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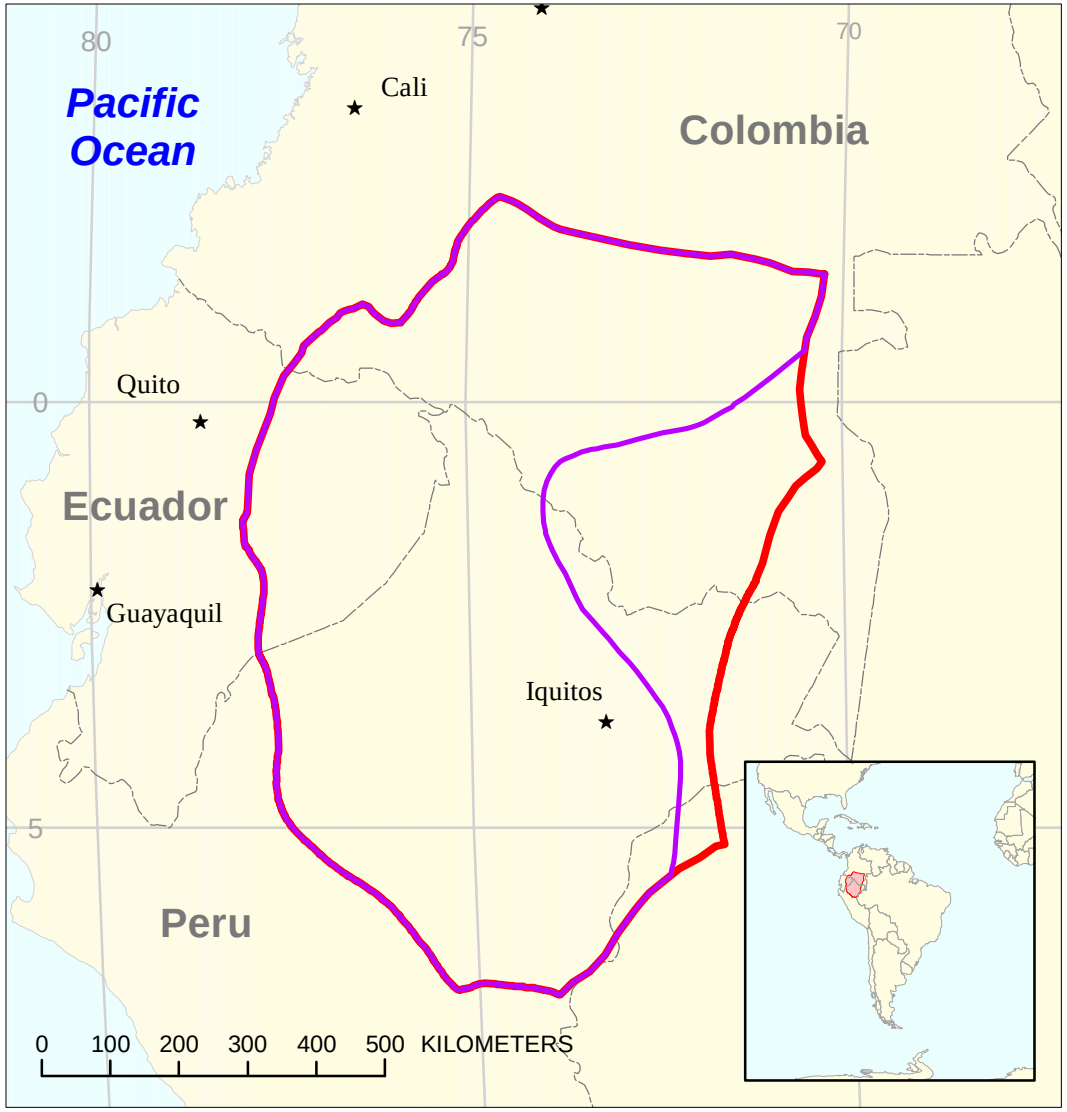
Ene
Assessment Unit 60410201



Ene Assessment Unit 60410201
Putumayo-Oriente-Maranon Basin Geologic Province 6041

Geologic Summary

Detailed map of this assessment unit

Assessment Input Data

Assessment Results

- Assessment Unit Summary
- Detailed Assessment Results
- Undiscovered Field-Size Distributions

USGS PROVINCE: Putumayo-Oriente-Maranon Basin (6041) **GEOLOGIST:** D.K. Higley

TOTAL PETROLEUM SYSTEM: Paleozoic (604102)

ASSESSMENT UNIT: Ene (60410201)

DESCRIPTION: This is a hypothetical petroleum system and assessment unit.

SOURCE ROCKS: Evaporitic shales in the Permian Ene Formation are the probable hydrocarbon source rocks for a family of crudes from Cretaceous reservoirs in the southern part of the Maranon Basin (Mathalone and Montoya, 1995); this work, particularly in the Corrientes field, is based on geochemical differences among oils across the basin. There is some potential for Permian-sourced oil and gas in Paleozoic reservoirs.

MATURATION: Across South America, source rock units as old as Ordovician and as young as Neogene (Miocene and Pliocene time) have become mature in the Neogene phase(s) of basin development (Pindell and Tabbutt, 1995). Marksteiner and Aleman (1996) believe the main phase for hydrocarbon generation and migration was from Late Cretaceous to Middle Eocene.

MIGRATION: The probable primary migration pathways for hydrocarbons from Paleozoic source rocks would be vertical along a series of faults that cut to basement, and in-place for Paleozoic reservoirs that are within the oil or gas window. Because of variable faulting, uplift, and erosion, Paleozoic strata are isolated. This would limit lateral migration of hydrocarbons along unconformable surfaces and through porous and permeable formations.

RESERVOIR ROCKS: There is no oil or gas production from Paleozoic formations in the province. Hypothetical reservoirs in the Maranon Basin are sandstones of the Permian Ene Formation, and possibly other sandstones of the Mitu Group. Distribution and reservoir quality of sandstone and dolomite beds is poorly documented for the basins.

TRAPS AND SEALS: Potential seals for the hypothetical Paleozoic petroleum system (60410201) would be interbedded and capping shales of the Permian Ene Formation and the overlying Mitu Group. The Triassic salt is a potential seal, particularly in the western areas of the basin, and may have contributed to the possible structural traps; stratigraphic and combination traps may also occur.

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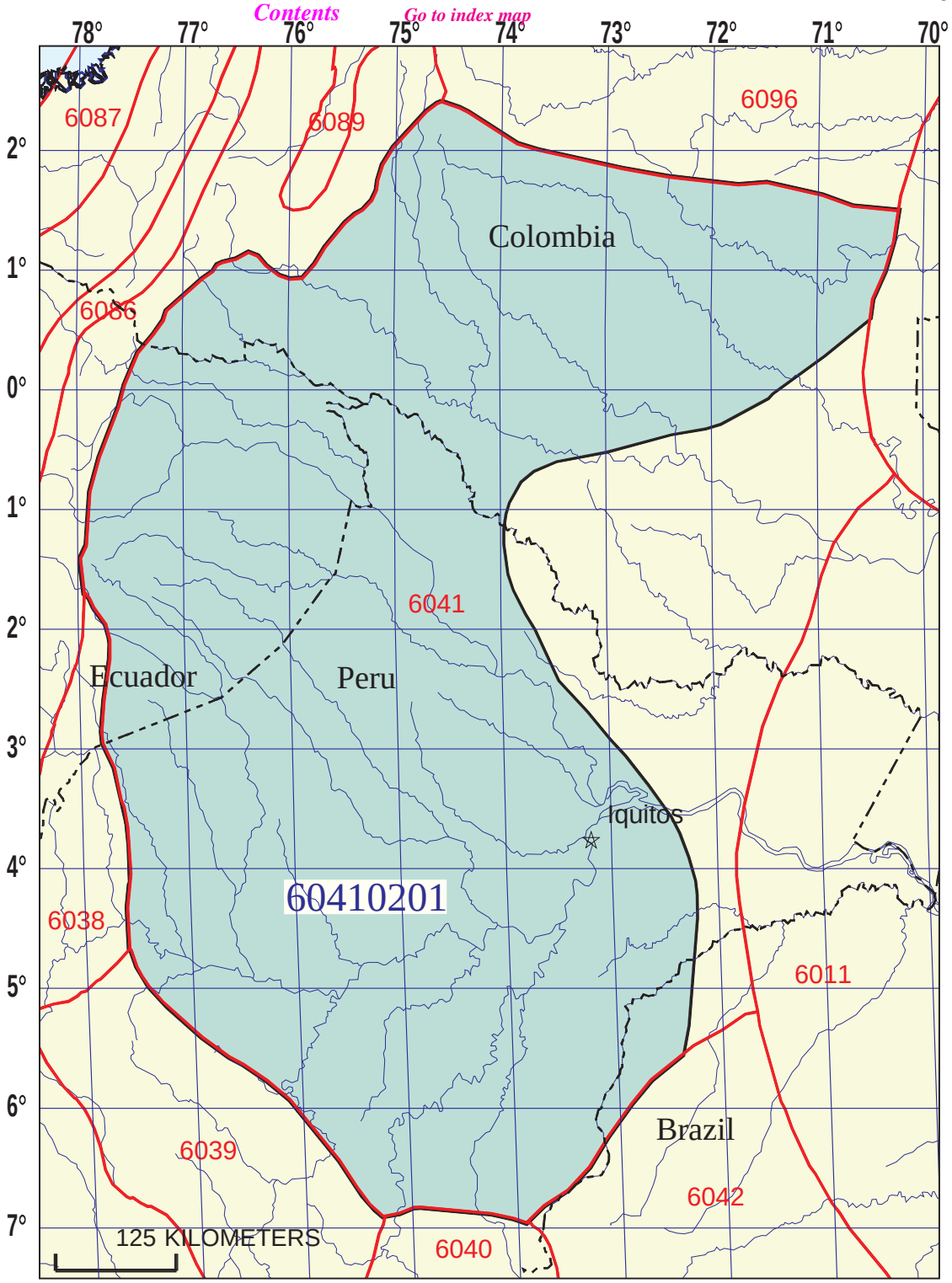

Ene
Assessment Unit - 60410201

EXPLANATION

- Hydrography
- Shoreline
- 6041 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 60410201 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

SEVENTH APPROXIMATION
NEW MILLENNIUM WORLD PETROLEUM ASSESSMENT
DATA FORM FOR CONVENTIONAL ASSESSMENT UNITS

Date:……..	2/4/99		
Assessment Geologist:……..	D.K. Higley		
Region:……..	Central and South America	Number:	6
Province:……..	Putumayo-Oriente-Maranon Basin	Number:	6041
Priority or Boutique……..	Priority		
Total Petroleum System:……	Paleozoic	Number:	604102
Assessment Unit:……..	Ene	Number:	60410201
* Notes from Assessor			

CHARACTERISTICS OF ASSESSMENT UNIT

Oil (<20,000 cfg/bo overall) **or** Gas (≥20,000 cfg/bo overall):… Oil

What is the minimum field size?……. 5 mmboe grown (≥1mmboe)
(the smallest field that has potential to be added to reserves in the next 30 years)

Number of discovered fields exceeding minimum size:…….. Oil: 0 Gas: 0
Established (>13 fields) _____ Frontier (1-13 fields) _____ Hypothetical (no fields) X

Median size (grown) of discovered oil fields (mmboe):
1st 3rd _____ 2nd 3rd _____ 3rd 3rd _____
Median size (grown) of discovered gas fields (bcfg):
1st 3rd _____ 2nd 3rd _____ 3rd 3rd _____

Assessment-Unit Probabilities:

Attribute	Probability of occurrence (0-1.0)
1. **CHARGE:** Adequate petroleum charge for an undiscovered field ≥ minimum size……	1.0
2. **ROCKS:** Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size……	0.5
3. **TIMING OF GEOLOGIC EVENTS:** Favorable timing for an undiscovered field ≥ minimum size	1.0

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):…….. 0.5

4. **ACCESSIBILITY:** Adequate location to allow exploration for an undiscovered field ≥ minimum size…… 1.0

UNDISCOVERED FIELDS

Number of Undiscovered Fields: How many undiscovered fields exist that are ≥ minimum size?:
(uncertainty of fixed but unknown values)

Oil fields:……min. no. (>0)	1	median no.	10	max no.	25
Gas fields:……min. no. (>0)	1	median no.	6	max no.	15

Size of Undiscovered Fields: What are the anticipated sizes (**grown**) of the above fields?:
(variations in the sizes of undiscovered fields)

Oil in oil fields (mmbo)……min. size	5	median size	10	max. size	150
Gas in gas fields (bcfg):…….. min. size	30	median size	150	max. size	2000

Assessment Unit (name, no.)
Ene, 60410201

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	1100	2200	3300
NGL/gas ratio (bngl/mmcfg)……	30	60	90

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	22	44	66
Oil/gas ratio (bo/mmcfg)……			

SELECTED ANCILLARY DATA FOR UNDISCOVERED FIELDS

(variations in the properties of undiscovered fields)

Oil Fields:	minimum	median	maximum
API gravity (degrees)……		45	
Sulfur content of oil (%)……		0.02	
Drilling Depth (m) ……	900	3650	5200
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……			
CO_2 content (%)……			
Hydrogen-sulfide content(%)……			
Drilling Depth (m)……	3650	4300	6400
Depth (m) of water (if applicable)……			

Assessment Unit (name, no.)
Ene, 60410201

ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

1. Colombia represents 32 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		5	
Portion of volume % that is offshore (0-100%).....		0	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		0	
Portion of volume % that is offshore (0-100%).....		0	

2. Ecuador represents 16 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		15	
Portion of volume % that is offshore (0-100%).....		0	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		10	
Portion of volume % that is offshore (0-100%).....		0	

3. Peru represents 52 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		80	
Portion of volume % that is offshore (0-100%).....		0	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):.....			
Volume % in parcel (areal % x richness factor):...		90	
Portion of volume % that is offshore (0-100%).....		0	

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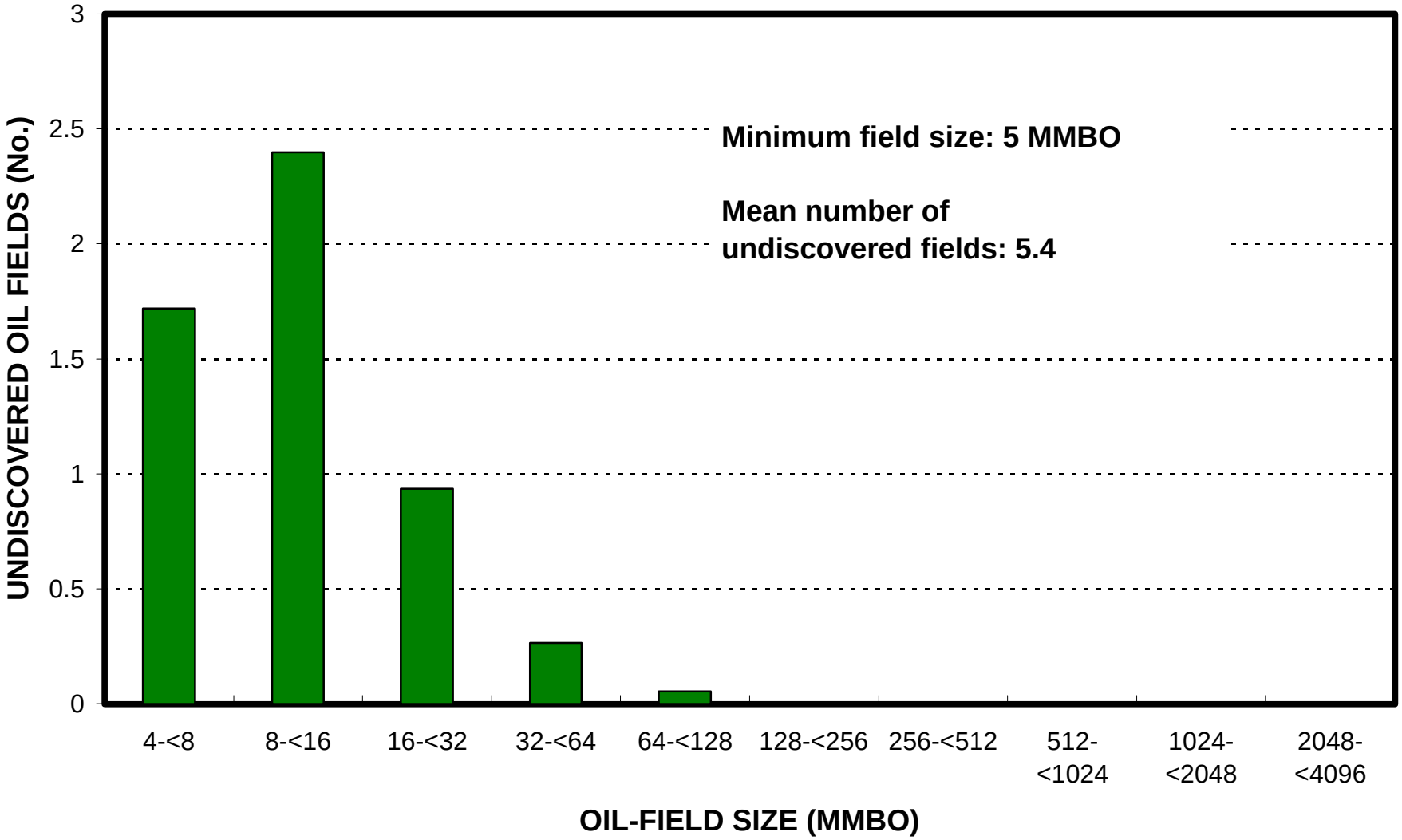
Undiscovered Field-Size Distribution



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Undiscovered Field-Size Distribution