




Indus Fan

Assessment Unit 80420102



-  Indus Fan Assessment Unit 80420102
-  Indus Geologic Province 8042
-  Other geologic province boundary

USGS PROVINCE: Indus (8042) Pakistan and India.

GEOLOGIST: C.J. Wandrey

TOTAL PETROLEUM SYSTEMS: Sembar-Goru/Ghazij (804201)

ASSESSMENT UNITS: Indus Fan (80420102)

DESCRIPTION: This assessment unit is located in southeastern Pakistan between the Murray Ridge and the Indian border from a water depth of 200 m (approximate shelf edge) to 3000 m of water depth (approximate base of the middle portion of the fan). It is a gas prone offshore fan developed on the edge of the Indian continental crust and adjacent oceanic crust. No wells have been drilled in water deeper than 200 m but wells have been drilled in water less than 200 m in depth on structures located primarily using seismic data. This assessment unit includes Eocene through Pliocene rocks of the upper part of the Sembar-Goru-Ghazij composite petroleum system. These rocks include siltstones, sandstones, and mudstones of the fan facies.

SOURCE ROCKS: Source rocks are postulated to be primarily Oligocene, Miocene, and Pliocene mudstones of the delta slope. Total organic carbon content ranges from 0.5 percent to >3.5 percent with an average of 1.4 percent where sampled onshore and are mainly Type II and III kerogens. While this assessment unit is assumed to be charged primarily by Oligocene and younger source rocks there may be some contribution from upper Cretaceous source rocks near the shelf edge.

MATURATION AND GENERATION: Maturation most likely occurred in Late Miocene and Pliocene with generation continuing today.

MIGRATION: Migration pathways are presumed to be vertical and updip into adjacent reservoirs and over short distances through faults associated with fan development.

RESERVOIR ROCKS: Included reservoir rocks are Miocene through Pliocene siltstones and sandstones. Porosities range from 10 to 30 percent in other deltas worldwide.

TRAPS AND SEALS: Traps such as filled channels, ridges, turbidites, and mud diapirs are likely in the fan sequences. Seals include interbedded mudstones and fault truncations.

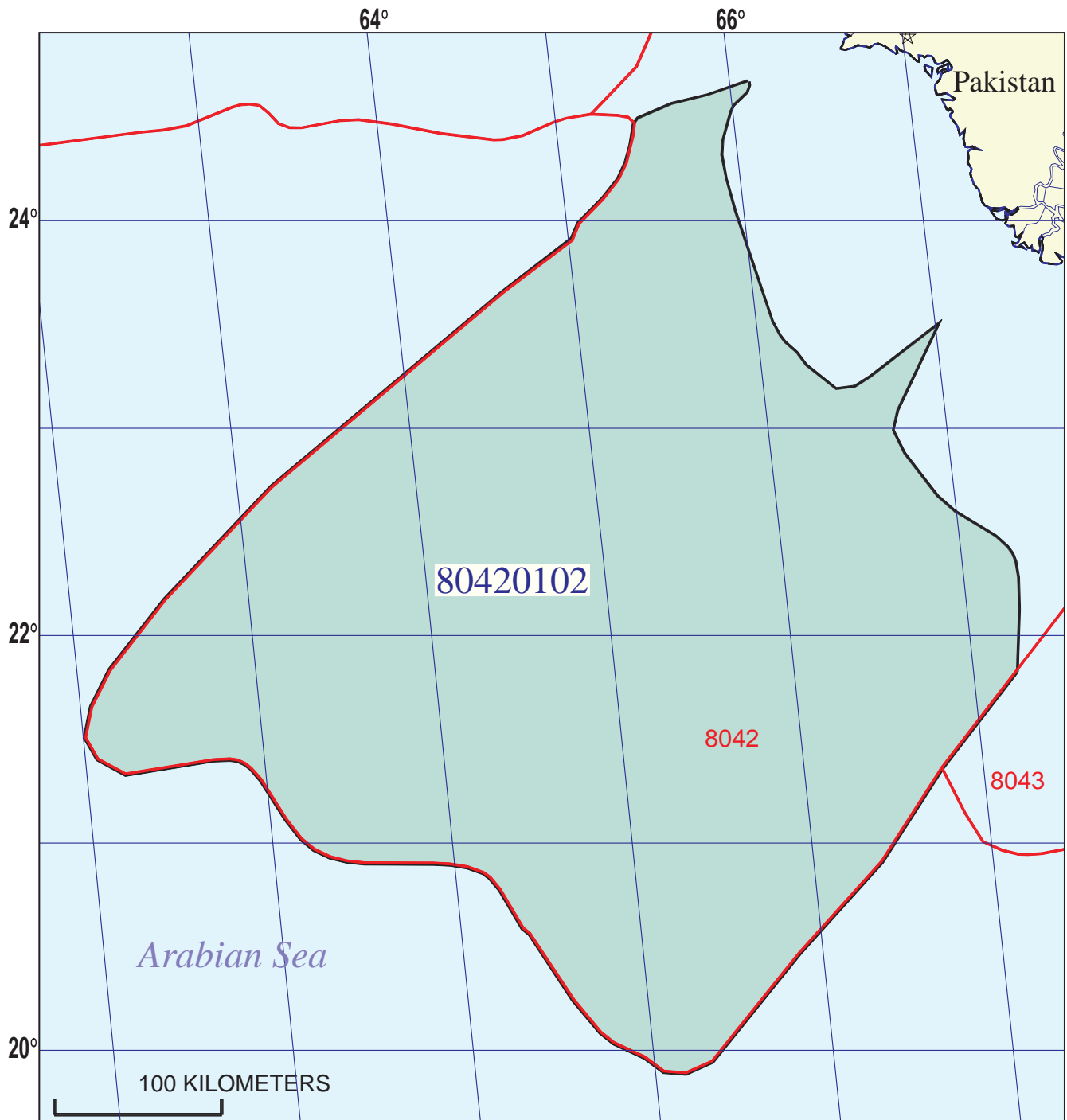
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Indus Fan Assessment Unit - 80420102

EXPLANATION

- Hydrography
- Shoreline
- 8042 — Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 80420102 — Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:..... 12/15/99
 Assessment Geologist:..... C.J. Wandrey
 Region:..... South Asia Number: 8
 Province:..... Indus Number: 8042
 Priority or Boutique:..... Priority
 Total Petroleum System:..... Sembar-Goru/Ghazij Number: 804201
 Assessment Unit:..... Indus Fan Number: 80420102
 * Notes from Assessor

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?..... 10 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:

<u>Attribute</u>	<u>Probability of occurrence (0-1.0)</u>
1. CHARGE: Adequate petroleum charge for an undiscovered field ≥ minimum size.....	<u>0.55</u>
2. ROCKS: Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size.....	<u>1.0</u>
3. TIMING OF GEOLOGIC EVENTS: Favorable timing for an undiscovered field ≥ minimum size	<u>1.0</u>

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):..... 0.55

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

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 _____ median size _____ max. size _____
 Gas in gas fields (bcfg):.....min. size 60 median size 150 max. size 10000

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).....	_____	_____	_____
NGL/gas ratio (bnl/mmcf).....	_____	_____	_____
<u>Gas fields:</u>	minimum	median	maximum
Liquids/gas ratio (bnl/mmcf).....	20	35	50
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).....	_____	_____	_____
Sulfur content of oil (%).....	_____	_____	_____
Drilling Depth (m)	_____	_____	_____
Depth (m) of water (if applicable).....	_____	_____	_____
<u>Gas Fields:</u>	minimum	median	maximum
Inert gas content (%).....	_____	_____	_____
CO ₂ content (%).....	_____	_____	_____
Hydrogen-sulfide content (%).....	_____	_____	_____
Drilling Depth (m).....	1000	3000	8000
Depth (m) of water (if applicable).....	200	1100	3000

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

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

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Undiscovered Field-Size Distribution

