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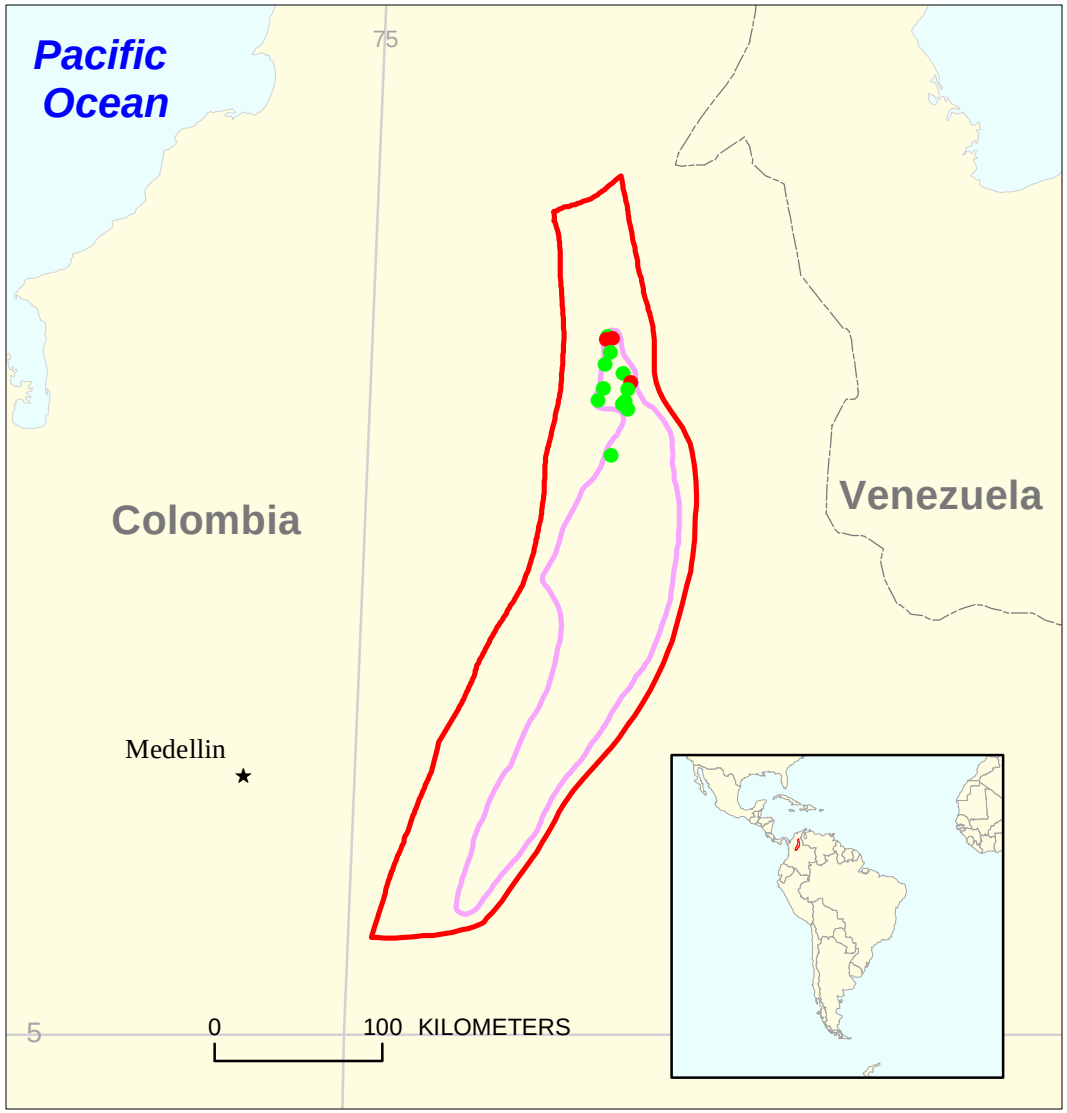
La Luna and Older
Assessment Unit 60900104



La Luna and Older Assessment Unit 60900104

Middle Magdalena Geologic Province 6090

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: Middle Magdalena (6090), Eastern Cordillera Basin (6092), and Perija-Venezuela-Coastal Ranges (6093)

GEOLOGIST: L.B. Magoon III

TOTAL PETROLEUM SYSTEM: La Luna-La Paz (609001)

ASSESSMENT UNIT: La Luna and Older (60900104)

DESCRIPTION: This assessment unit includes the traps underlying the La Luna source rock throughout much of the La Luna-La Paz total petroleum system in provinces 6090, 6092, and 6093.

SOURCE ROCK: The source rock is the Late Cretaceous La Luna Formation.

MATURATION: The thermal maturity (0.6 percent Ro) of the source rock was sufficient to began in the Eocene (~50 Ma) and was depleted in the Oligocene (~30 Ma).

MIGRATION: Migration path is complex because petroleum migrated from the lower portion of the source rock into different reservoir rocks below the area where major production occurs. Migration is along stratigraphic units and into structural traps, some of which may be fault bounded.

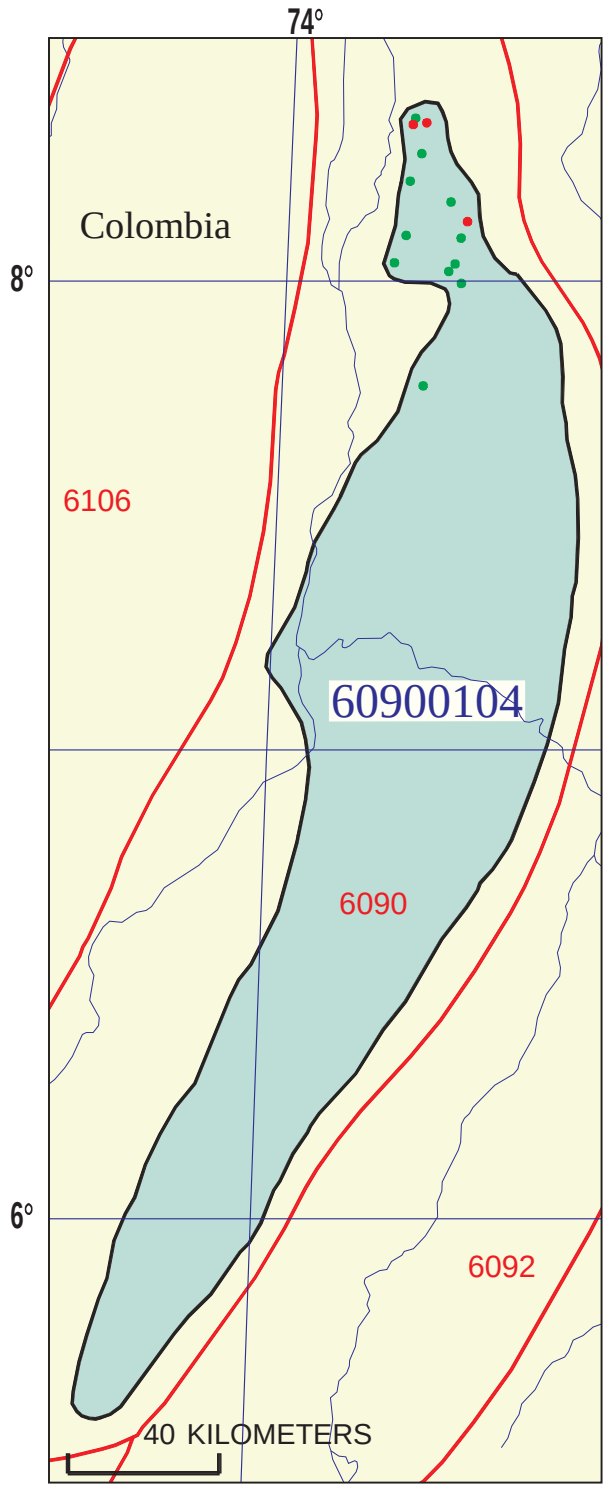
RESERVOIR ROCKS: Cretaceous siliciclastic and carbonate reservoir rocks were derived from the craton on the east or developed in-situ. Rock units include the Simiti, Tablazo, and Rosa Blanca formations. Gross and net thickness, porosity and permeability of the potential reservoir rocks are unknown.

TRAPS AND SEALS: Traps are expected to be mostly structural with some stratigraphic. The seal rocks are thick shales of local extent that occur within the major reservoir rocks.

REFERENCES:

Cooper, M.A., Addison, F.T., Alvarez, R., Coral, M., Graham, R.H., Hayward, A.B., Howe, S., Martinez, J., Naar, J., Peñas, R., Pulham, A.J., and Taborda, A., 1995, Basin development and tectonic history of the Llanos basin, Eastern Cordillera, and Middle Magdalena Valley, Colombia: American Association of Petroleum Geologists Bulletin, v. 79, p. 1421-1443.

Ramon, J.C., Dzou, L., and Giraldo, B., 1997, Geochemical evaluation of the Middle Magdalena basin, Colombia: Instituto Colombiano del Petróleo, Ciencia, TecnologÍa y Futuro, v. 1, no. 3, p. 47-66.



La Luna and Older Assessment Unit - 60900104

EXPLANATION

- Hydrography
- Shoreline
- 6090 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 60900104 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:……..	6/29/99		
Assessment Geologist:……..	L.B. Magoon		
Region:……..	Central and South America	Number:	6
Province:……..	Middle Magdalena	Number:	6090
Priority or Boutique……	Priority		
Total Petroleum System:……	La Luna-La Paz	Number:	609001
Assessment Unit:……..	La Luna and Older	Number:	60900104
* Notes from Assessor	Lower 48 growth factor.		

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?……. 4 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: 2 Gas: 0

Established (>13 fields) _____ Frontier (1-13 fields) X Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 7.8 2nd 3rd 5.4 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……	1.0
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):…….. 1.0

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)	2	median no.	15	max no.	30
Gas fields:……min. no. (>0)	1	median no.	2	max no.	4

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	4	median size	10	max. size	200
Gas in gas fields (bcfg):……min. size	24	median size	50	max. size	1000

Assessment Unit (name, no.)
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AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	500	1000	2000
NGL/gas ratio (bngl/mmcfg)……	30	60	90

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	20	40	60
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)……	15	35	50
Sulfur content of oil (%)……	0.1	1	2.8
Drilling Depth (m) ……	500	3000	5500
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……			
CO_2 content (%)……			
Hydrogen-sulfide content (%)……			
Drilling Depth (m)……	500	3000	5500
Depth (m) of water (if applicable)……			

Assessment Unit (name, no.)
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ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

1. Colombia represents 100 areal % of the total assessment unit

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

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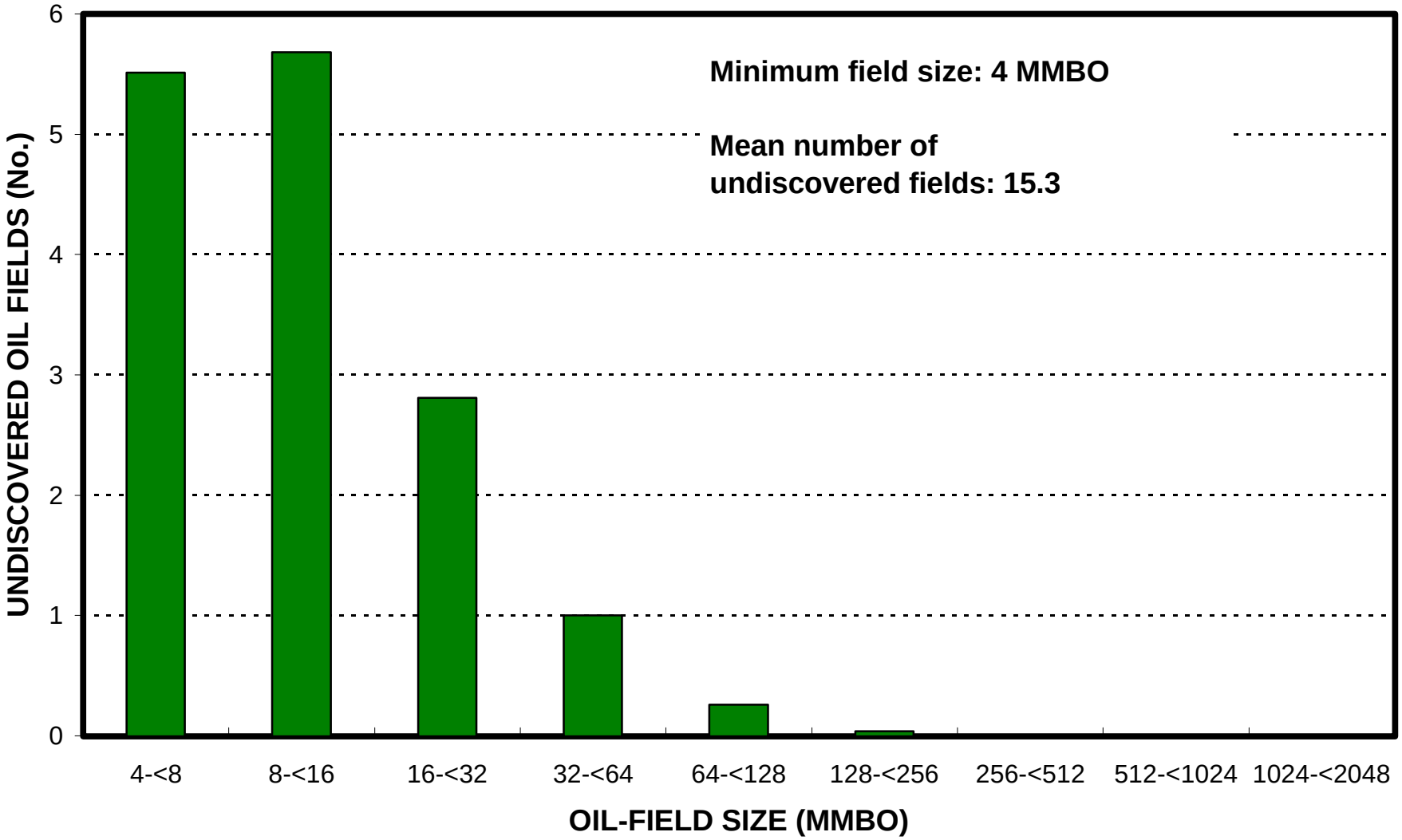
Undiscovered Field-Size Distribution



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Undiscovered Field-Size Distribution