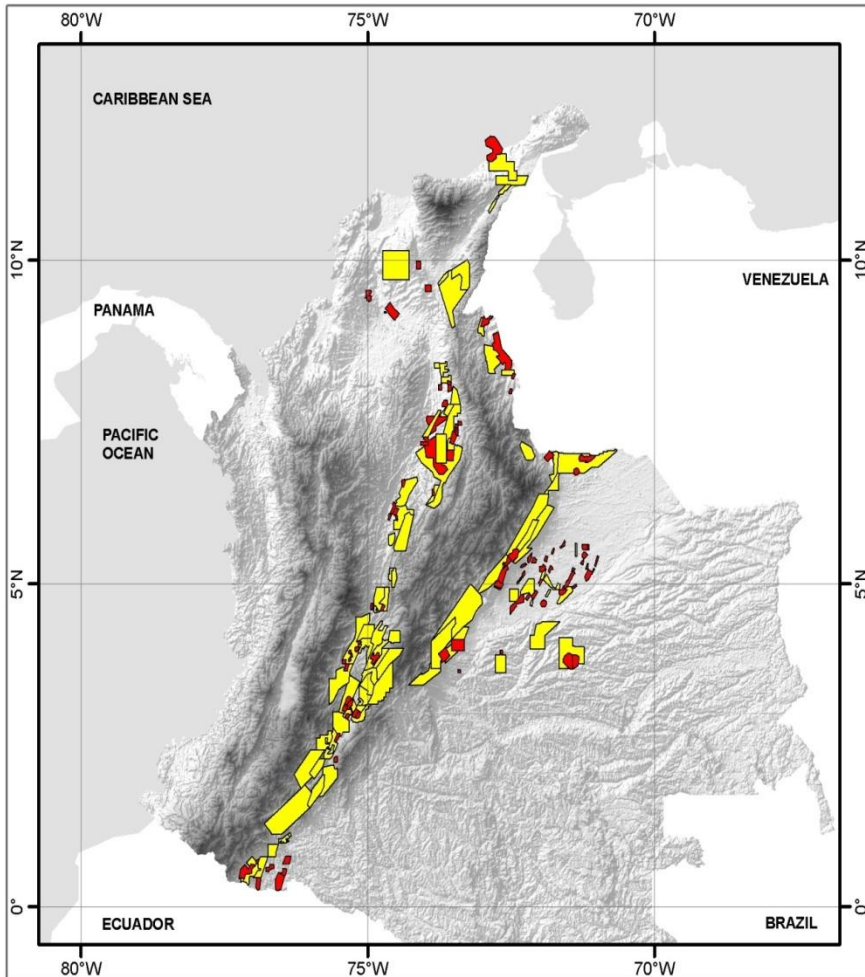


Exploration activity has increased considerably

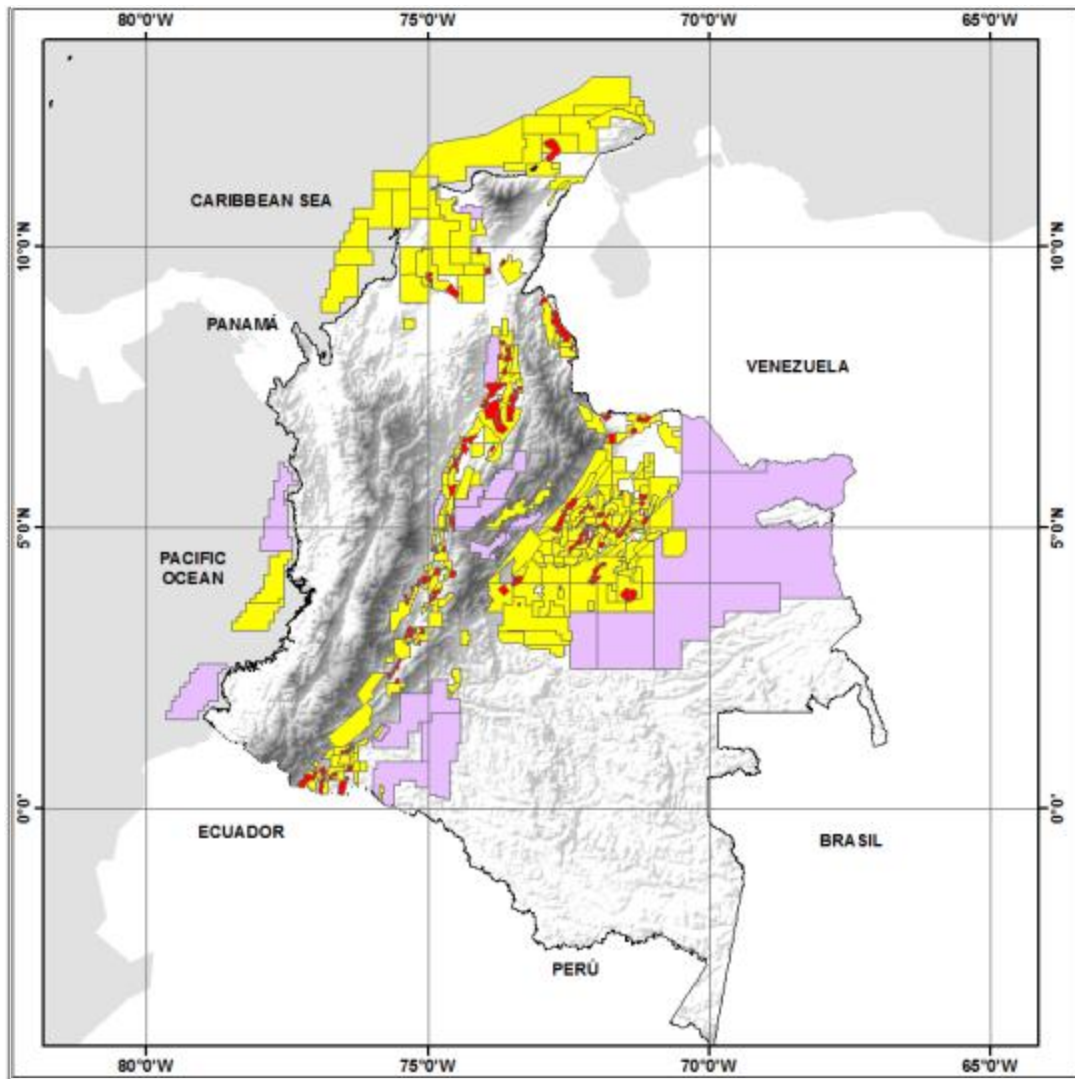
E&P Areas in 2003
12,5 millions Ha.



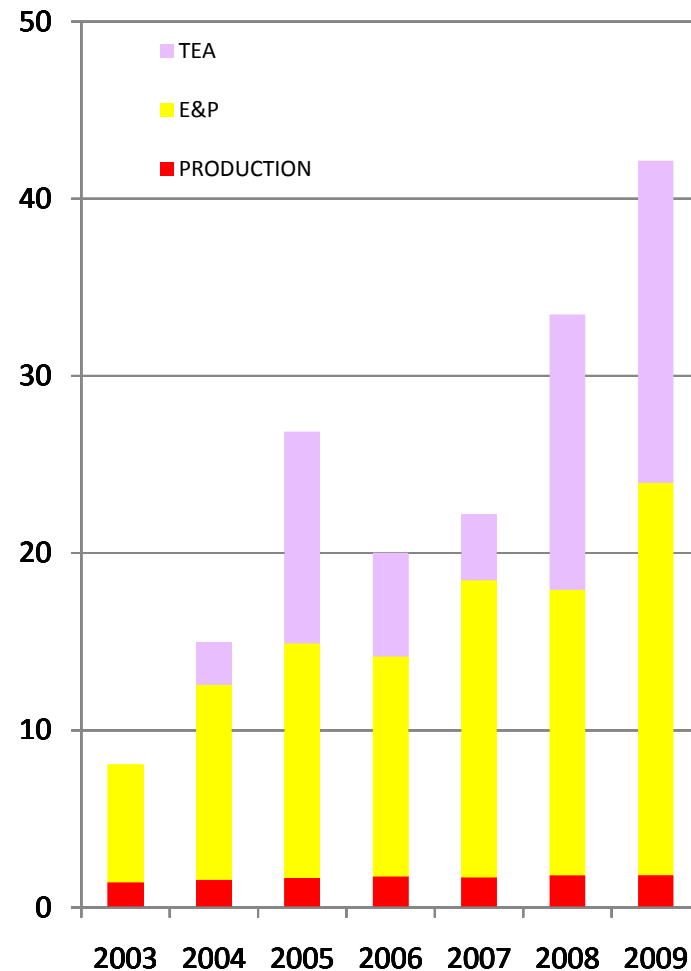
Land map - February 2008
21,5 millions Ha.



Evolution of our increasing activities

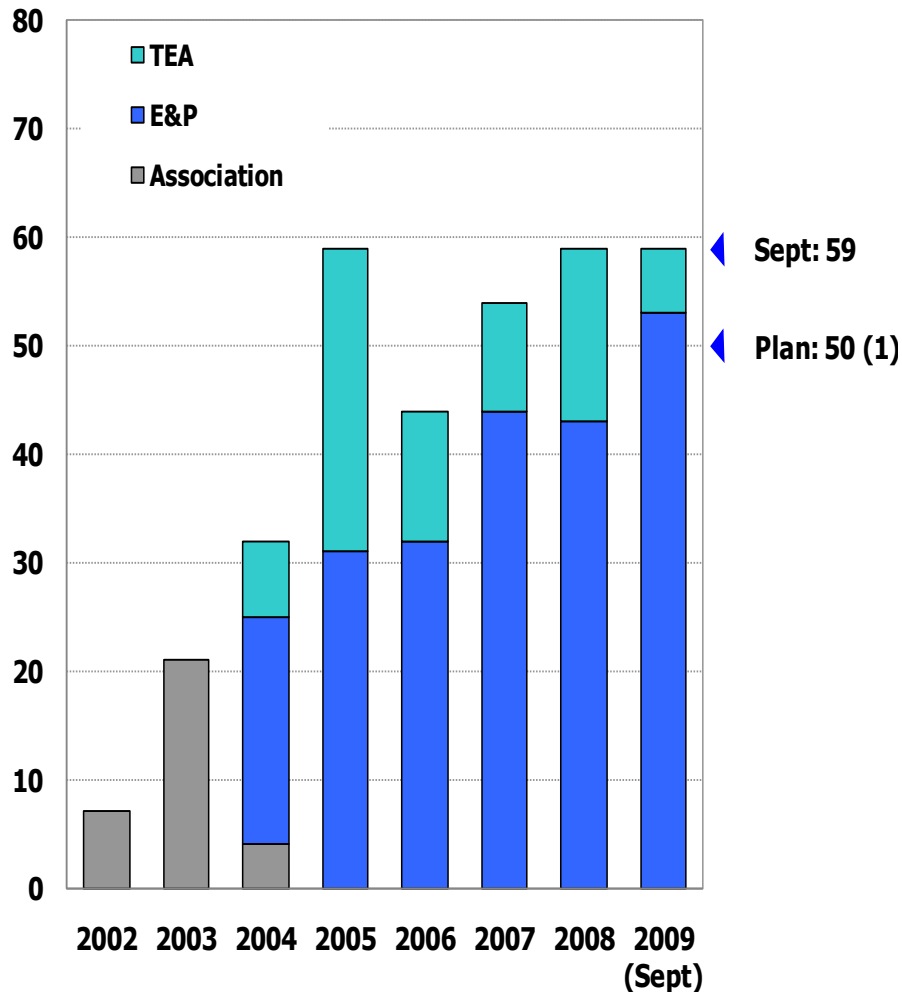


Million ha.



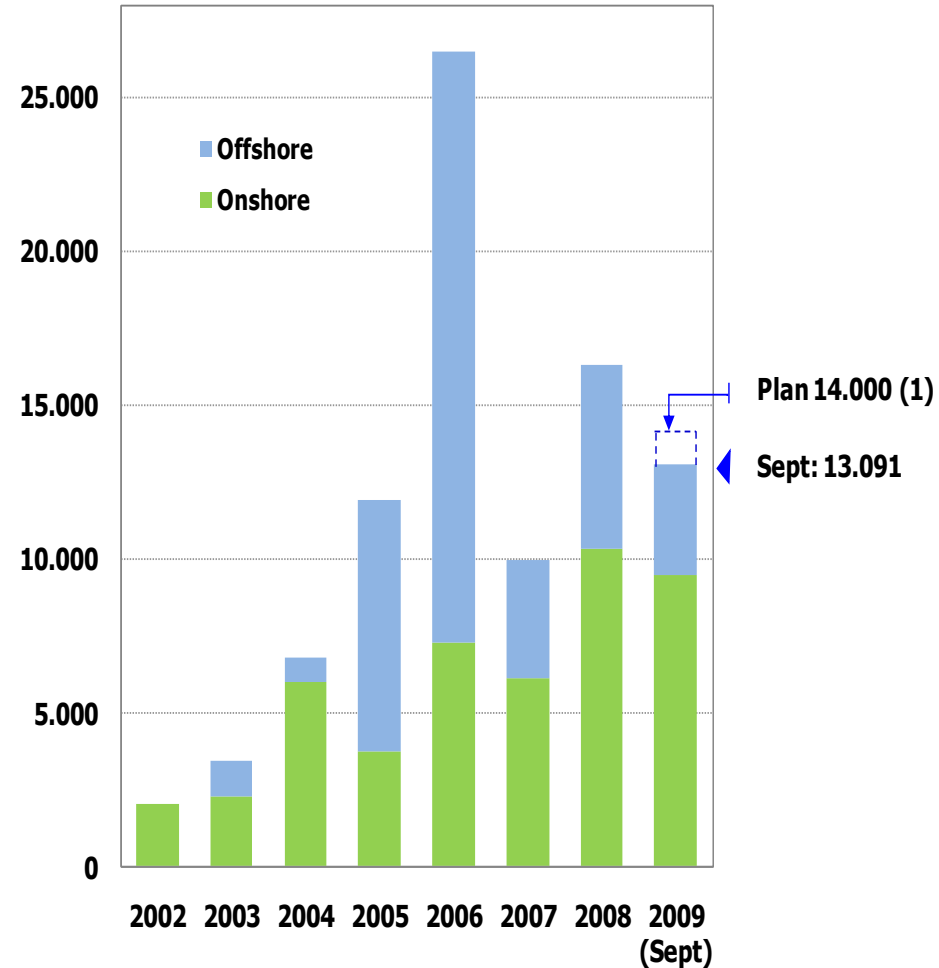
Licensing activity continues to increase and seismic data acquisition activity is high ...

No. contracts



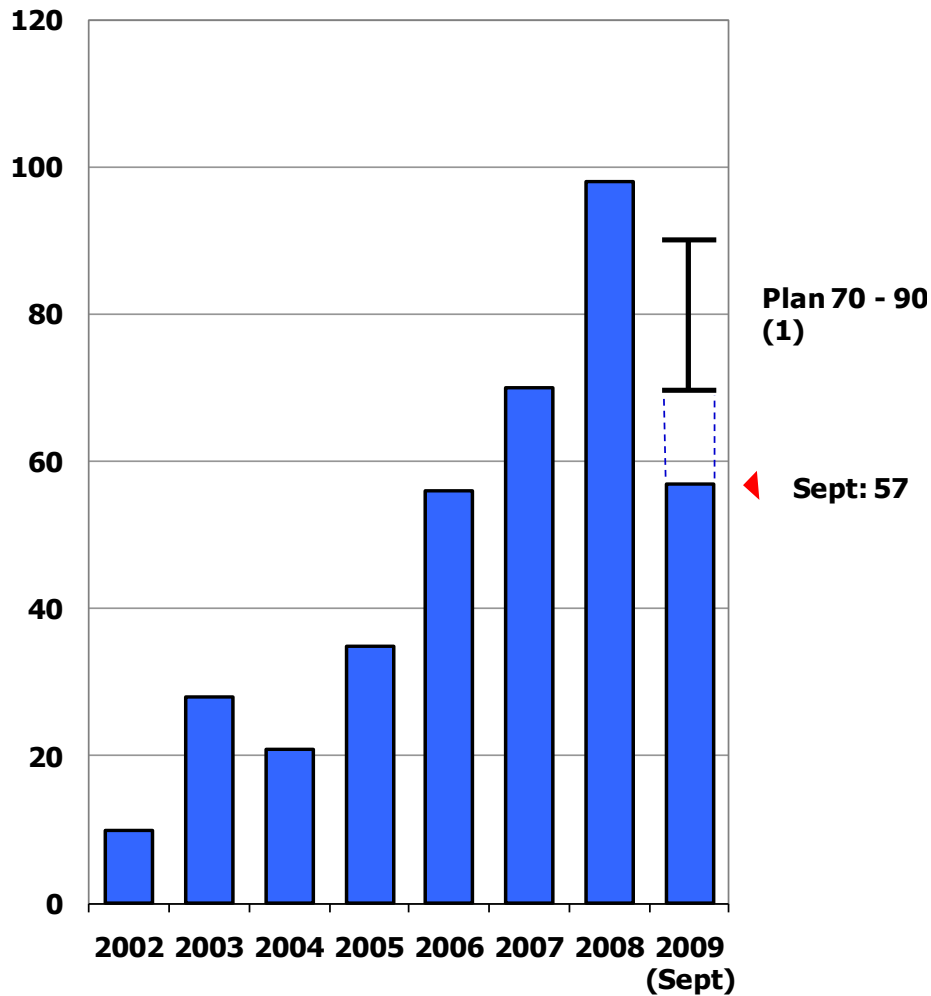
* TEA: Technical Evaluation Agreement

Seismic:
Km of 2D equivalent

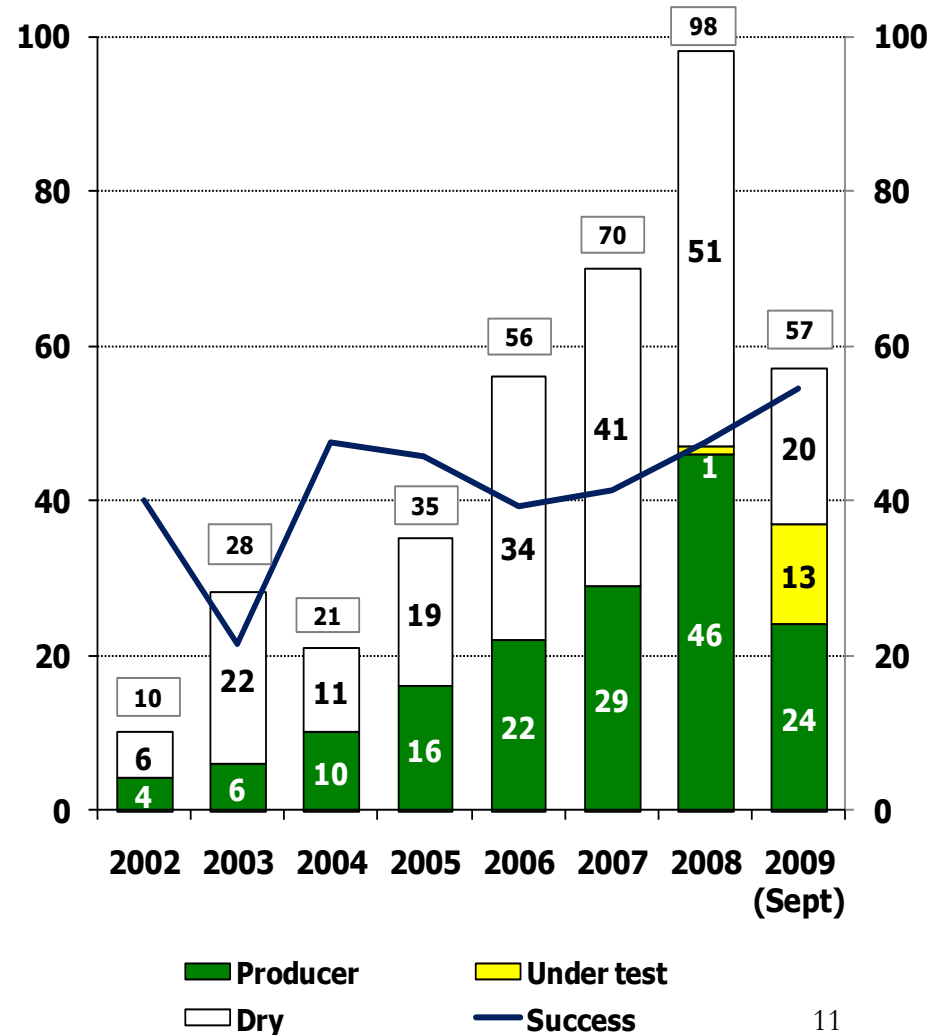


... highest number of exploratory wells and high success rates ...

No. of wildcats



No. of wildcats



Operator companies in Colombia

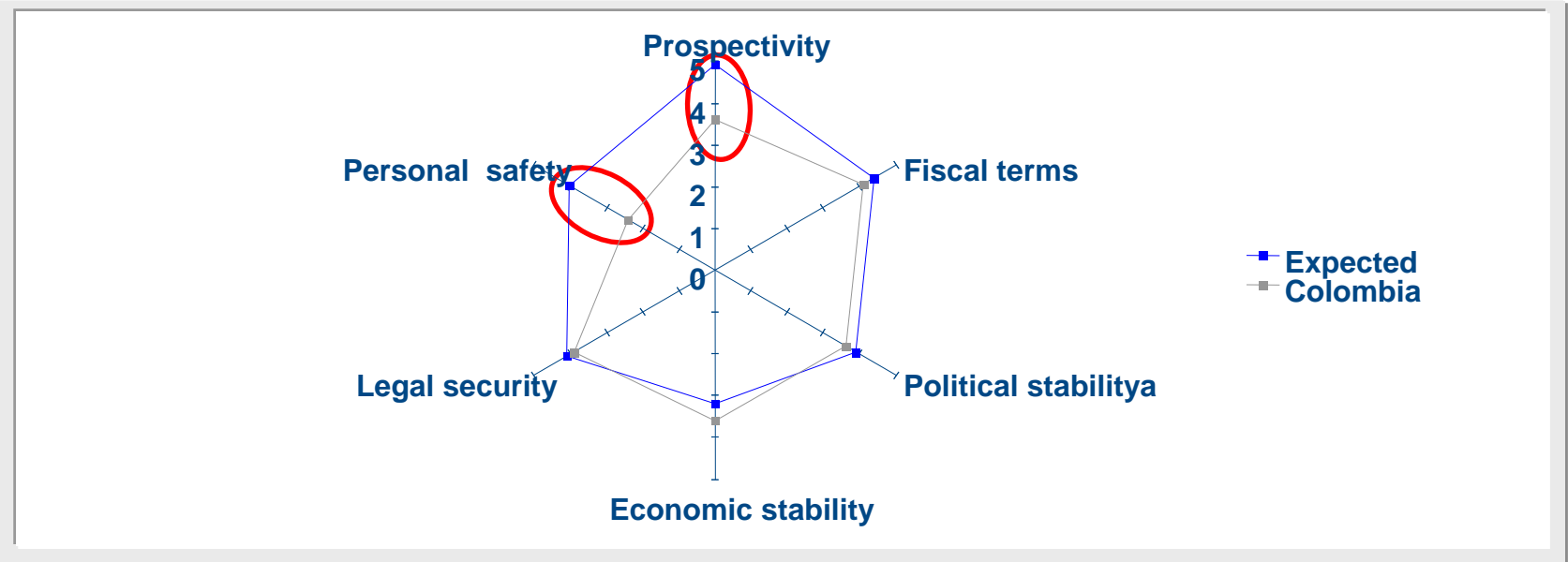
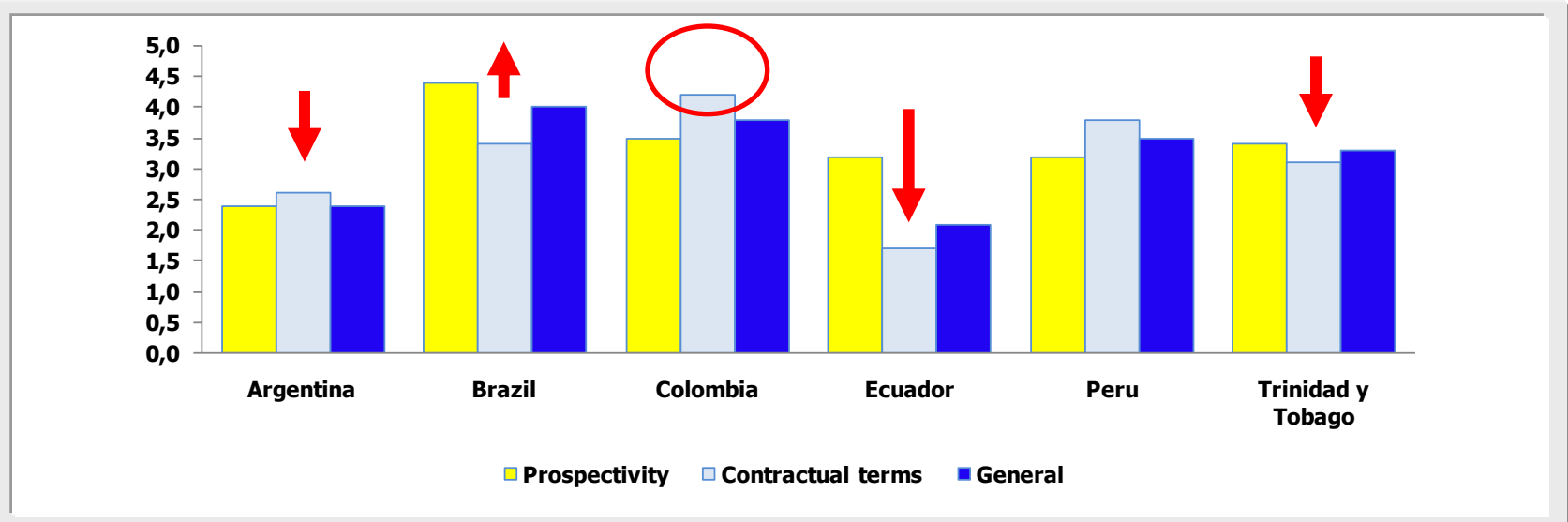
Category	Count	Company 1	Company 2	Company 3	Company 4
MAJOR	7	BHP BILLITON BP EXPLORATION COMPANY	EXXONMOBIL NEXEN INC.	RELIANCE INDUSTRIES LTD SK ENERGY CO LTD	TALISMAN OIL & GAS LTD
NOC	3	ECOPETROL S.A.	ONGC VIDESH LIMITED	PETROBRAS	
IOC	76	ALPHA CONSULTORES AMERISUR ARGENTA OIL & GAS BD PRODUCTION CO., INC. C&C ENERGÍA CARBOPETROL SA CEPCOLSA COLOMBUS ENERGY COMPAÑÍA DE TRAT DE LODOS SA COMPETROL LTDA CENERCOL S.A. DRUMMOND LTD EL TRIUNFO EMERALD ENERGY PLC EMPESA S.A. ERAZO VALENCIA SA FÉNIX OIL & GAS SA GEOKINETICS INTERNATIONAL INC. GEOPRODUCTION OIL AND GAS	GOLD OIL PLC GOLDEN OIL CORPORATION GRAN TIERRA ENERGY LTD GREAT NORTH ENERGY INC. HARKEN DE COLOMBIA LIMITED HOCOL S.A. HUNT OIL COMPANY HUPECOL INEPETROL S.A. CONEQUIPOS ING LTDA INTEROIL EXPL Y PROD KAPPA RESOURCES COLOMBIA LTD LEWIS ENERGY COLOMBIA, INC. MAUREL & PROM COLOMBIA B.V. MAXIM WELL SERVICES LTD META PETROLEUM CORP MOMPOS OIL COMPANY INC MONTECZ S.A. MORICHAL PETROLEO Y GAS C.A.	NCT ENERGY GROUP CA NEW HORIZON EXPLORATION INC OCCIDENTAL ANDINA LLC OMEGA ENERGY COLOMBIA OMMIMEX OIL & GAS OPEN CHOKE EXPLORATION LLC OPERACIONES PETROLERAS AND S.A. OPICA BLC. S.A PACIFIC STRATUS ENERGY CORP PAN ANDEAN COLOMBIA PARKO SERVICES S.A. PETROANDINA COLOMBIA LTD. PETROCOLOMBIA PETROLEOS COLOMBIANOS LIMITED PETRÓLEOS DEL MAR PETROLEOS DEL NORTE PETROLERA MONTERRICO S.A. PETROLIFERA PETROLEUM LIMITED PETROMINERALES COLOMBIA LTD	PETROPULI LTDA PETROTESTING COLOMBIA S.A. PLUSPETROL RESOURCES CORP. RAMSHORN INTERNATIONAL LIMITED RANCHO HERMOSO S.A SHONA ENERGY COLOMBIA LIMITED SOGOMI ENERGY S.A. SOLANA PETROLEUM EXPL LTD TC OIL & SERVICES S.A. TECPECOL S.A e INEPETROL S.A. TEXICAN OIL LTD THETYS PETROLEUM THORNELOE ENERGY TRAYECTORIA OIL & GAS TURKISH PETROLEUM INT. CO. LTD VAROSA ENERGY LIMITADA VETRA COLOMBIA WELL LOGGING LTDA WINCHESTER OIL AND GAS
TOTAL	86				

1. Background
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A most competitive fiscal system

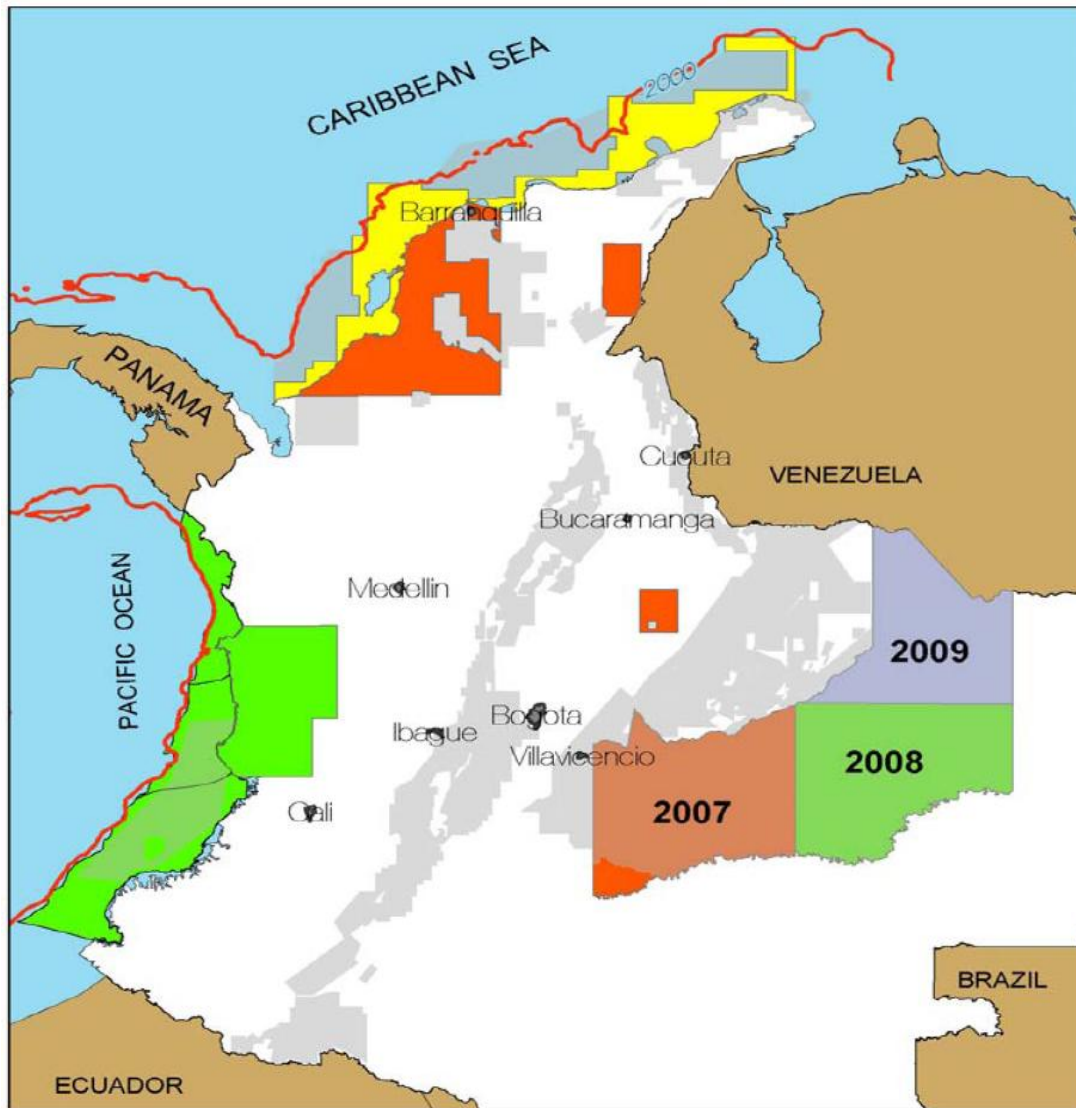
- ✓ Competitive, flexible government take (45 to 75%)
- ✓ Sliding-scale royalties (8 to 25%)
- ✓ 33% corporate tax rate
- ✓ Deductible local taxes
- ✓ No remittance taxes
- ✓ 40% corporate tax deduction for productive investment
- ✓ 20-year stability contracts

Perceptions on Colombia's attractiveness



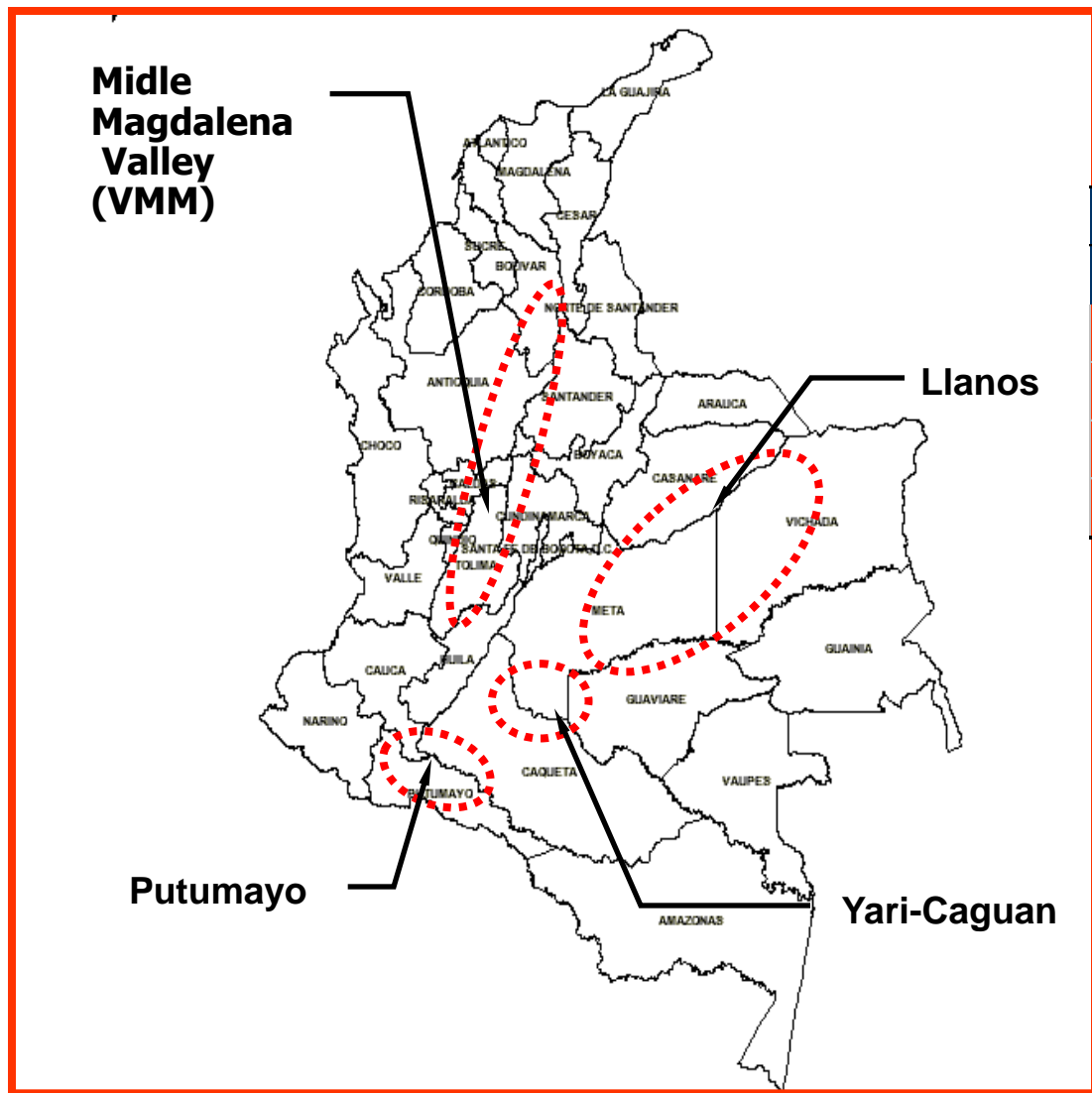
1. Background
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Heavy Oil Areas of interest in Colombia



Fuente: Ecopetrol

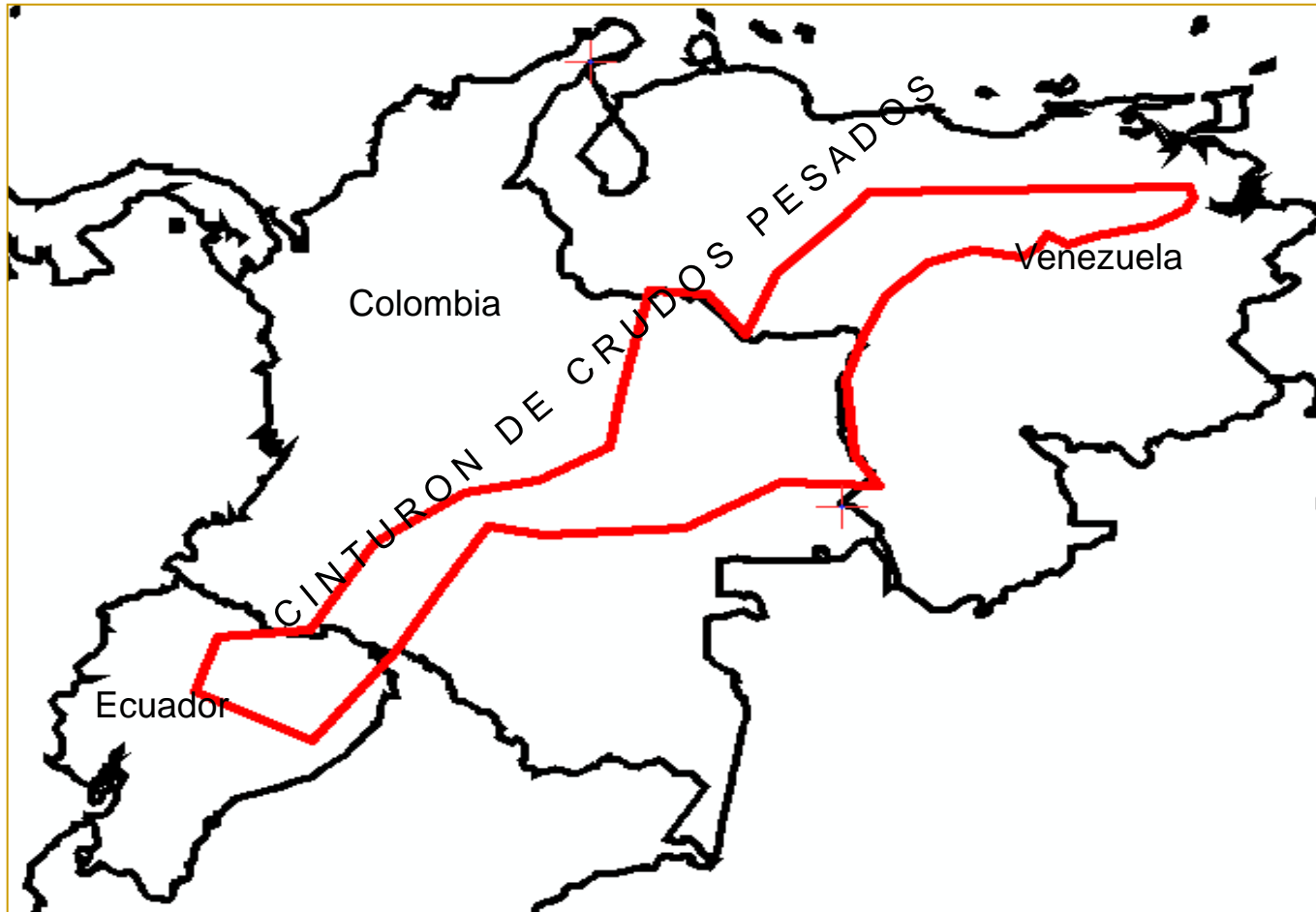
Heavy Oil Areas of interest in Colombia



CUENCA	POES	RESERVAS
	MBLS	MBLS
Llanos	9.000	760 - 1310
Magdalena Medio	1.700	90 -190
Otros	80	1 -5
Total	10.780	851 -1505

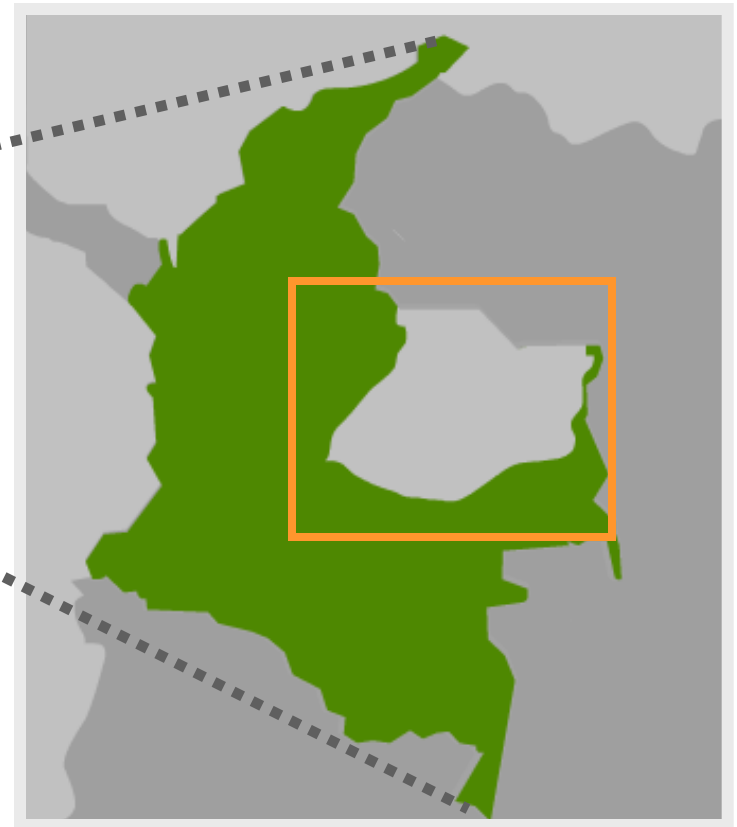
Fuente: Ecopetrol

Colombian HO in the Llanos Basin are included in a regional belt



Location of Colombia

Colombia is located in the North-Western corner of the South American Continent and has access by the two oceans, Atlantic and Pacific.



COLOMBIA

LLANOS ORIENTALES BASIN

- ANH Heavy Oil Llanos Basin Projects -

Llanos Orientales Basin

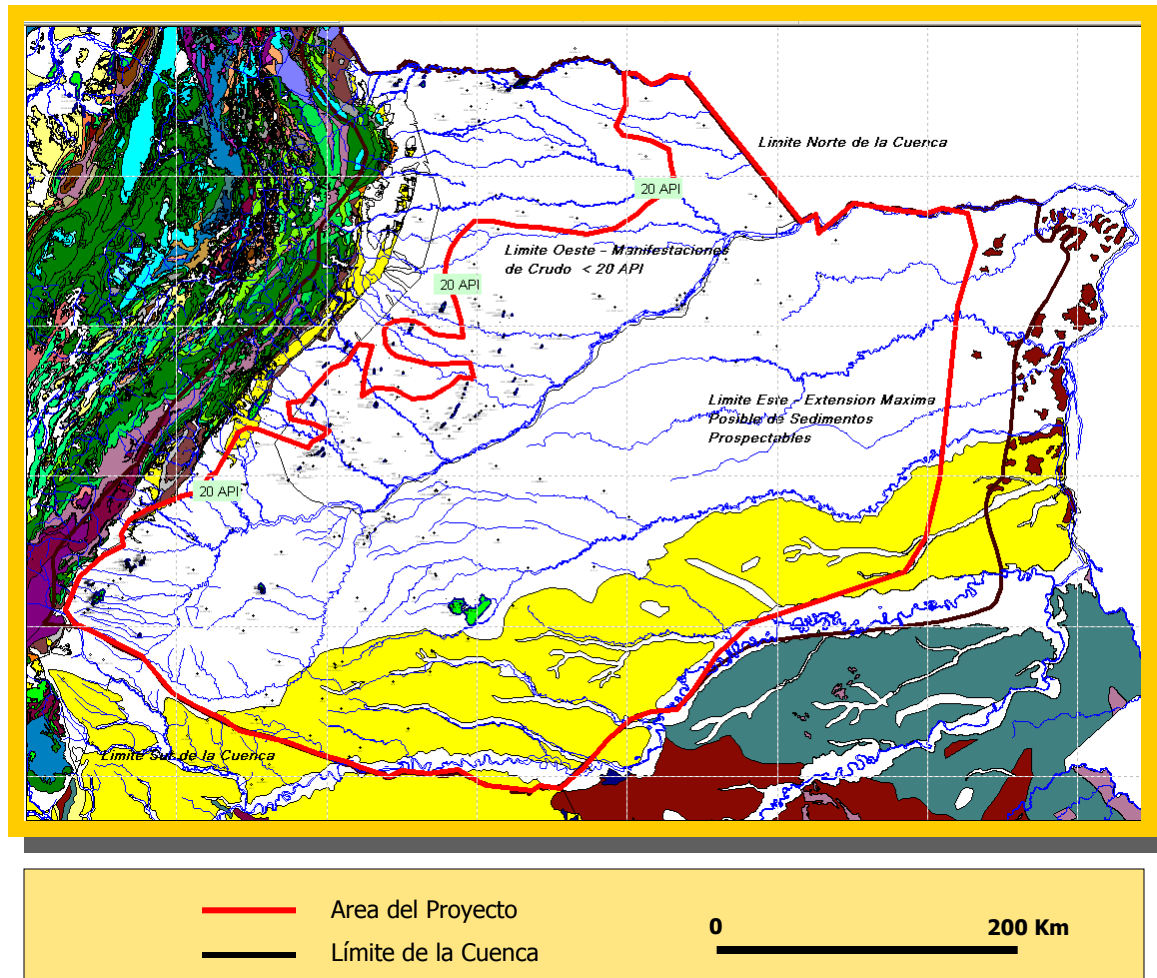
- 220,000 Km²
- 87,000 Km – seismic
- 1,360 wells

Heavy oil area

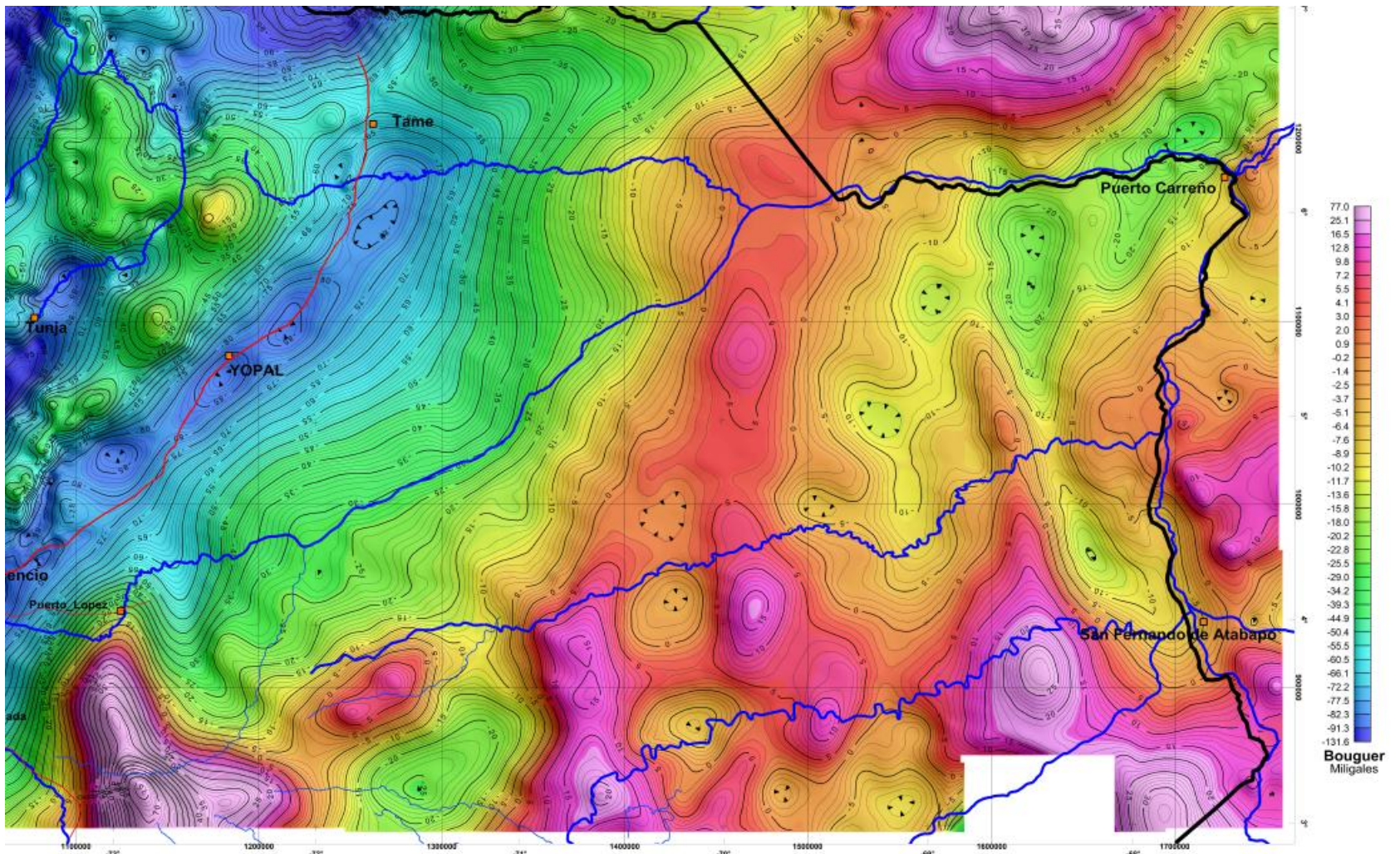
- 153,000 Km²
- 42,550 Km – seismic

Selection

- 220 PWells (466)
- 5,000 Km – seismic
- 6,100 Interpreted
- (~12,800 Km loaded)
- Reports 245
- Maps 656



Airborne Gravity in the Llanos Basin



Llanos Orientales de Colombia

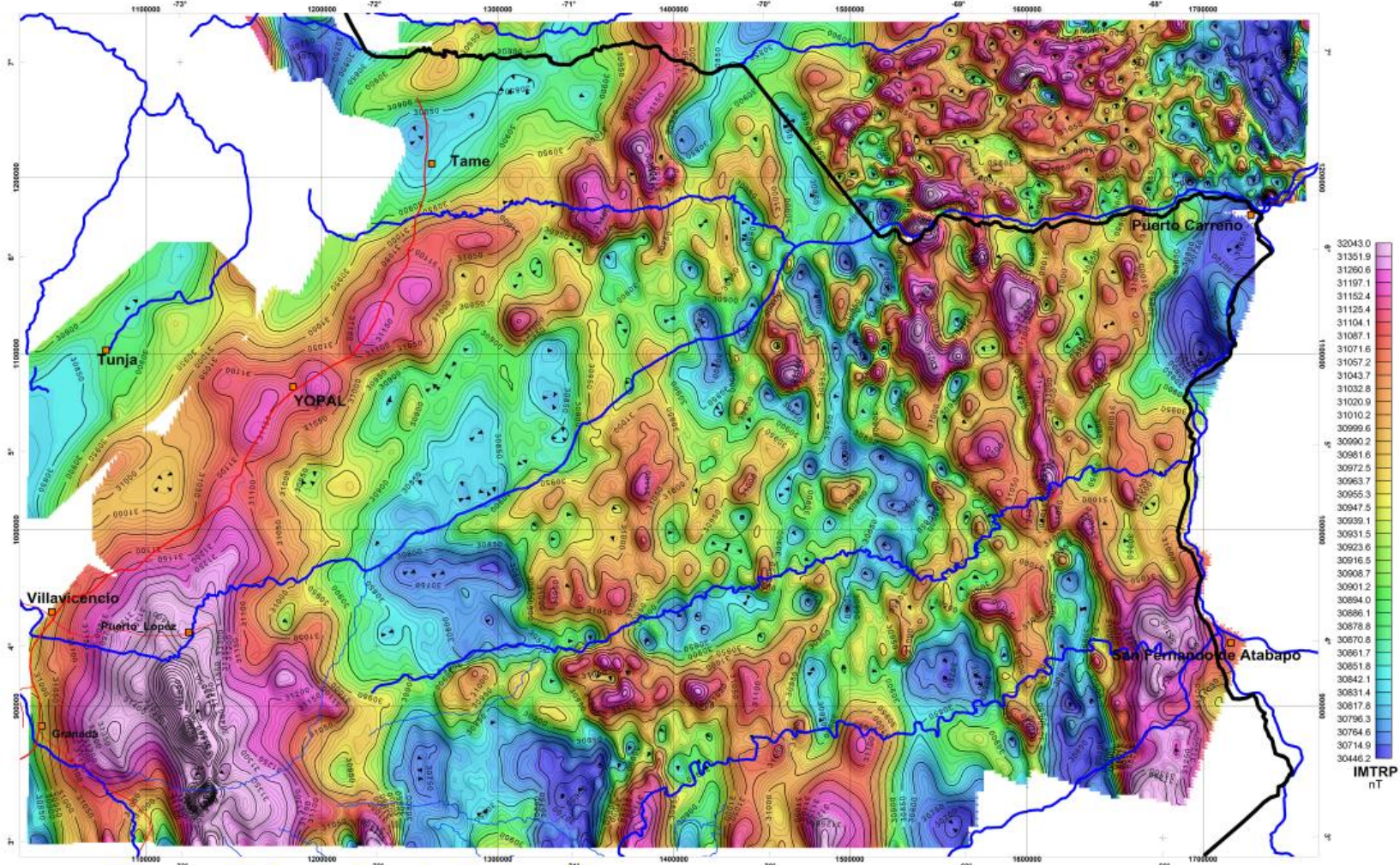
Scale 1:750000
 4GNA / Colombia Bogotá zone



Figura 4

Agencia Nacional de Hidrocarburos		
ANOMALIA DE BOUGUER ($\rho=2.14\text{g/cc}$)		
Autor: V. Graterol		Fecha: Diciembre del 2008
CARSON AEROGRAVITY Inc.		

Airborne Magnetometry in the Llanos Basin



Llanos Orientales de Colombia

Scale 1:750000

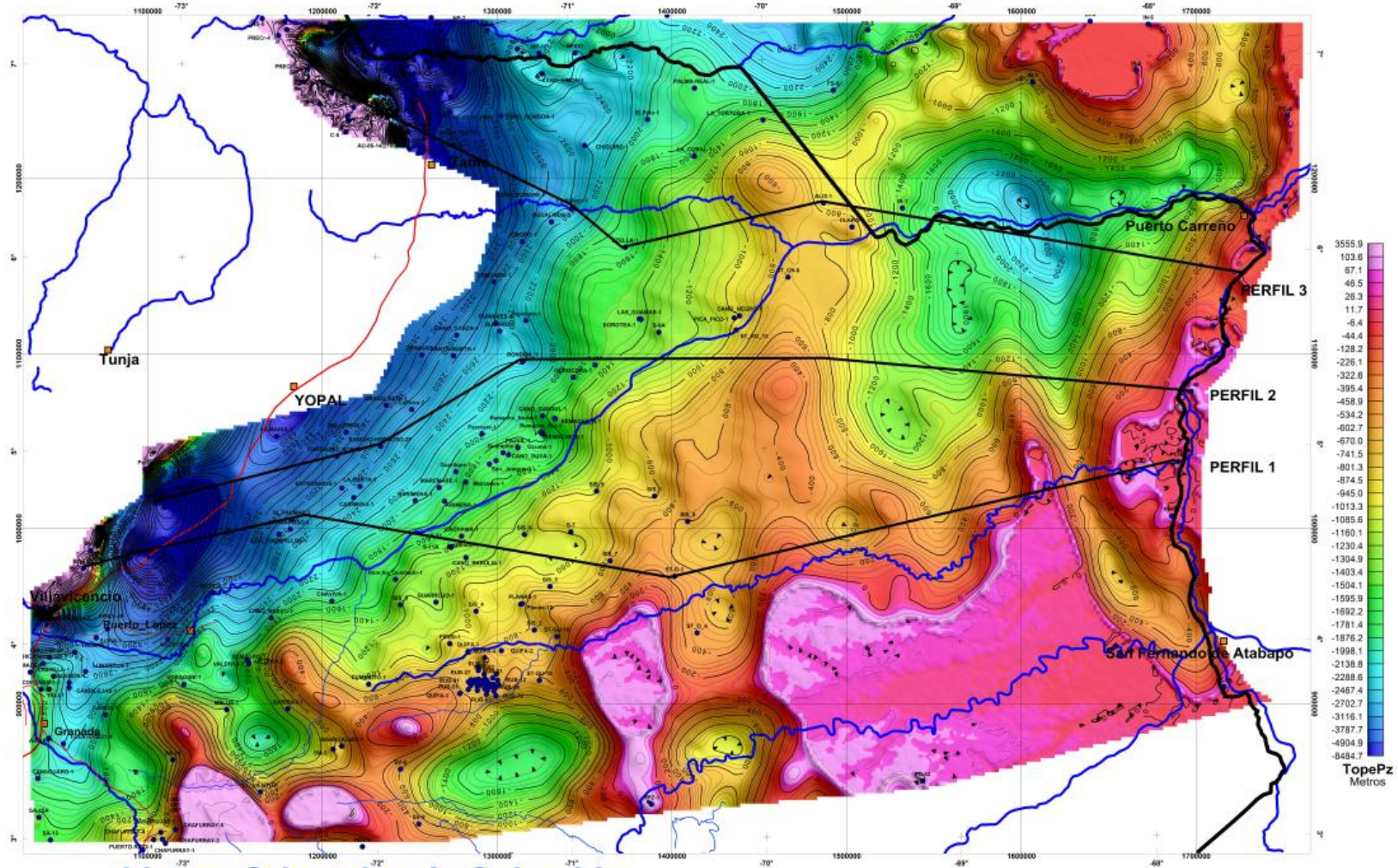
Bogotá MAGNA / Colombia Bogotá zone

LOCALIZACION REGIONAL

Figura 6

Agencia Nacional de Hidrocarburos	
Intensidad Magnética Total REDUCIDA AL POLO(IMTRP)	
Autor: V. Graterol	Fecha: Diciembre del 2008
CARSON AEROGRAVITY Inc.	

Depth to Paleozoic Top from airborne geophysics



Llanos Orientales de Colombia

Scale 1:750000
Bogota MAGNA / Colombia Bogota zone



Figura 13

Agencia Nacional de Hidrocarburos



Topo del Paleozoico
Inversión 3D del Residuo Controlado ... Referencia: NMM

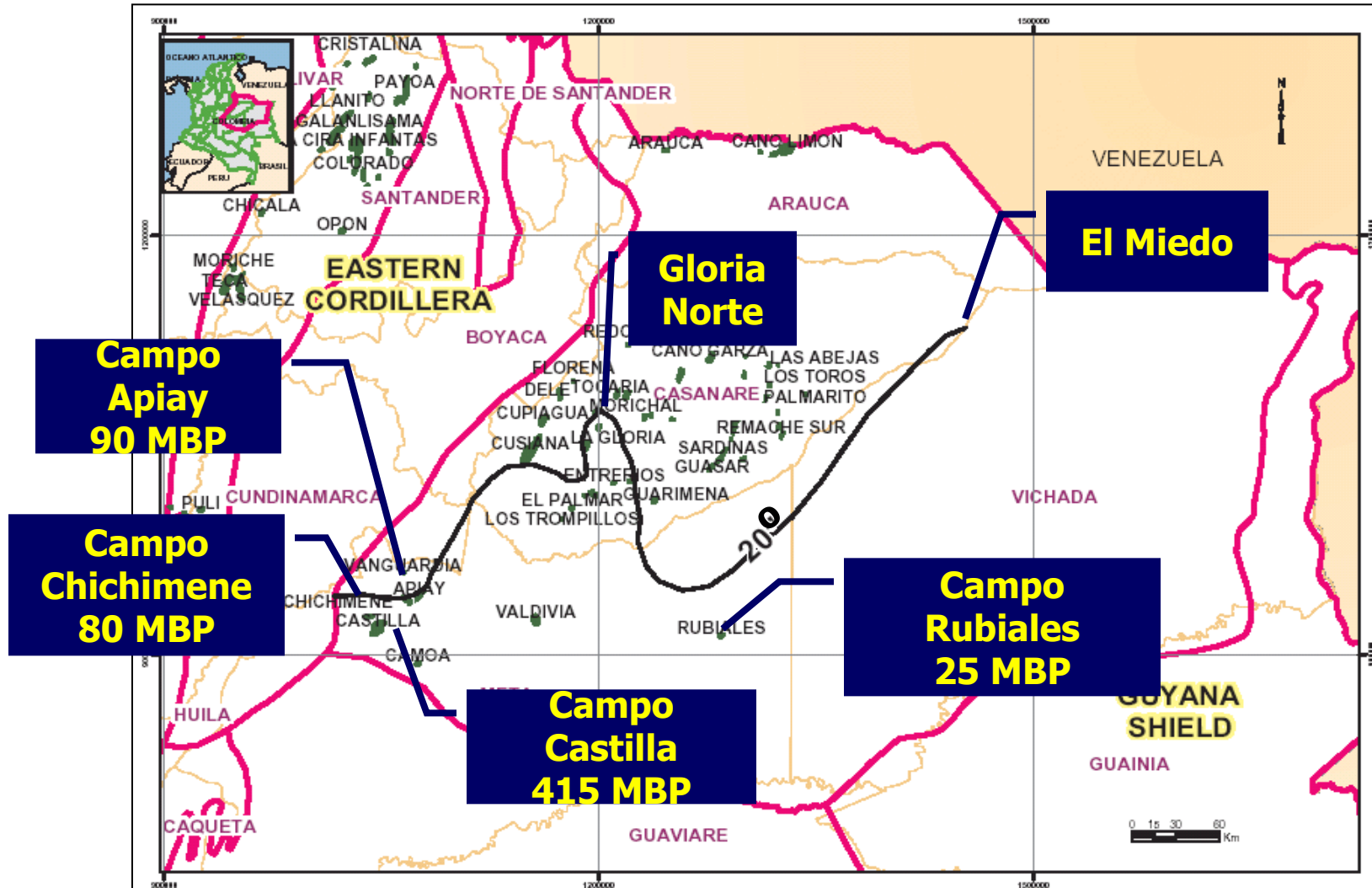
Autor: V. Graterol

Fecha: Diciembre del 2008

CARSON AEROGRAVITY Inc.

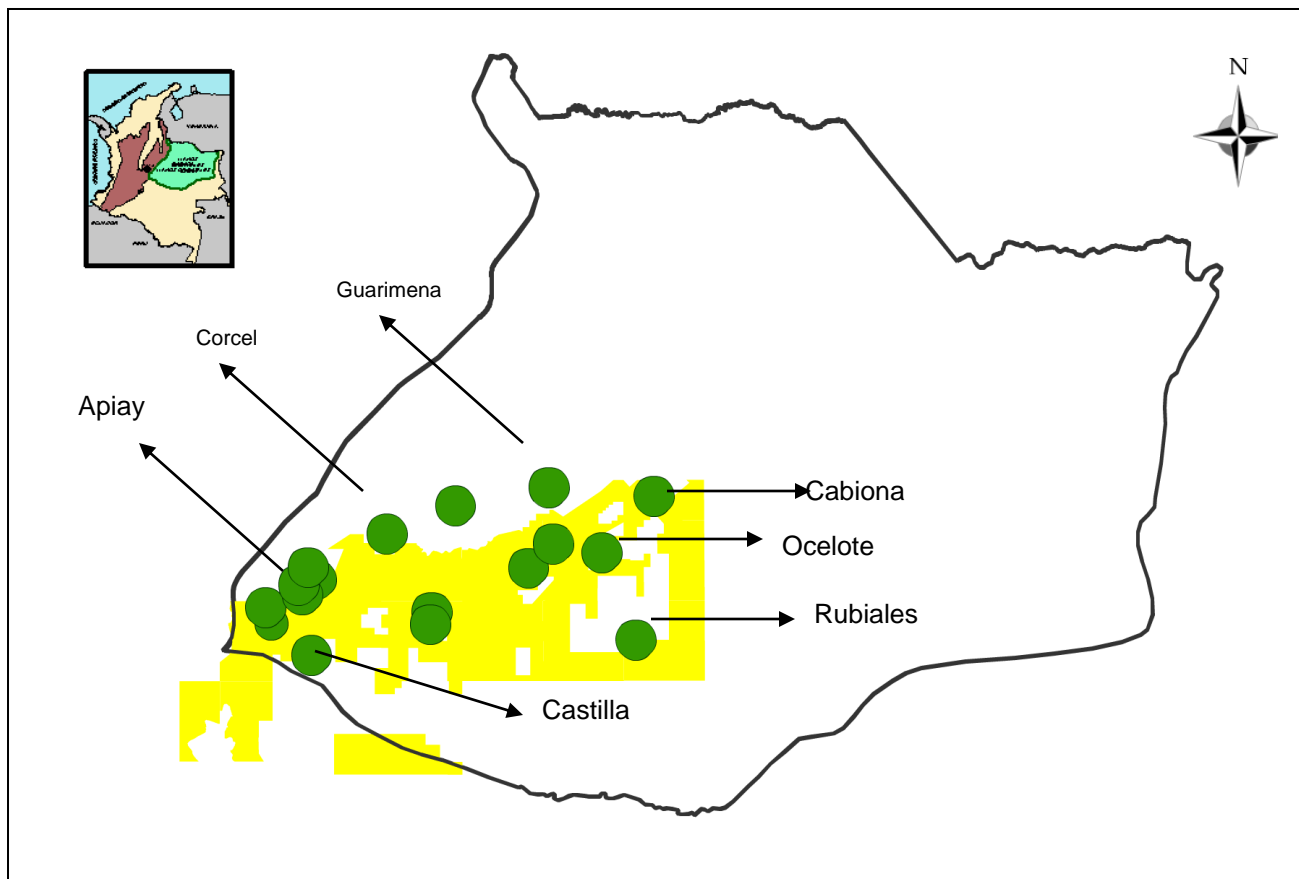


HO main production fields



Oilfields

17 Oil fields have been discovered in the nearest area of the Western Blocks.



Cabiona
Guarimena
Rubiales
Guatiquia

Trompillos
Caracara
Chichimene
Castilla

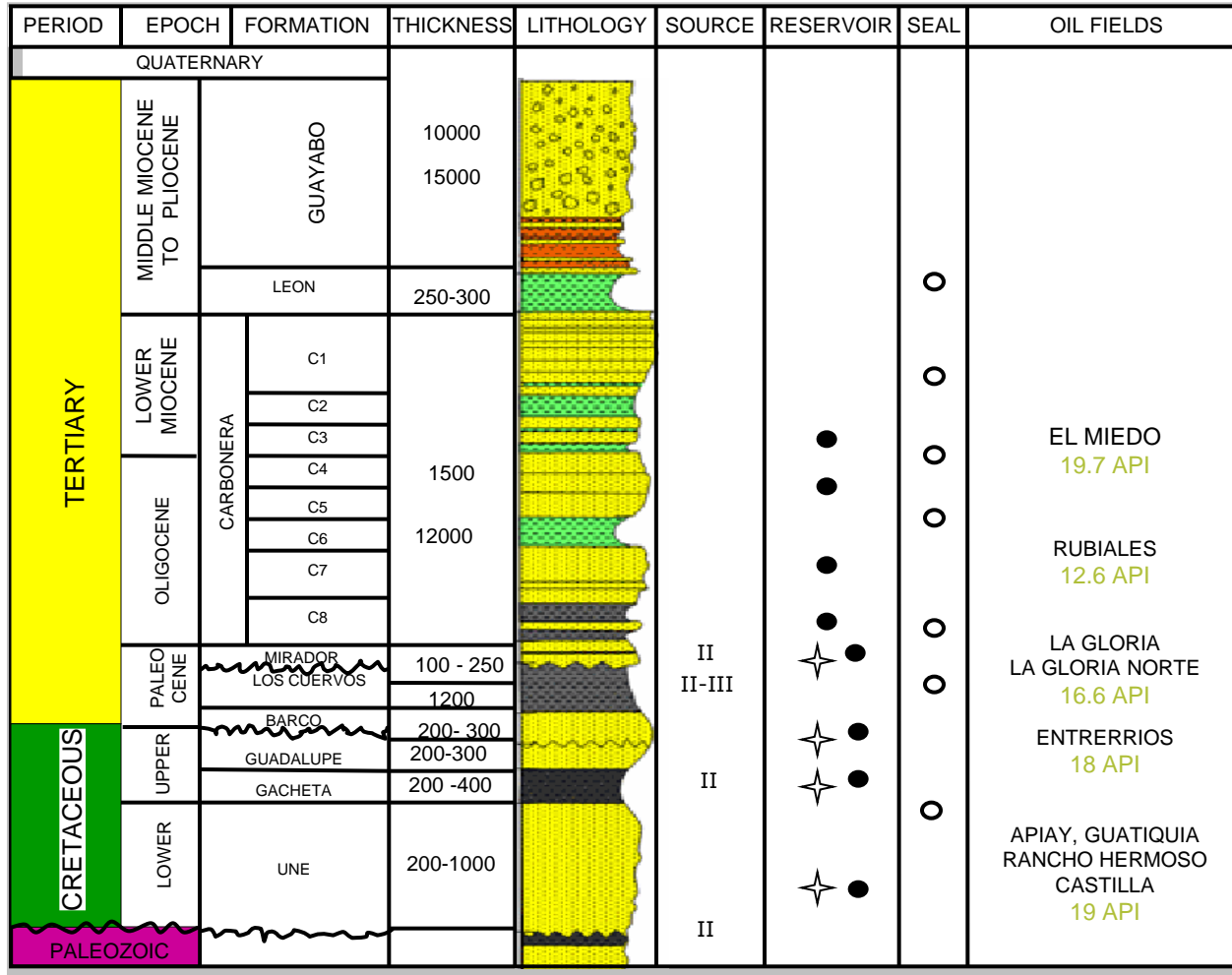
Ocelote
Rubiales
Corcel
Camoá

Rancho Quemado
Valdivia/Almagro
Libertad
Austral
Apiay



Generalized Stratigraphic Column

A maximum of 12.000 ft of section needs to be drilled to target the Paleozoic Sediments in the Western area. The Rubiales field reaches the Paleozoic at 3.000 ft.



EL MIEDO
19.7 API

RUBIALES
12.6 API

LA GLORIA
LA GLORIA NORTE
16.6 API

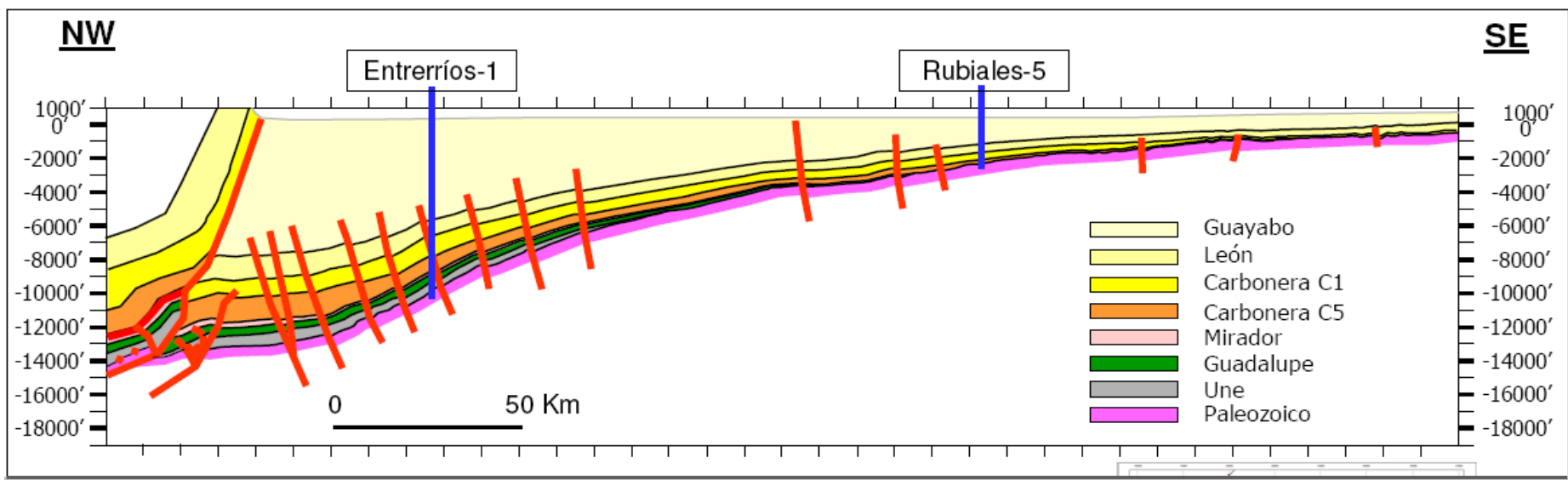
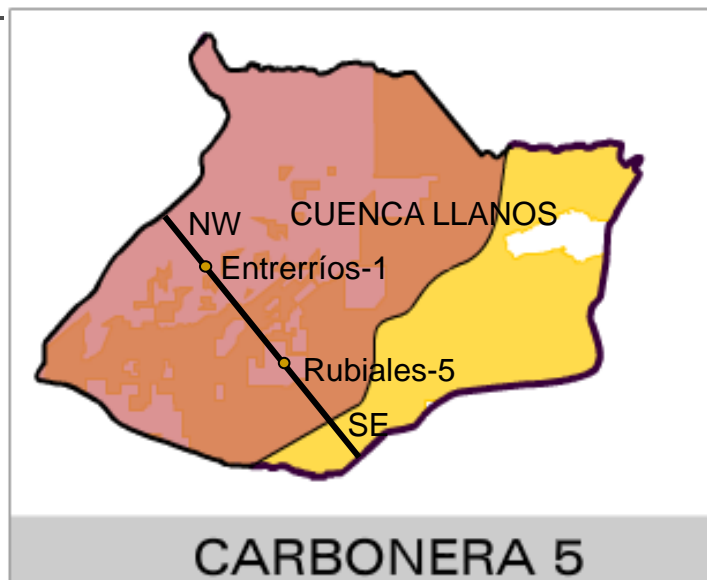
ENTRERRIOS
18 API

APIAY, GUATQUIA
RANCHO HERMOSO
CASTILLA
19 API

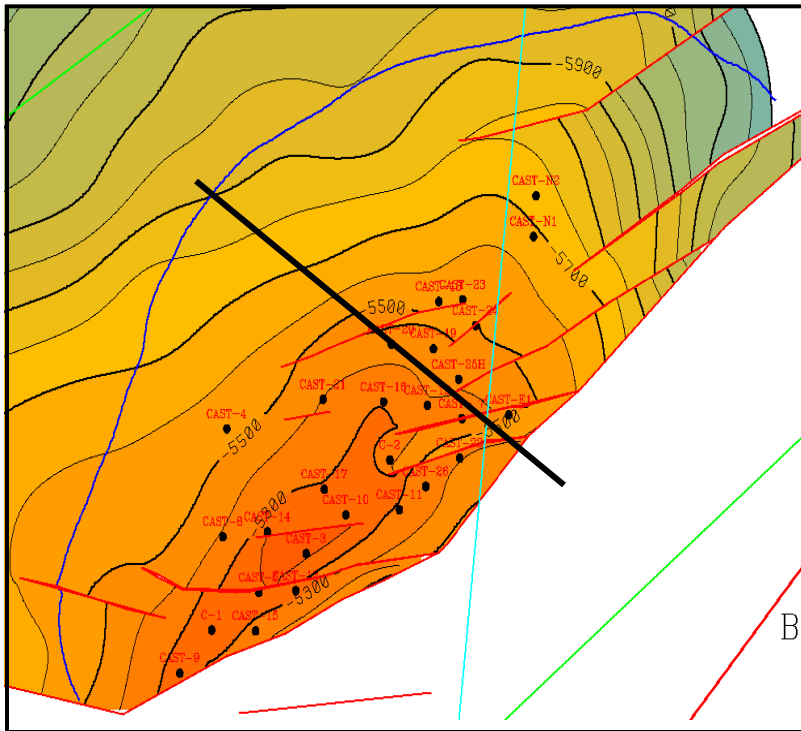
- OIL
- ★ GAS
- SEAL ROCK

Structural Model

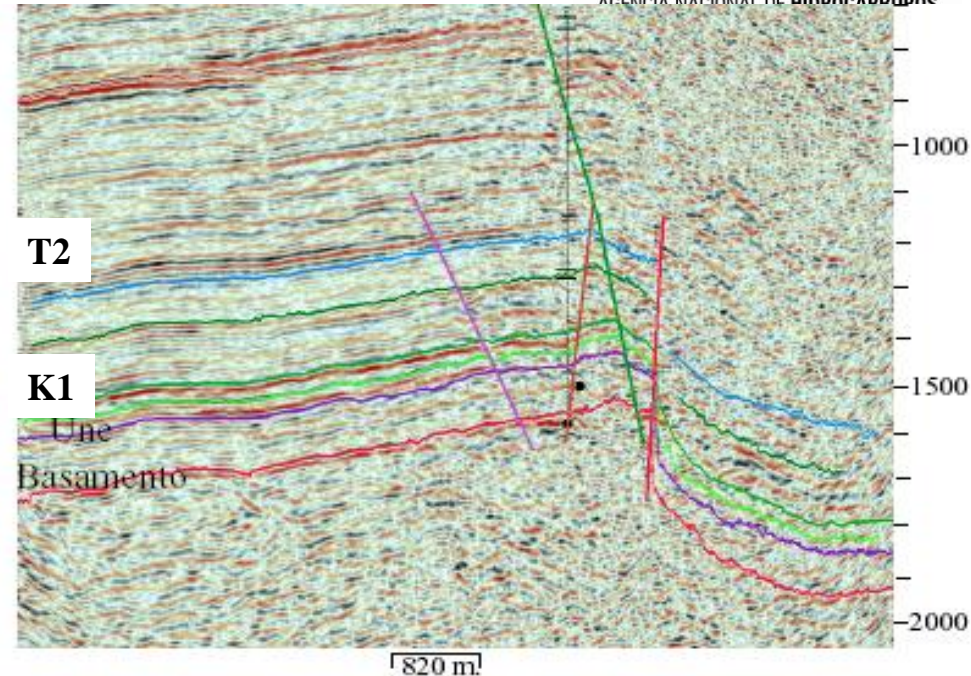
The typical structures are gentle monoclines dipping west.



Castilla



Ecopetrol, 2004

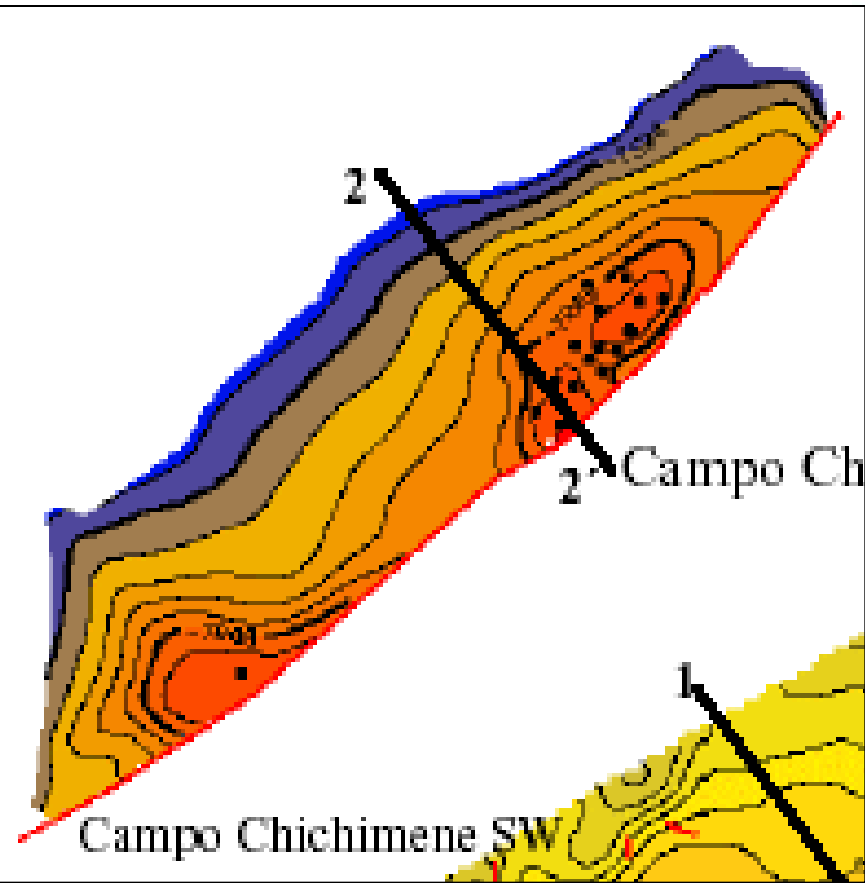
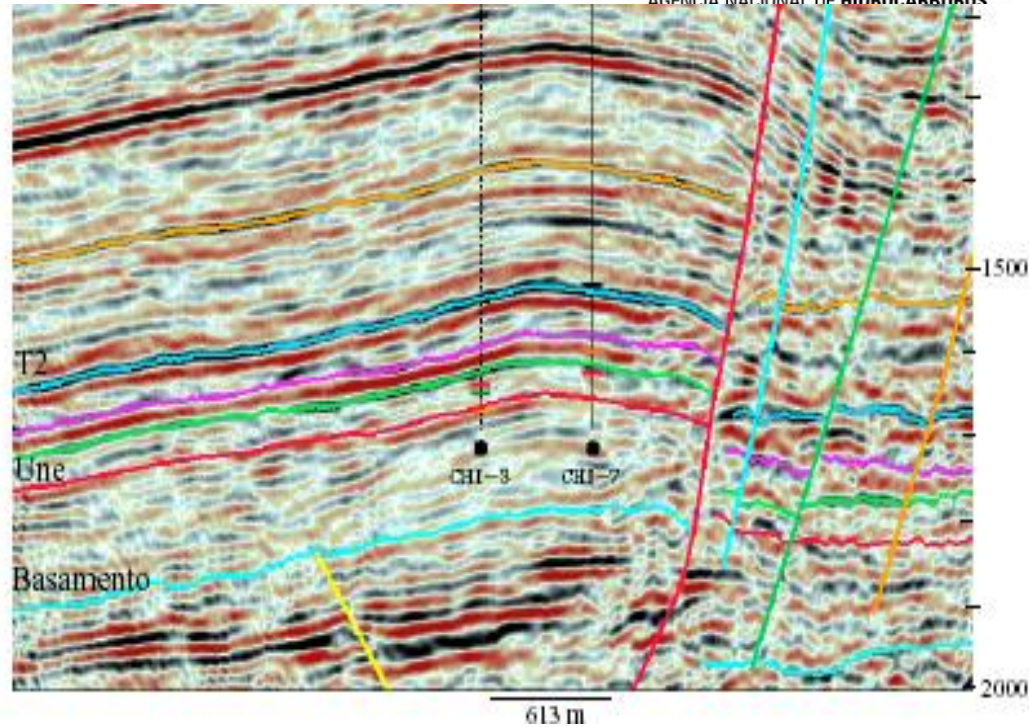


CASTILLA FIELD

Formation	K1	K2
Depth ft	6300`	6600`
Net Pay ft.	80	400
Porosity %	16	17
Permeability md	1000	450
Gravity API	13	13
Reservoir Temperature - F	180	180
Viscosity reservoir conditions cp	60	60
Reserves OOIP MBP	2600	

Producción en 2004 a 60 KBPD, reservas 400 MMBL, inversiones US\$ 515

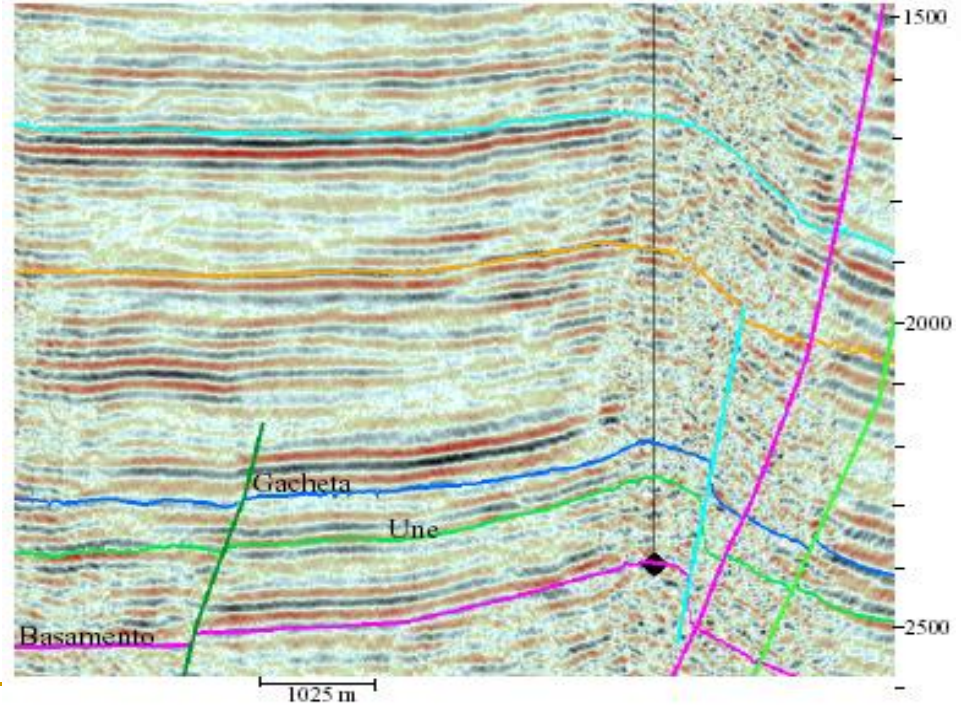
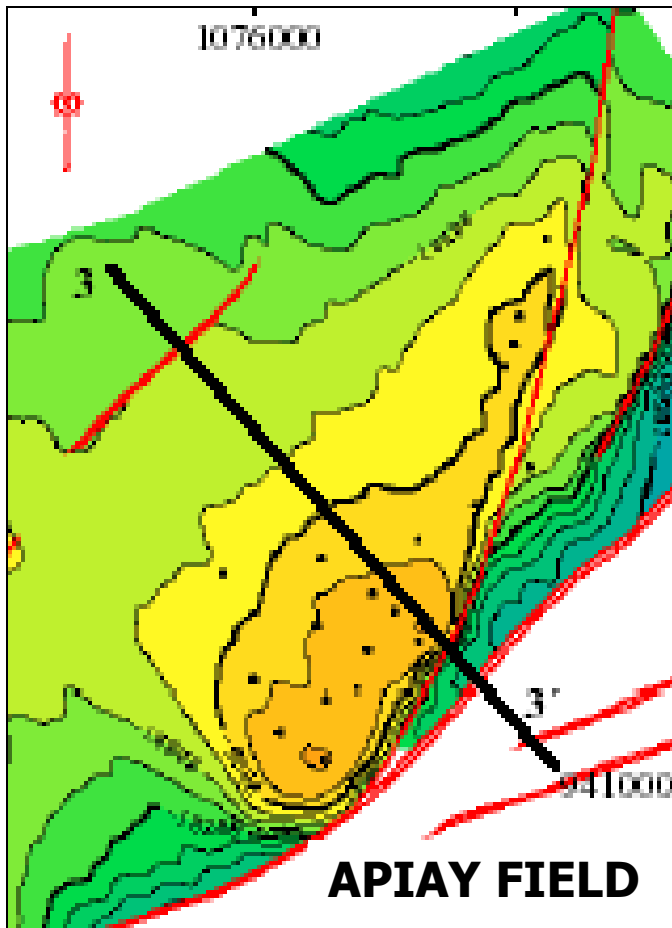
Chichimene



CHICHIMENE

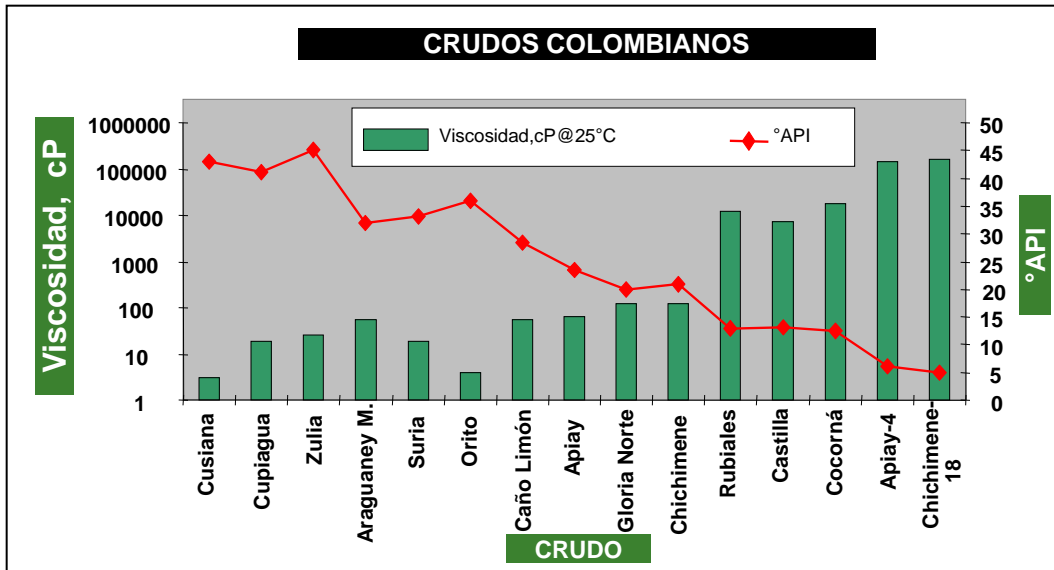
Formation	K1-K2
Depth ft	8500`
Net Pay ft.	250
Porosity %	16
Permeability md	1100
Gravity API	17
Reservoir Temperature - F	180
Viscosity reservoir conditions cp	60
Reserves MBP	80 North & 53 South

Apiay



APIAY

Formation	K1	K2
Depth ft	6300`	6600`
Net Pay ft.	80	400
Porosity %	16	17
Permeability md	1000	450
Gravity API	13	13
Reservoir Temperature - F	180	180
Viscosity reservoir conditions cp	60	60
Recovery Reserves MBP	90	
Proven Reserves MBP	10	



High to Very High Viscosity (7000 - 320.000 cP at 20°C)

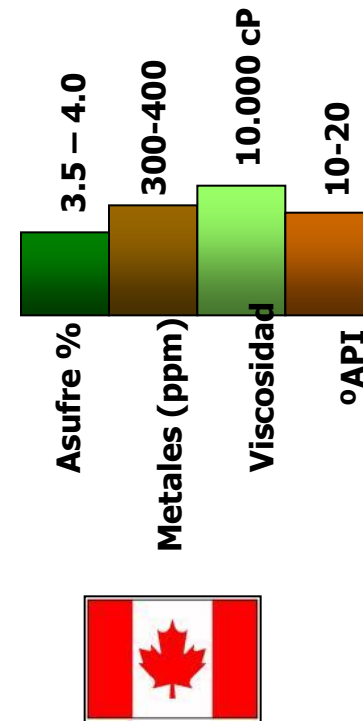
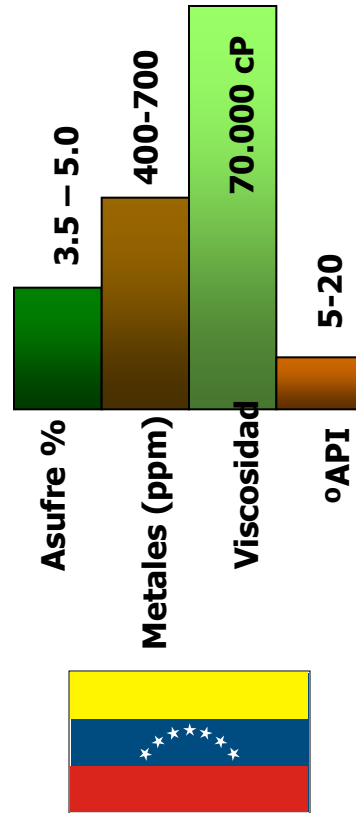
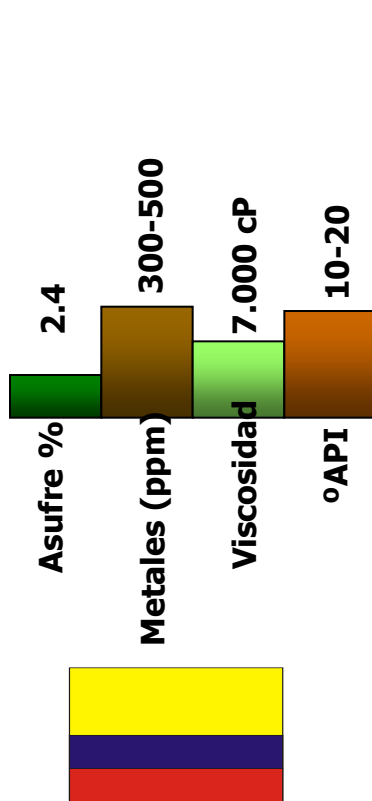
Low API: Heavy oils 10-20 API (Castilla Field)

Extra Heavy oils < 10 API (San Fernando Fm. well Chichemene 18)

Implications:

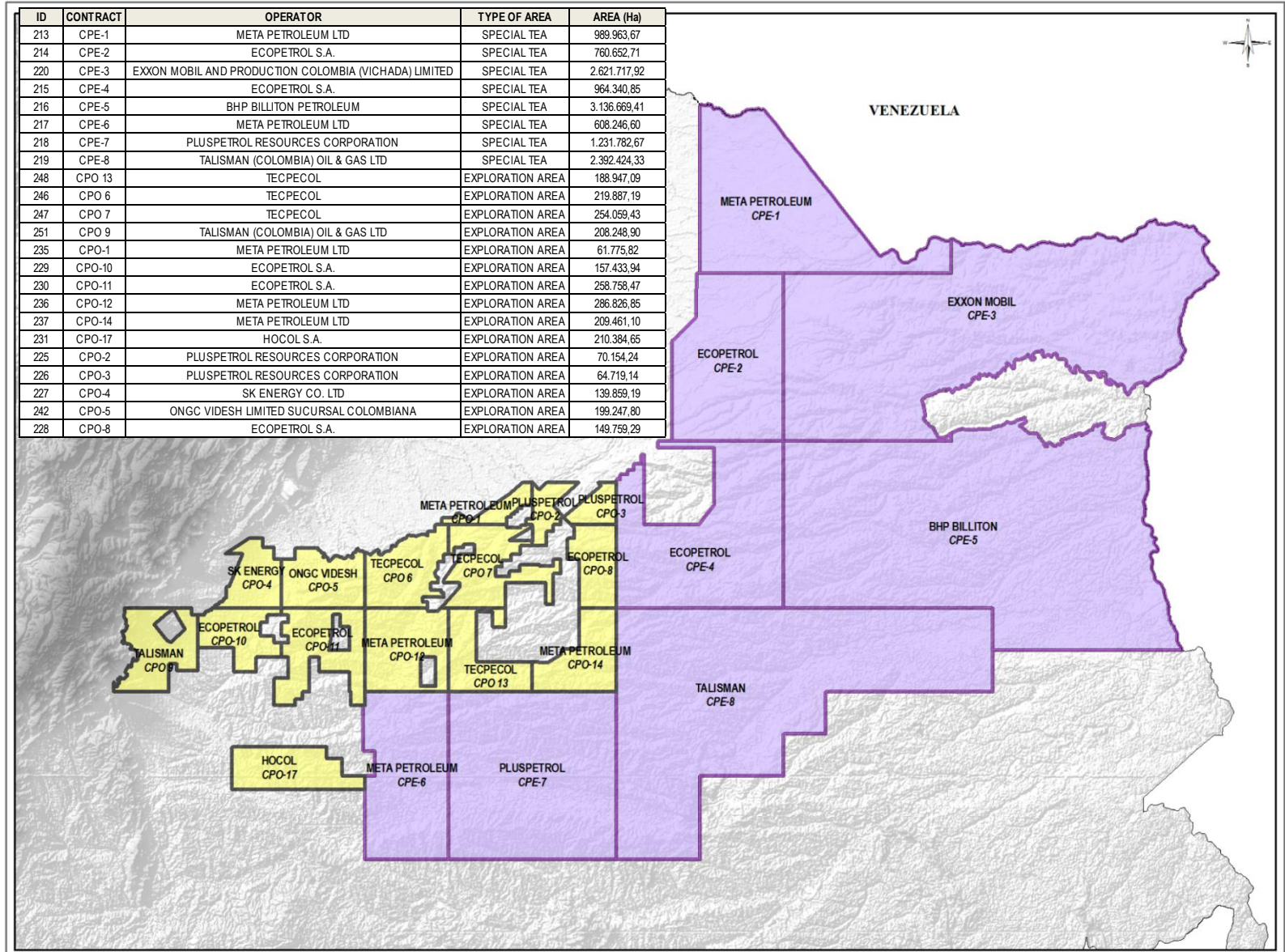
- ▶ High energy consumes \$\$
 - ▶ Higher pumping power
 - ▶ Larger diameters

Some Heavy Oils Characteristics



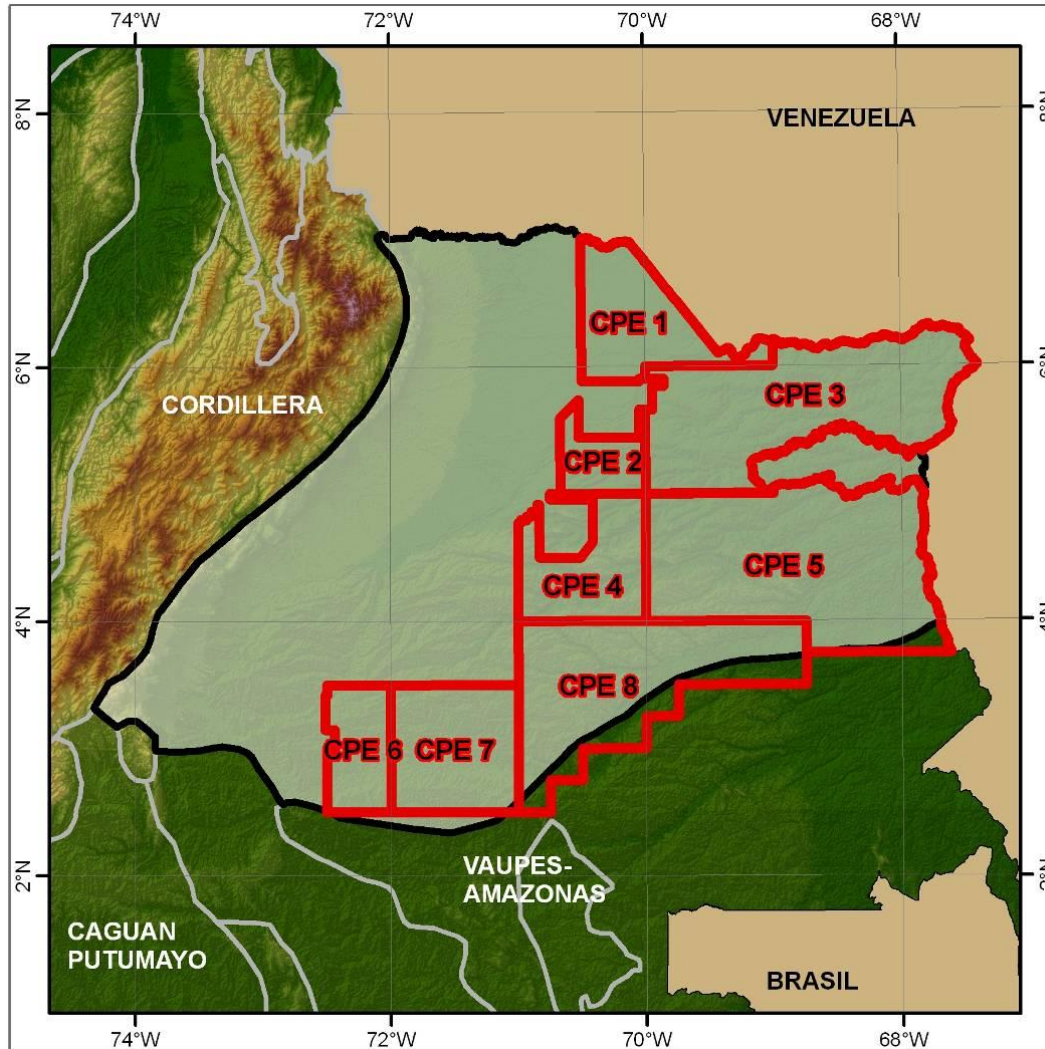
TSP (2005)

PRESENT HO CONTRACTS IN THE LLANOS BASIN



Heavy oil development project - East

8 frontier blocks

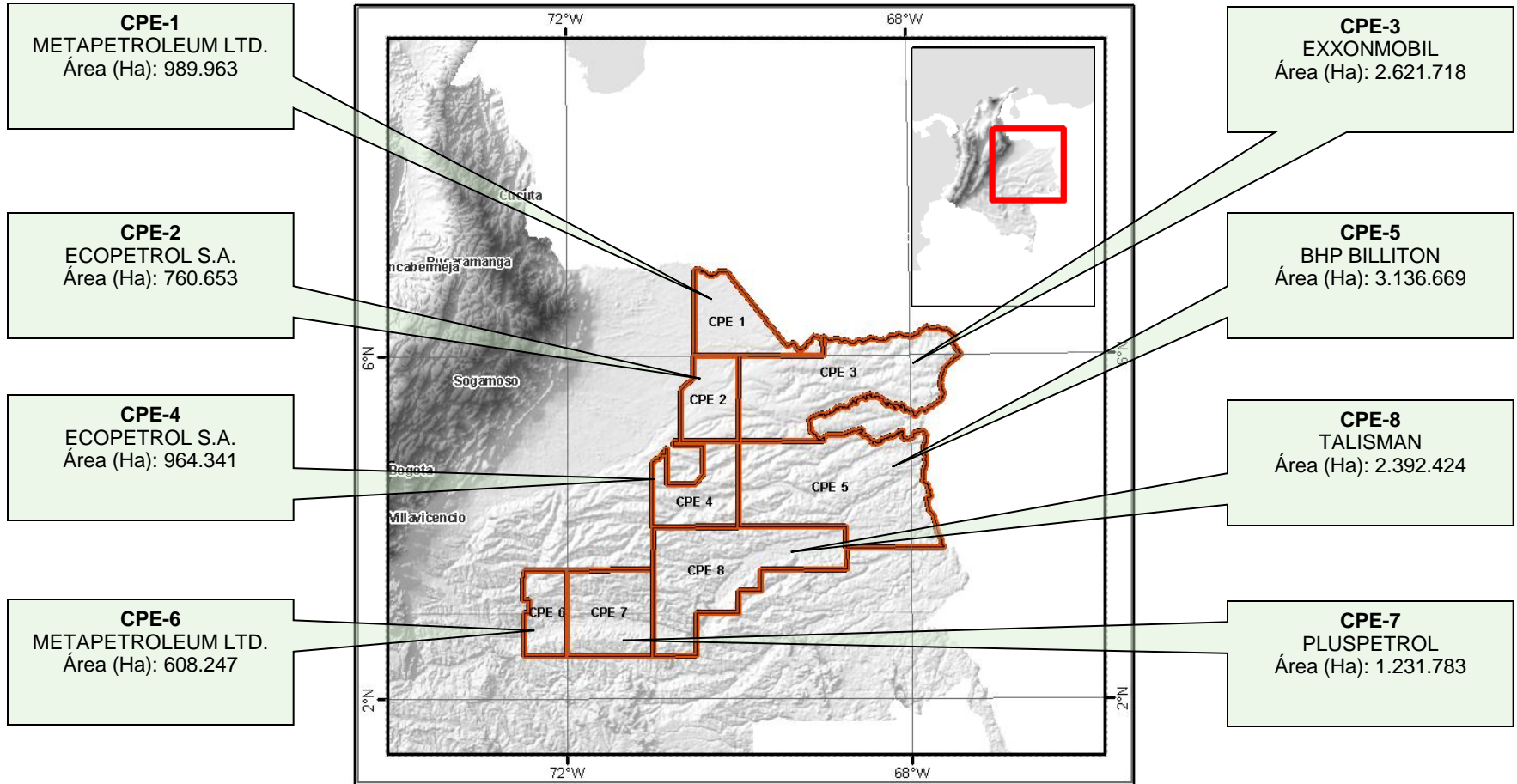


Blocks	AREA (Ha)
CPE 1	1.059.744
CPE 2	415.666
CPE 3	2.598.791
CPE 4	964.341
CPE 5	3.209.426
CPE 6	608.247
CPE 7	1.231.783
CPE 8	2.237.549
TOTAL	12.325.546

Seismic lines		Well
Number	Length (Km)	Number
405	7.267	37



EASTERN HEAVY OIL PROJECTS – DCP -

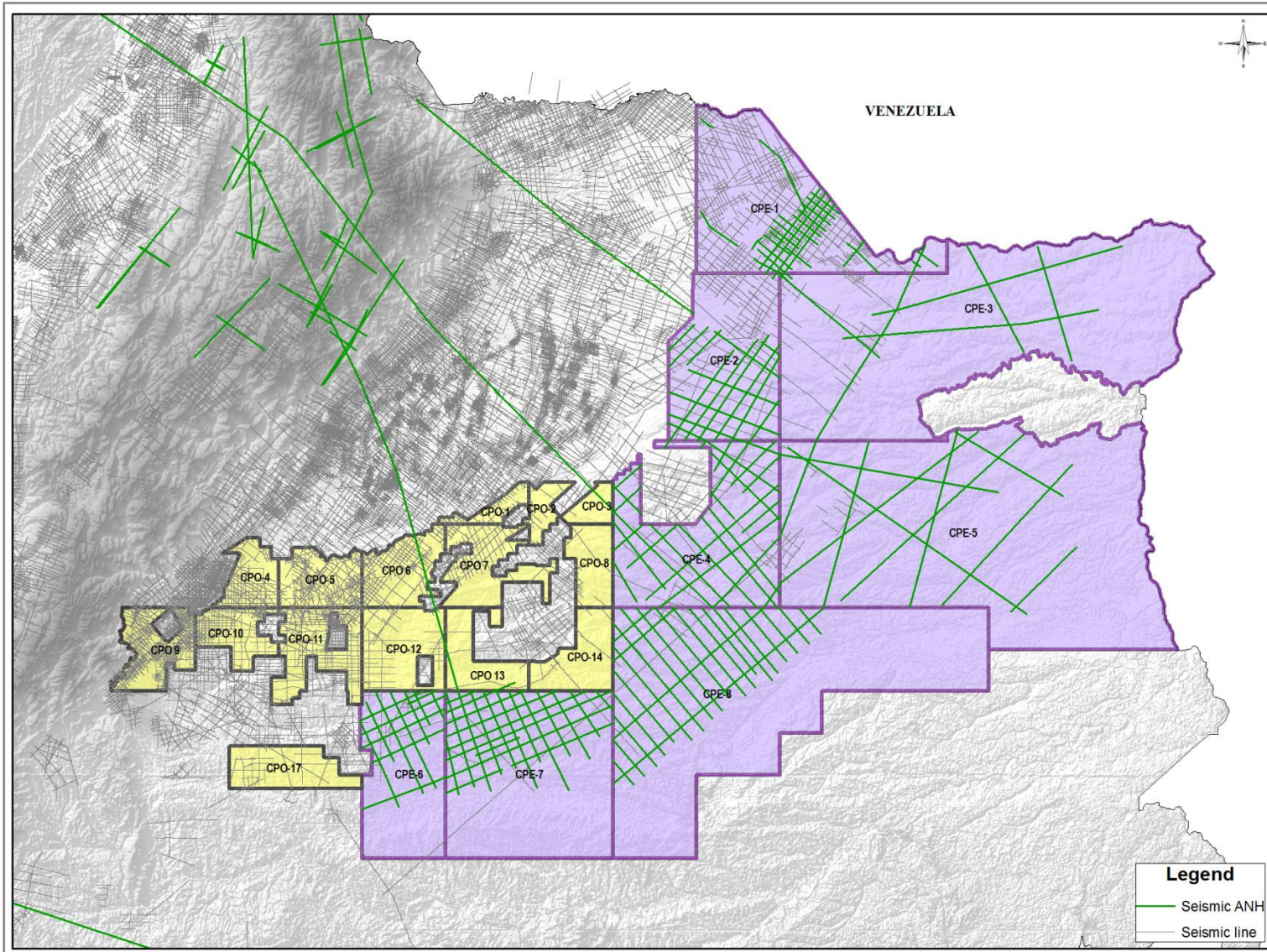


Project – DCP – Minimum Exploration Programs

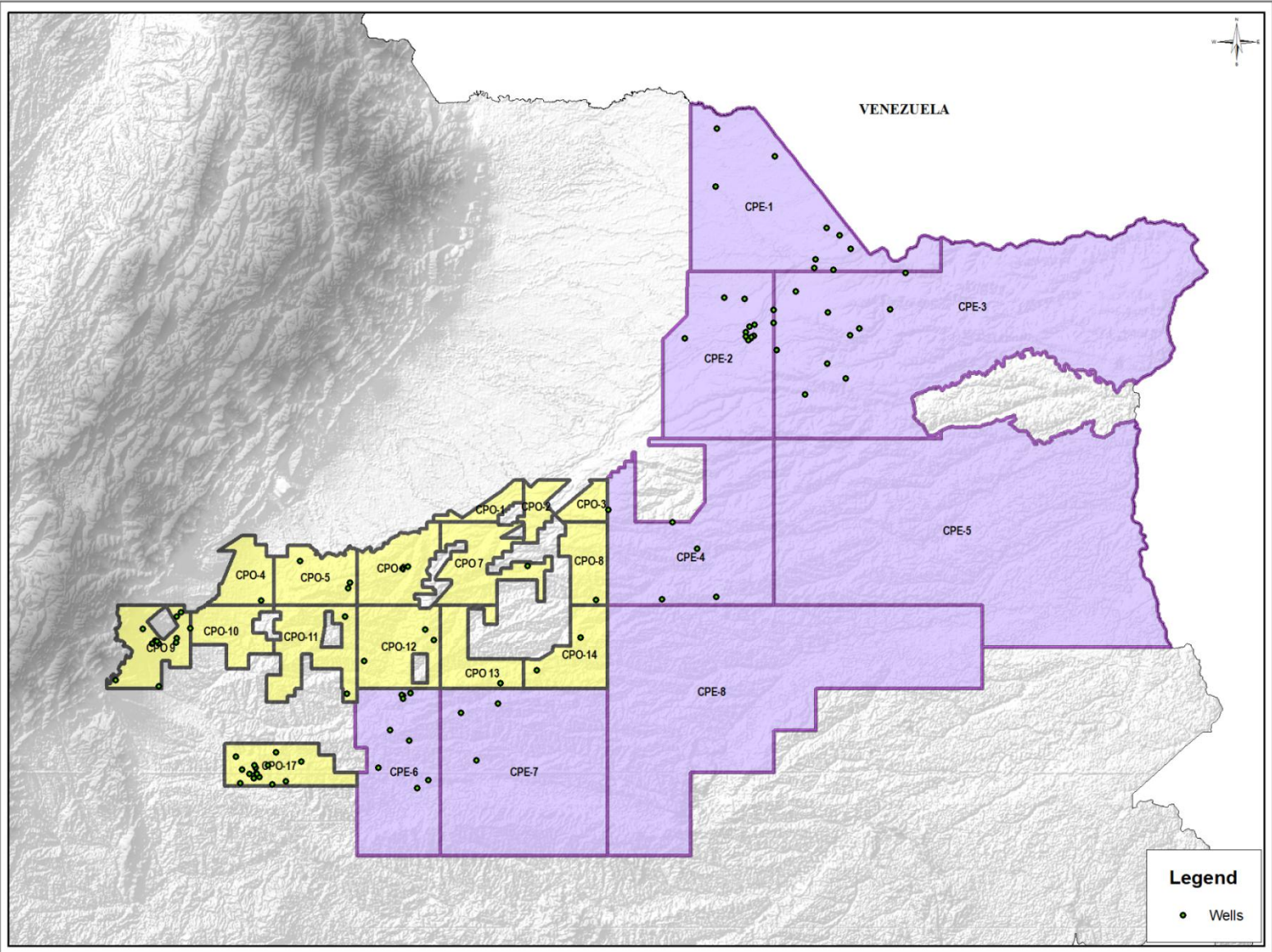


BLOQUE	Programa Mínimo Exploratorio	Programa Adicional	Total
	Descripción	Descripción de las actividades adicionales	
CPE-1	1 pozo estratigráfico	3 pozos @ 2.900 pies	4
	225 Km de sísmica 2D	275 Km de sísmica 2D	500
CPE-2	1 pozo	4 pozos	5
	200 Km de sísmica 2D	1050 Km de sísmica 2D	1.250
CPE-3	2 pozos	13 pozos	15
	580 Km de sísmica 2D		580
CPE-4	1 pozo	6 pozos	7
	220 Km de sísmica 2D	1075 Km de sísmica 2D	1.295
CPE-5	3 pozos	2 pozos	5
	700 Km de sísmica 2D	300 Km de sísmica 2D	1.000
CPE-6	1 pozo	5 pozos	6
	135 Km de sísmica 2D	501 Km de sísmica 2D	636
CPE-7	1 pozo	3 pozos	4
	370 Km de sísmica 2D	635 Km de sísmica 2D	1.005
CPE-8	2 pozos		2
	470 Km de sísmica 2D	1031Km de símica 2D	1.501
		455 Km de reprocesamiento sísmica 2D 7288 Km ² de gravimetría	
Total Pozos	12	36	48
Total Sísmica (Km)	2.900	4.867	7.767

ANH - SEISMIC LINES IN THE DCP PROJECT AREA



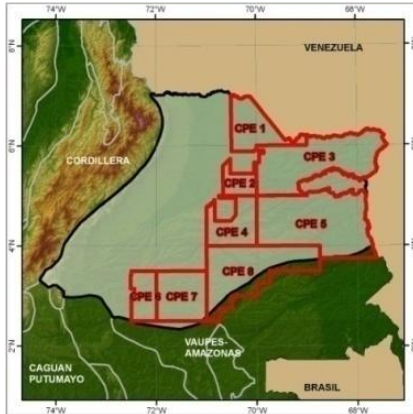
EXISTING WELLS IN THE DCP PROJECT AREA



The area has five main economic activities

- Oil exploitation
- Livestock production
- Agricultural production
- Trade
- Ecotourism





- Information meetings with local and regional governmental offices and native communities.
- General geology and geophysics courses to the region teachers.
- Identification of longterm selfsustained economical projects for the region.
- Designing appropriated strategies for indigenous issues and environmental policies.



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AREA (Ha) No. Blocks

Type 1
E&P
MINIROUND

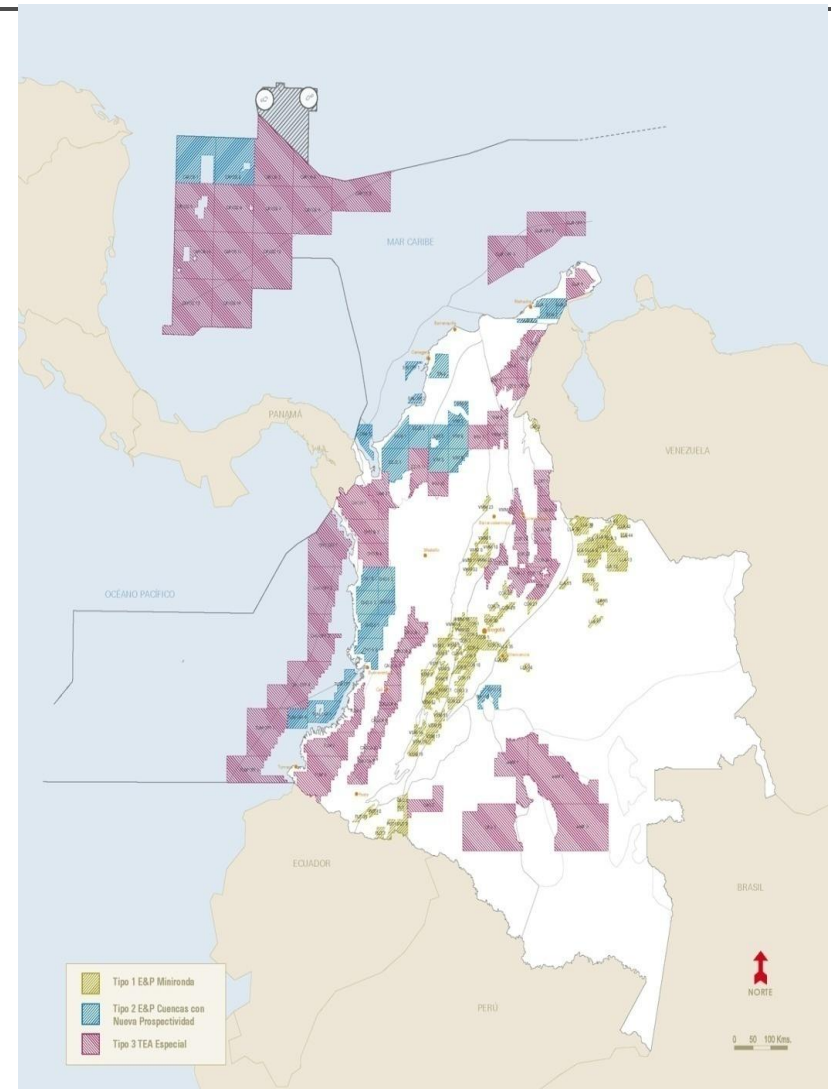
4' 347.052 74

Type 2
E&P
NEWLY
PROSPECTIVE BASINS

8' 457.927 31

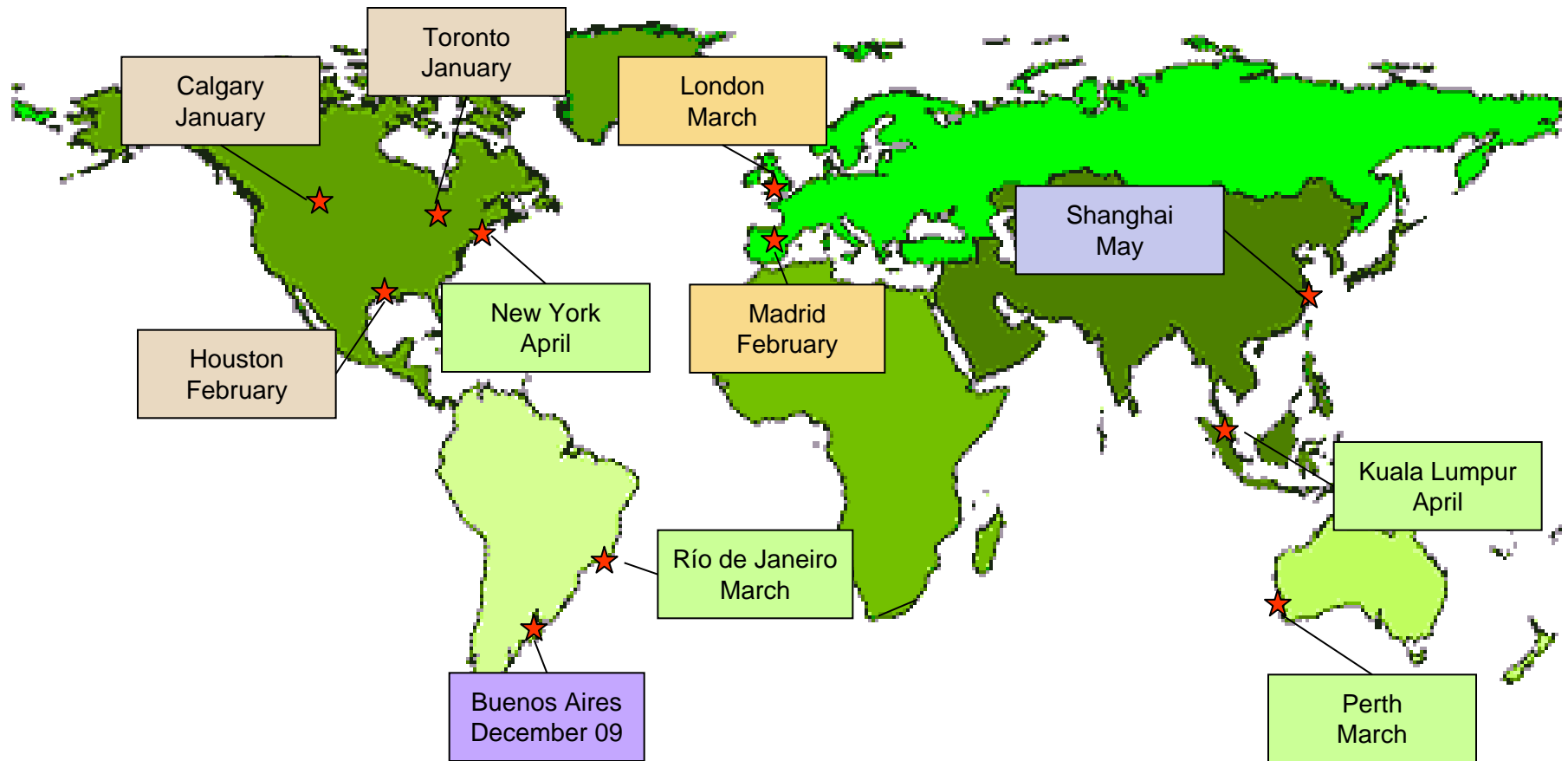
Type 3
SPECIAL
TEA

39' 057.767 63



*TEA: Technical Evaluation Agreement

Pre Launch	October 15 (Bogotá)
Data Packs	November 2009
Launch	December 2 (Bogotá)
Road Show	January – April 2010
Pre-Qualification	Early May 2010
Bids	Mid June 2010



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Colombia offers good business opportunities

- Prolific geology
- Good business environment
- Appropriate institutional framework
- Competitive and fair contract
- Competitive rounds
- Continued stability in the sector
- ... still a window of opportunity

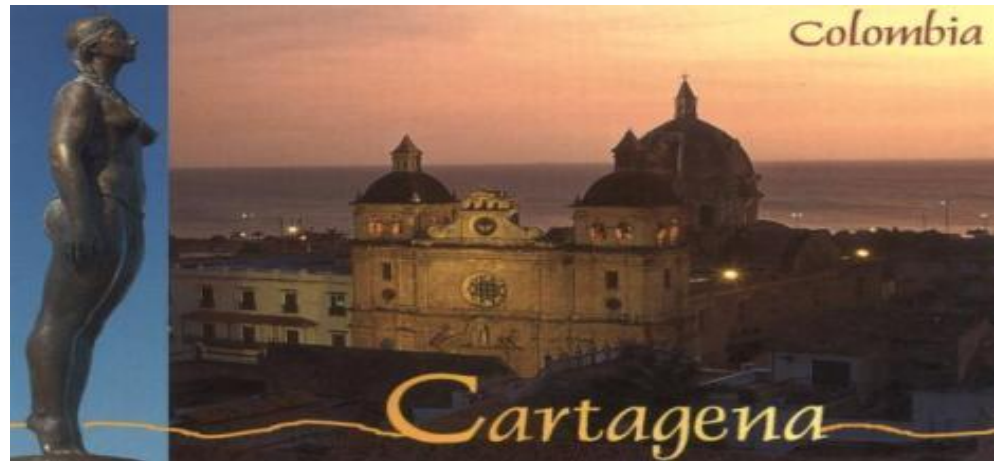


Please, book in your agendas for 2009-2010

**Bogotá, 1 - 4 December 2009:
Colombia Petroleum Show
Fairground: Corferias**



**Cartagena, 23 - 25 June 2010:
IV Colombia Oil and Gas
Investment Conference**



Web page: www.rondacolombia2010.com
www.colombiaround2010.com

- All information pertinent to Round
- Regularly updated, containing:
 - Initial and definitive terms of reference
 - Block maps
 - Basic Round information / schedule
 - Relevant legislation
 - FAQs
 - Links to ANH main web-site and information on E&P activity in Colombia

Thank you!

Muchas gracias VENEZUELA

www.anh.gov.co