



# Foreland Central Chaco High Assessment Unit 60450103



-  Foreland Central Chaco High Assessment Unit 60450103
-  Santa Cruz-Tarija Geologic Province 6045

**USGS PROVINCE:** Santa Cruz-Tarija Basin (6045)

**GEOLOGIST:** S.J. Lindquist

**TOTAL PETROLEUM SYSTEM:** Los Monos-Machareti (604501)

**ASSESSMENT UNIT:** Foreland Central Chaco High (60450103) (hypothetical)

**DESCRIPTION:** The Santa Cruz-Tarija Province comprises a Paleozoic intracratonic rift basin that evolved into a Tertiary thin-skinned thrust belt and foreland basin. This assessment unit has been a persistent structural high in the foreland area through geologic time. It is approximately 104,000 sq km in area and includes portions of Paraguay, Bolivia, and Argentina (minor).

**SOURCE ROCKS:** Primary Devonian Los Monos and secondary Silurian Kirusillas (El Carmen) oil-and-gas-prone shales attain composite maximum thicknesses of 4 km in other parts of the province. The shales were deposited in semi-restricted, marine extensional basins and contain Type II to Type III kerogens and a maximum TOC content of 2 wt. %. Within this assessment unit, the source rocks should be thinner, more terrigenous in character, and perhaps less organically rich than elsewhere.

**MATURATION:** Thermal gradients are locally high in and adjacent to this assessment unit. Geologically recent hydrocarbon generation is possible from oil-and-gas-prone source rocks bordering the margin and from more gas-prone source rocks in the center of the assessment unit.

**MIGRATION:** Cenozoic proximal lateral migration into updip stratigraphic traps or more lengthy Paleozoic and Mesozoic lateral updip migration from foreland basin centers to older fault-block traps around the margin of the Central Chaco High.

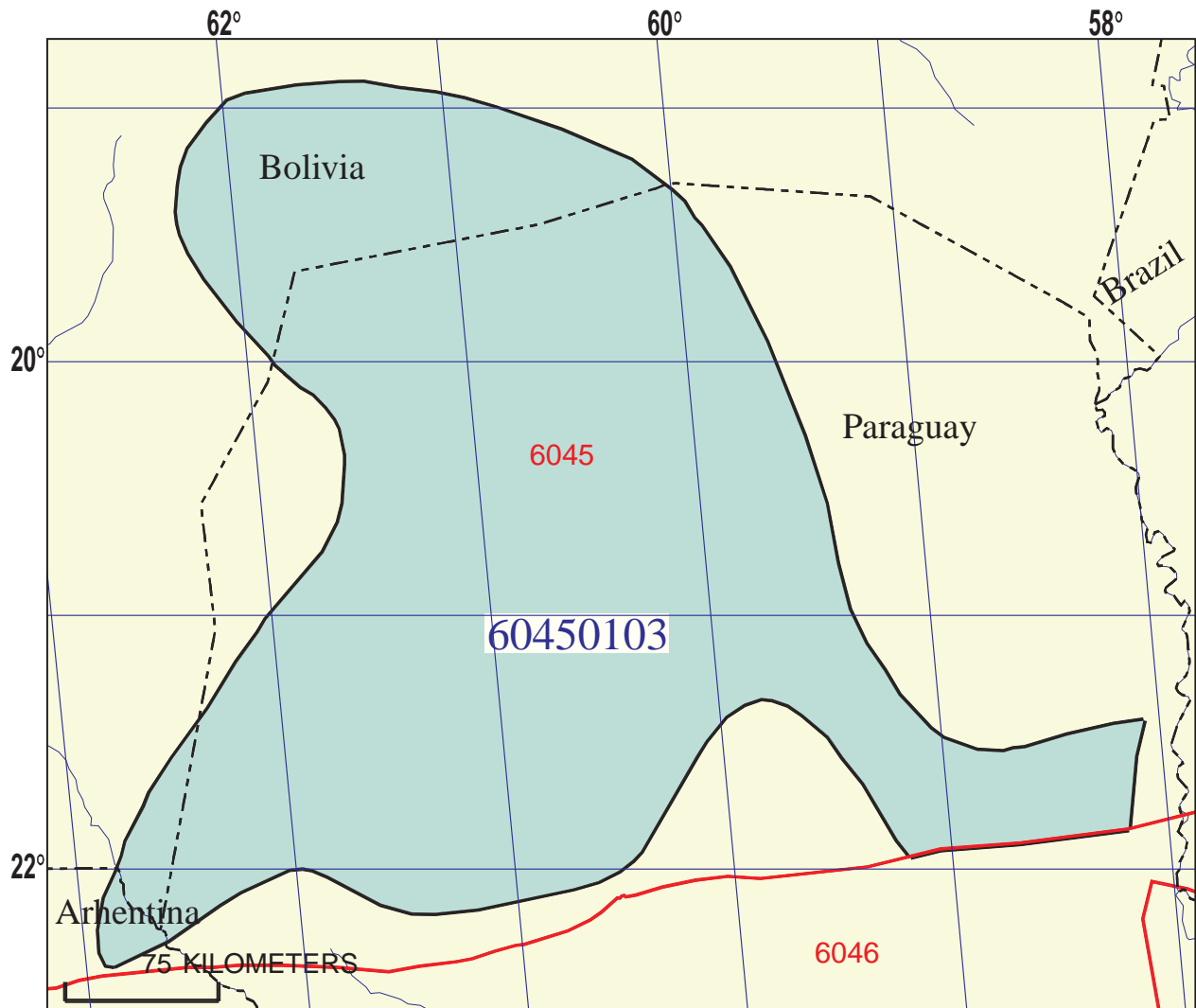
**RESERVOIR ROCKS:** The primary Carboniferous reservoirs of the province are absent in assessment unit. Dominant stratigraphic traps are expected to be Tertiary siliclastic reservoirs; other non-Carboniferous siliclastic reservoirs might comprise older structural fault-block traps (porosity 10 to 23 percent, permeability 10 to 160 mD).

**TRAPS AND SEALS:** Traps are Cenozoic stratigraphic onlaps onto the eastward-migrating foreland “forebulge axis” and possible Paleozoic extensional fault blocks parallel with the assessment unit margin. Seals are local and regional shales of all ages and variable thicknesses, possibly of lesser quality than elsewhere in the province.

**REFERENCES:**

Lindquist, S.J., 1998, The Santa Cruz-Tarija province of central South America—Los Monos-Machareti(!) petroleum system: U.S. Geological Survey Open-File Report 99-50-C, 16 p., 11 figs., 1 table.

Tankard, A.J., Suarez S., R., and Welsink, H.J., eds., 1995, Petroleum basins of South America: American Association of Petroleum Geologists Memoir 62, 792 p.



## Foreland Central Chaco High Assessment Unit - 60450103

### EXPLANATION

- Hydrography
- Shoreline
- 6045 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 60450103 — Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:..... 3/5/99  
 Assessment Geologist:..... C.J. Schenk  
 Region:..... Central and South America Number: 6  
 Province:..... Santa Cruz-Tarija Basin Number: 6045  
 Priority or Boutique..... Priority  
 Total Petroleum System:..... Los Monos-Machareti Number: 604501  
 Assessment Unit:..... Foreland Central Chaco High Number: 60450103  
 \* Notes from Assessor Lower 48 growth model. Grand Erg/Ahnet Province.

**CHARACTERISTICS OF ASSESSMENT UNIT**

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

What is the minimum field size?..... 3 mmmboe 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:**

<u>Attribute</u>	<u>Probability of occurrence (0-1.0)</u>
1. <b>CHARGE:</b> Adequate petroleum charge for an undiscovered field ≥ minimum size.....	<u>1.0</u>
2. <b>ROCKS:</b> Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size.....	<u>0.6</u>
3. <b>TIMING OF GEOLOGIC EVENTS:</b> Favorable timing for an undiscovered field ≥ minimum size	<u>1.0</u>

**Assessment-Unit GEOLOGIC Probability** (Product of 1, 2, and 3):..... 0.6

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. 20 max no. 50  
 Gas fields:.....min. no. (>0) 1 median no. 12 max no. 30

**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 3 median size 20 max. size 2000  
 Gas in gas fields (bcfg):..... min. size 18 median size 80 max. size 4800

**AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS**

(uncertainty of fixed but unknown values)

<u>Oil Fields:</u>	minimum	median	maximum
Gas/oil ratio (cfg/bo).....	1300	2600	3900
NGL/gas ratio (bnl/mmcf).....	30	60	90
<u>Gas fields:</u>	minimum	median	maximum
Liquids/gas ratio (bnl/mmcf).....	19	37	55
Oil/gas ratio (bo/mmcf).....			

---

**SELECTED ANCILLARY DATA FOR UNDISCOVERED FIELDS**

(variations in the properties of undiscovered fields)

<u>Oil Fields:</u>	minimum	median	maximum
API gravity (degrees).....	30	42	52
Sulfur content of oil (%).....	0.01	0.08	0.16
Drilling Depth (m) .....	500	1000	2000
Depth (m) of water (if applicable).....			
<u>Gas Fields:</u>	minimum	median	maximum
Inert gas content (%).....			
CO <sub>2</sub> content (%).....			
Hydrogen-sulfide content(%).....			
Drilling Depth (m).....	500	2200	4000
Depth (m) of water (if applicable).....			

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

1. Paraguay represents 82.7 areal % of the total assessment unit

<u>Oil in Oil Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>82.7</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>0</u>	_____
<u>Gas in Gas Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>82.7</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>0</u>	_____

2. Bolivia represents 16.5 areal % of the total assessment unit

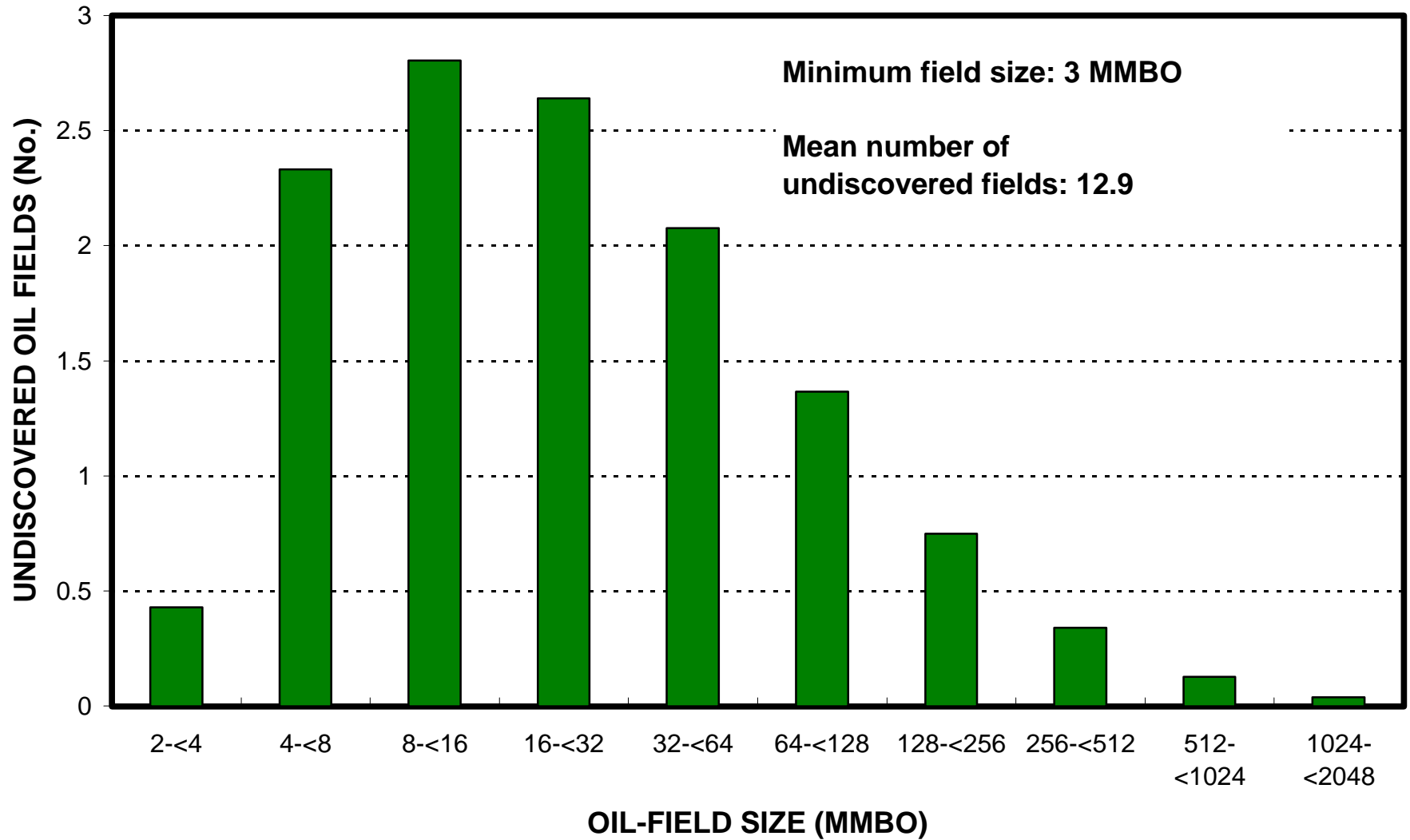
<u>Oil in Oil Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>16.5</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>0</u>	_____
<u>Gas in Gas Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>16.5</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>0</u>	_____

3. Argentina represents 0.8 areal % of the total assessment unit

<u>Oil in Oil Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>0.8</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>0</u>	_____
<u>Gas in Gas Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	<u>0.8</u>	_____
Portion of volume % that is offshore (0-100%):.....	_____	<u>0</u>	_____

# Foreland Central Chaco High, AU 60450103

## Undiscovered Field-Size Distribution



# Foreland Central Chaco High, AU 60450103

## Undiscovered Field-Size Distribution

