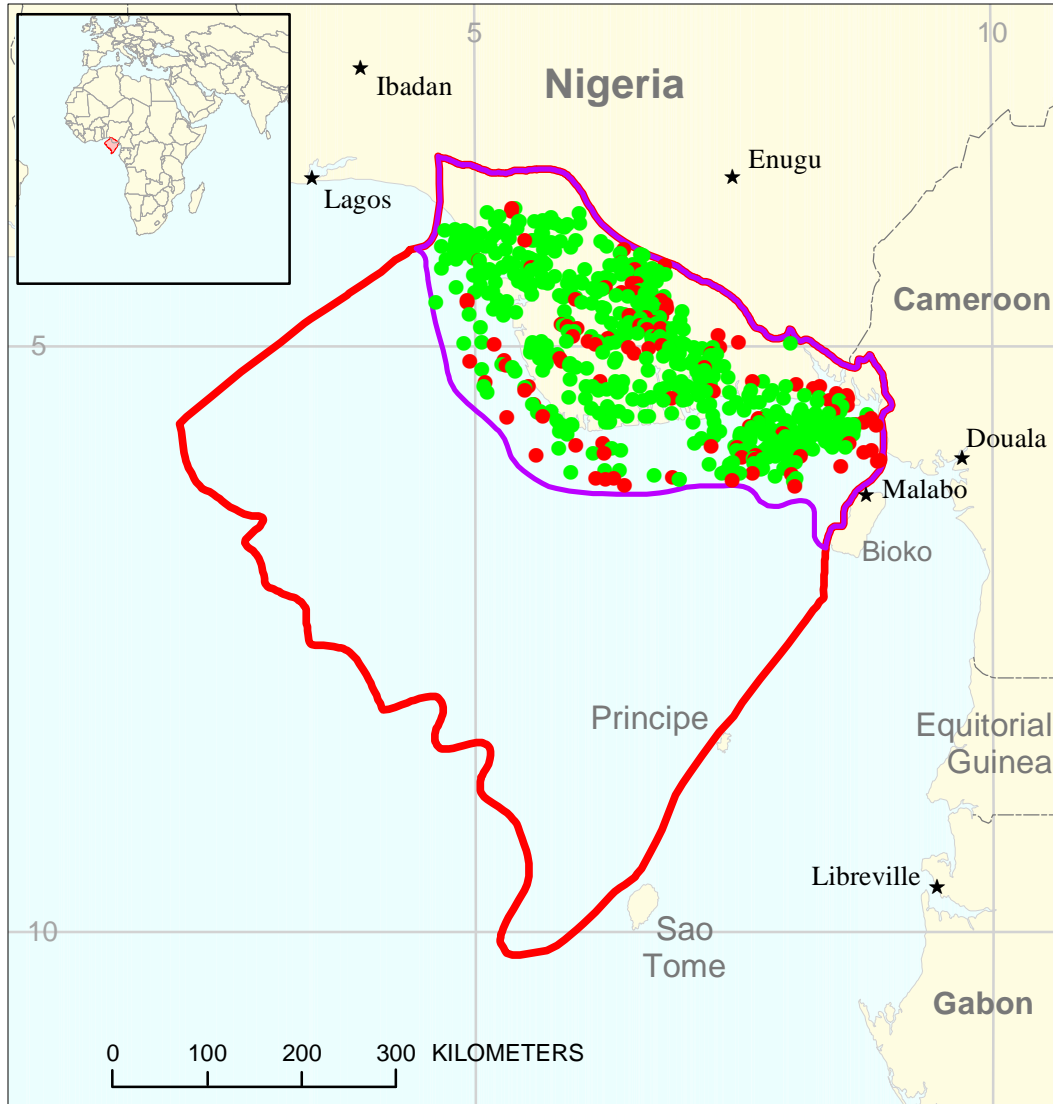




Agbada Reservoirs Assessment Unit 71920101



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 Niger Delta Geologic Province 7192

USGS PROVINCE: Niger Delta (7192)

GEOLOGISTS: M.L. Tuttle, M.E. Brownfield, and R.R. Charpentier

TOTAL PETROLEUM SYSTEM: Tertiary Niger Delta (Agbada/Akata) (719201)

ASSESSMENT UNIT: Agbada Reservoirs (71920101)

DESCRIPTION: Sandstone reservoirs in the Agbada Formation of the Niger Delta.

SOURCE ROCKS: Marine shales of the Agbada and Akata Formations; low TOCs (average 2.2 to 2.5 percent) and low HIs (generally less than 250); proposed hypothetical deeper Cretaceous source. Most oils are paraffinic, but some shallow oils are biodegraded and naphthenic. Gravities range from about 16° to 50° API, averaging about 35°.

MATURATION: Probably starting about Late Eocene and continuing to the present.

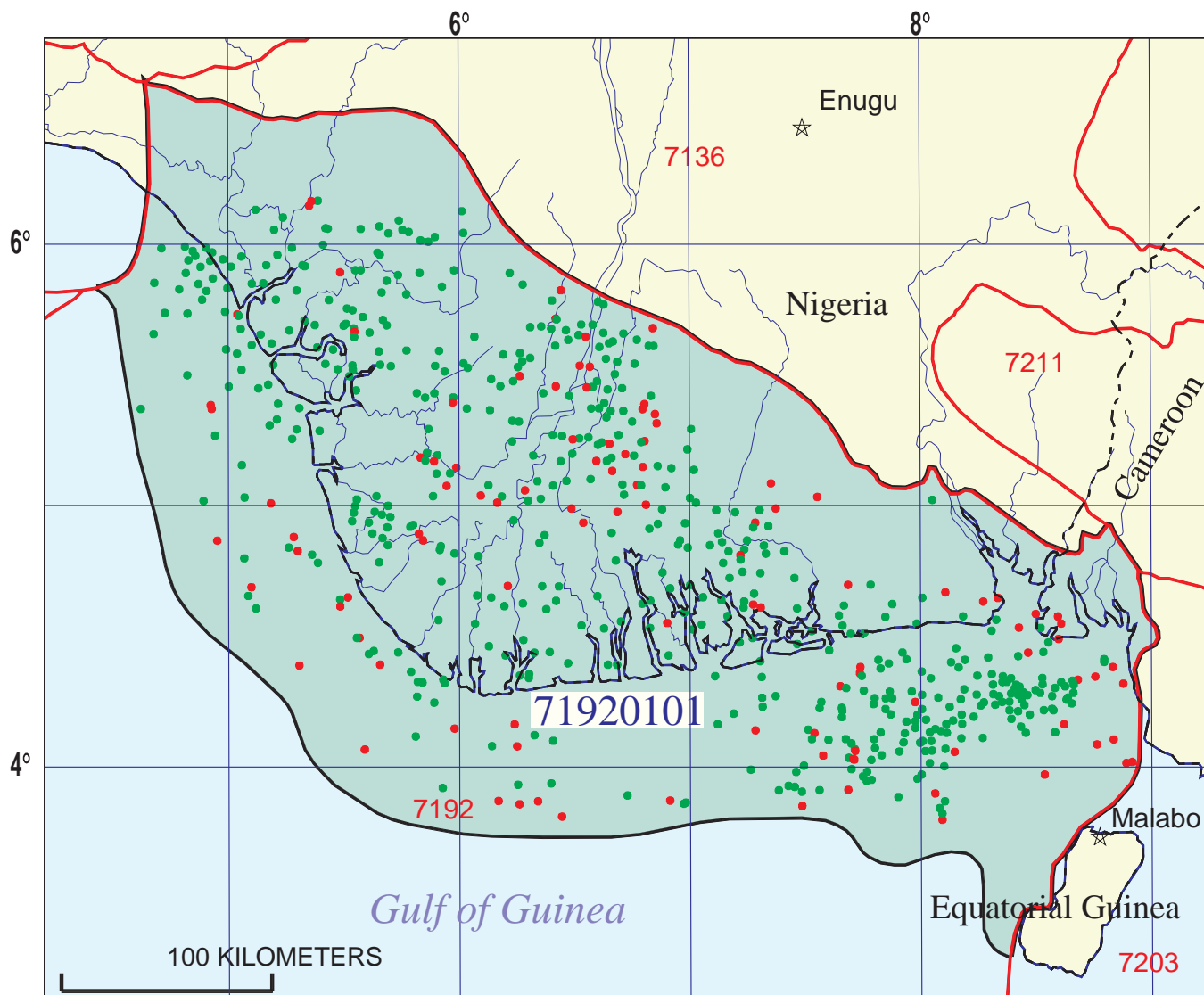
MIGRATION: Either directly from adjacent source rocks or up growth faults from deeper sources.

RESERVOIR ROCKS: Paralic sandstones in the Agbada Formation, especially point bars of distributary channels and coastal barrier bars. Many of the reservoirs sandstones are nearly unconsolidated. Typical sandstones have porosities of 40 percent and permeabilities of 2 D.

TRAPS AND SEALS: Structural traps related to rollovers and growth faults, some stratigraphic traps; seals are interbedded shales within the Agbada Formation.

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- Kulke, H., 1995, Nigeria, *in* Kulke, H., ed., *Regional petroleum geology of the world, part II, Africa, America, Australia, and Antarctica: Berlin, Gebrüder Borntraeger*, p. 143-172.
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Agbada Reservoirs Assessment Unit - 71920101

EXPLANATION

- Hydrography
- Shoreline
- 7192 Geologic province code and boundary
- - - Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 71920101 — Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:.....	<u>5/28/98</u>		
Assessment Geologist:.....	<u>M.L. Tuttle, M.E. Brownfield and R.R. Charpentier</u>		
Region:.....	<u>Sub-Saharan Africa and Antarctica</u>	Number:	<u>7</u>
Province:.....	<u>Niger Delta</u>	Number:	<u>7192</u>
Priority or Boutique:.....	<u>Priority</u>		
Total Petroleum System:.....	<u>Tertiary Niger Delta (Agbada/Akata)</u>	Number:	<u>719201</u>
Assessment Unit:.....	<u>Agbada Reservoirs</u>	Number:	<u>71920101</u>
* Notes from Assessor			

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?..... 1 mmmboe grown (\geq 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:	<u>481</u>	Gas:	<u>93</u>
Established (>13 fields) <u>X</u>	Frontier (1-13 fields)	<u></u>	Hypothetical (no fields)	<u></u>

Median size (grown) of discovered oil fields (mmboe):			
1st 3rd <u>60</u>	2nd 3rd <u>21.6</u>	3rd 3rd <u>22.6</u>	

Median size (grown) of discovered gas fields (bcfg):			
1st 3rd <u>116</u>	2nd 3rd <u>58</u>	3rd 3rd <u>199</u>	

Assessment-Unit Probabilities:

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

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):..... 1.0

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

UNDISCOVERED FIELDS

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

Oil fields:.....	min. no. (>0) <u>200</u>	median no. <u>580</u>	max no. <u>1000</u>
Gas fields:.....	min. no. (>0) <u>100</u>	median no. <u>250</u>	max no. <u>400</u>

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 <u>1</u>	median size <u>12</u>	max. size <u>1500</u>
Gas in gas fields (bcfg):.....	min. size <u>6</u>	median size <u>60</u>	max. size <u>7000</u>

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).....	1000	1770	3000
NGL/gas ratio (bnl/mmcf).....	20	33.5	45
<u>Gas fields:</u>	minimum	median	maximum
Liquids/gas ratio (bnl/mmcf).....	50	61.3	70
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).....	10	40	55
Sulfur content of oil (%).....	0.07	0.15	0.6
Drilling Depth (m)	350	2100	4500
Depth (m) of water (if applicable).....	0	40	200
<u>Gas Fields:</u>	minimum	median	maximum
Inert gas content (%).....			
CO ₂ content (%).....			
Hydrogen-sulfide content(%).....			
Drilling Depth (m).....	677	2200	4500
Depth (m) of water (if applicable).....	0	40	200

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

1. Nigeria represents 90 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):...	_____	90	_____
Portion of volume % that is offshore (0-100%):.....	_____	40	_____
<u>Gas in Gas Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	90	_____
Portion of volume % that is offshore (0-100%):.....	_____	40	_____

2. Cameroon represents 5 areal % of the total assessment unit

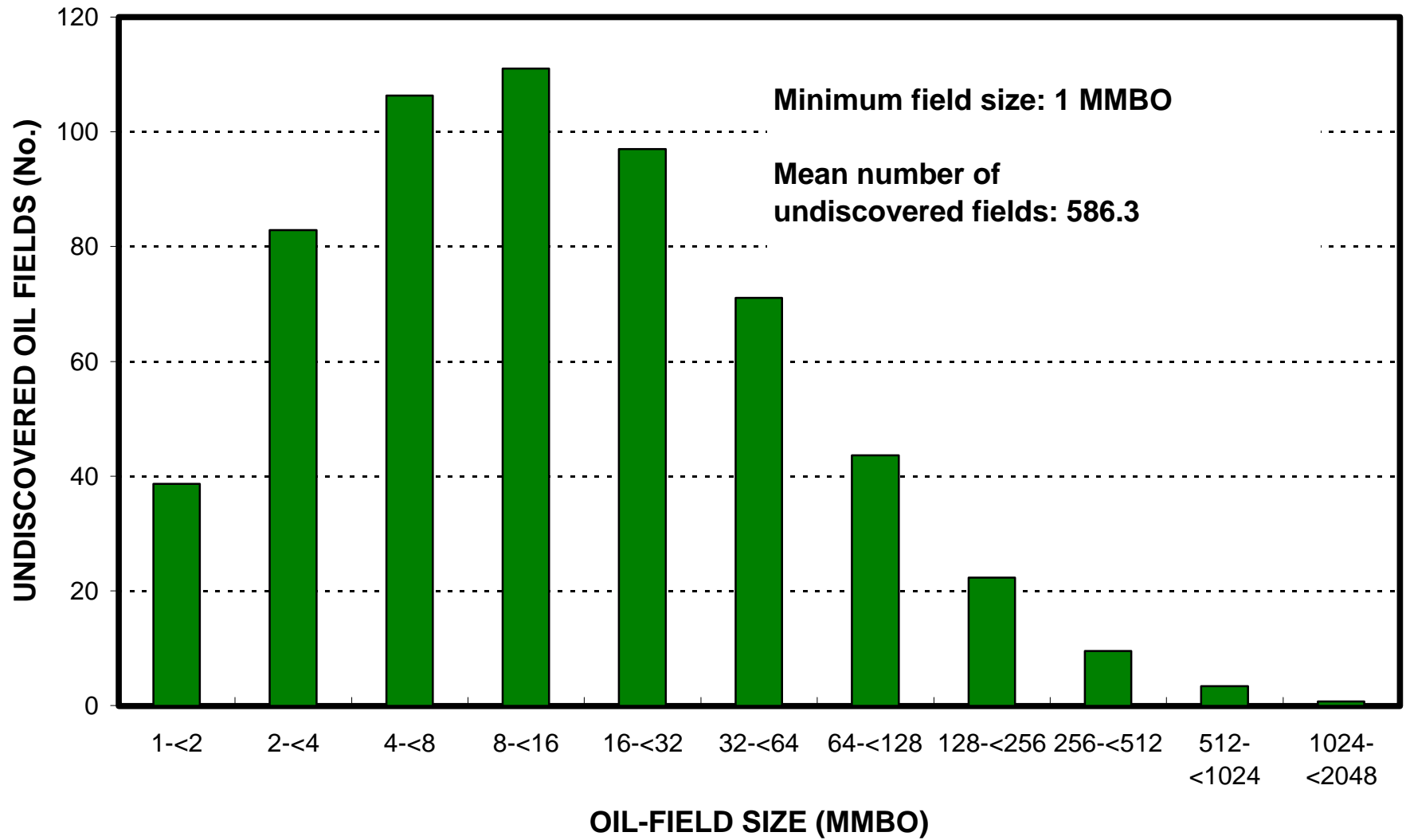
<u>Oil in Oil Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	5	_____
Portion of volume % that is offshore (0-100%):.....	_____	70	_____
<u>Gas in Gas Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	5	_____
Portion of volume % that is offshore (0-100%):.....	_____	70	_____

3. Equatorial Guinea represents 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):...	_____	5	_____
Portion of volume % that is offshore (0-100%):.....	_____	100	_____
<u>Gas in Gas Fields:</u>	minimum	median	maximum
Richness factor (unitless multiplier):.....	_____	_____	_____
Volume % in parcel (areal % x richness factor):...	_____	5	_____
Portion of volume % that is offshore (0-100%):.....	_____	100	_____

Agbada Reservoirs, AU 71920101

Undiscovered Field-Size Distribution



Agbada Reservoirs, AU 71920101

Undiscovered Field-Size Distribution

