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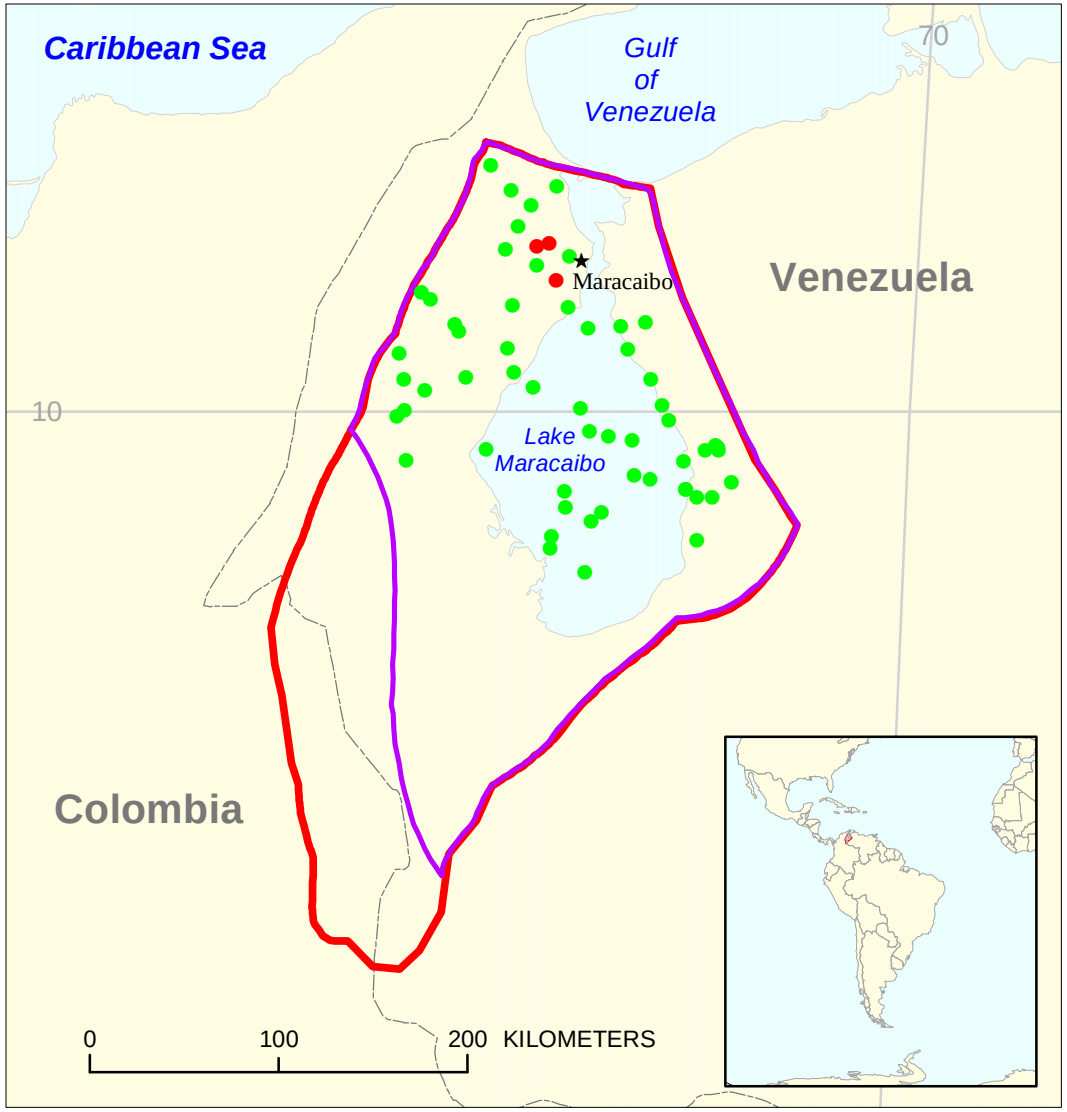
Main Maracaibo Basin
Assessment Unit 60990101



Main Maracaibo Basin Assessment Unit 60990101
Maracaibo Basin Geologic Province 6099

Geologic Summary

Detailed map of this assessment unit

Exploration/Discovery-History Data

- Plots of Known Field Sizes
- Plots of Grown Resources
- Tables

Assessment Input Data

Assessment Results

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

USGS PROVINCE: Maracaibo Basin (6099) **GEOLOGIST:** C.J. Schenk

TOTAL PETROLEUM SYSTEM: La Luna/Maracaibo (609901)

ASSESSMENT UNIT: Main Maracaibo Basin (60990101)

DESCRIPTION: This oil and gas assessment unit covers much of the Maracaibo Basin except for the fold belt in the southwestern part of the basin. The basin is bounded by the Perija Range, the Venezuelan Andes, the Santander Massif, and the Oca fault.

SOURCE ROCKS: Source rocks are mudstones of the Cretaceous La Luna Formation, which occurs throughout the Maracaibo Basin.

MATURATION: Mudstones of the Cretaceous La Luna Formation reached the oil window in the Eocene in the northeast part of the basin, but the majority of the La Luna in the Maracaibo Basin reached oil and gas maturity during the Miocene and Pliocene.

MIGRATION: Migration of oil and gas was mainly from the foredeep in the south and southeast to the north, where vertical migration occurred along the major fault systems.

RESERVOIR ROCKS: Main reservoir rocks are fluvial-deltaic sandstones of the Eocene Misoa Formation and deltaic sandstones of the Miocene Lagunillas Formation, and several other sandstones form minor reservoirs (< 1 percent).

TRAPS AND SEALS: Traps are dominantly structural, with the larger traps related to transpressional movement along the major faults. Stratigraphic traps are present, but are secondary to structural traps. Seals are mainly intraformational mudstones in the Eocene and Miocene sedimentary sections.

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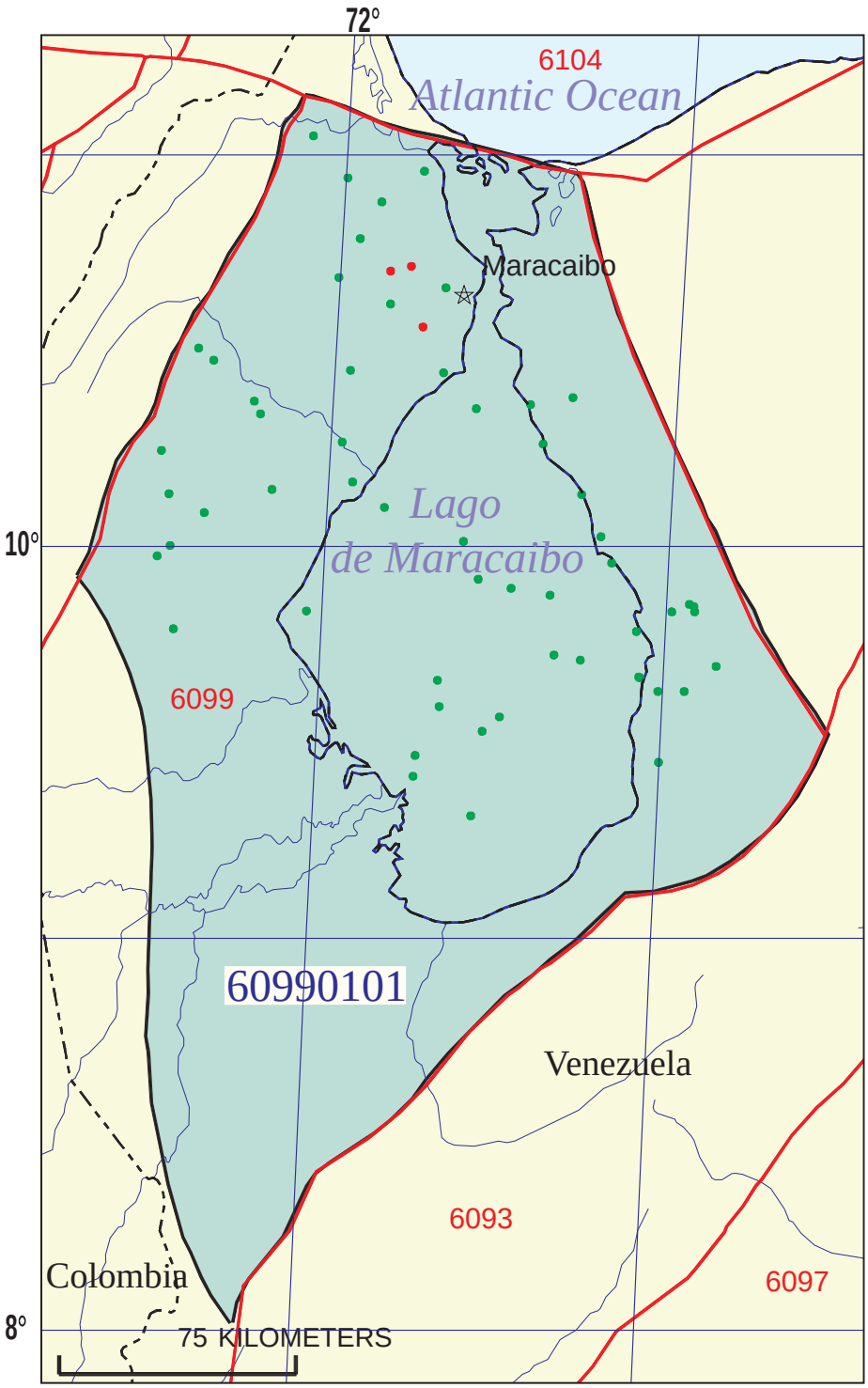
Talukdar, S., Gallango, O., and Lien, C.A., 1986, Generation and migration of hydrocarbons in the Maracaibo Basin, Venezuela–an integrated basin study: Organic Geochemistry, v. 10, p. 261-279.

Talukdar, S., and Marcano, F., 1994, Petroleum systems of the Maracaibo Basin, Venezuela, *in* Magoon, L.B., and Dow, W.G., eds., The petroleum system–from source to trap: American Association of Petroleum Geologists Memoir 60, p. 463-481.



Main Maracaibo Basin
Assessment Unit - 60990101

EXPLANATION

- Hydrography
- Shoreline
- 6099 — Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 60990101 — Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:……..	4/27/99		
Assessment Geologist:……..	C.J. Schenk		
Region:……..	Central and South America	Number:	6
Province:……..	Maracaibo Basin	Number:	6099
Priority or Boutique……	Priority		
Total Petroleum System:……	La Luna/Maracaibo	Number:	609901
Assessment Unit:……..	Main Maracaibo Basin	Number:	60990101
* Notes from Assessor	Lower 48 growth factor. Combined Bolivar coastal fields.		

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: 38 Gas: 3
Established (>13 fields) X Frontier (1-13 fields) _____ Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 304 2nd 3rd 204 3rd 3rd 123
Median size (grown) of discovered gas fields (bcfg):
1st 3rd 387 2nd 3rd 275 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)	20	median no.	100	max no.	200
Gas fields:……min. no. (>0)	2	median no.	25	max no.	60

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	30	max. size	2400
Gas in gas fields (bcfg):……min. size	24	median size	80	max. size	4000

Assessment Unit (name, no.)
Main Maracaibo Basin, 60990101

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	1000	1500	2000
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)……	20	35	50
Sulfur content of oil (%)……	0.5	1	1.5
Drilling Depth (m) ……	1500	3500	6000
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……			
CO_2 content (%)……			
Hydrogen-sulfide content(%)……			
Drilling Depth (m)……	2500	4000	7000
Depth (m) of water (if applicable)……			

Assessment Unit (name, no.)
Main Maracaibo Basin, 60990101

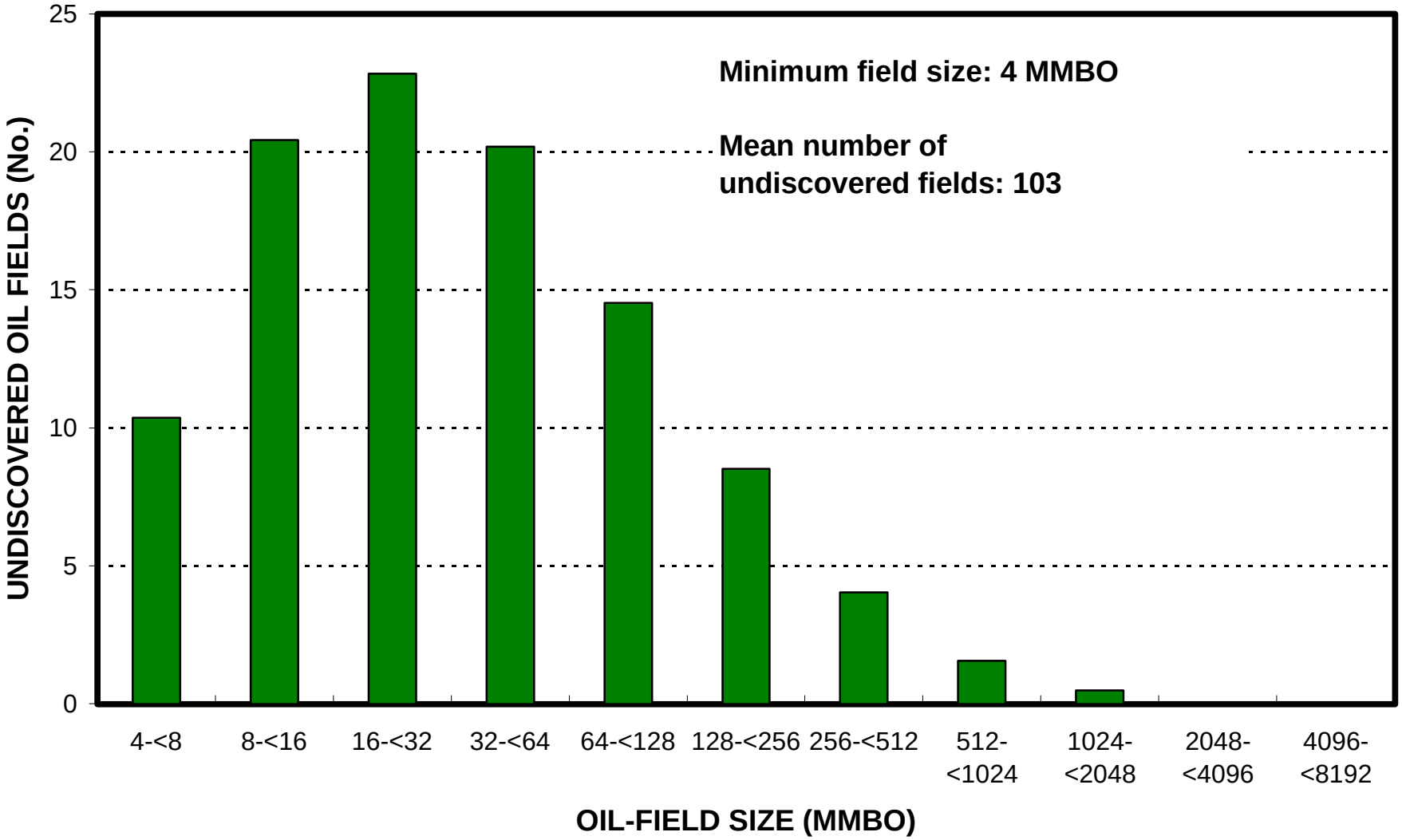
ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

1. Venezuela 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	

Main Maracaibo Basin, AU 60990101
Undiscovered Field-Size Distribution



Main Maracaibo Basin, AU 60990101
Undiscovered Field-Size Distribution