



Northern West Siberian Onshore Gas Assessment Unit 11740301



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 West Siberian Basin Geologic Province 1174

USGS PROVINCE: West Siberian Basin (1174)

GEOLOGIST: G.F. Ulmishek

PETROLEUM SYSTEM: Northern West Siberian Mesozoic Composite (117403)

ASSESSMENT UNIT: Northern West Siberian Onshore Gas (11740301)

DESCRIPTION: The assessment unit includes the onshore portion of the petroleum system that contains huge gas reserves. Most of the reserves are found at two stratigraphic levels. A larger part is dry gas that occurs in the Albian-Cenomanian Pokur Formation. Smaller amounts of wet gas and some oil are found in Neocomian and, to a lesser extent, in Jurassic sandstones. Unexplored offshore part of the petroleum system is considered a separate assessment unit.

SOURCE ROCKS: Genesis of gas in northern West Siberia is poorly understood. Upper dry gas could have been sourced by low-maturity coaly shales and coals in the lower part of the Pokur Formation, but deeper sources are also possible. Models of migration and accumulation of the gas are poorly constrained. Source rocks for wet gas and oil in Neocomian and older rocks are probably Neocomian coals and marine Jurassic shales including the Volgian-lower Berriasian Bazhenov Formation. The latter is not as organic-rich as in more southern areas.

MATURATION: Jurassic rocks are presently in the gas window zone. The lower Pokur Formation is at the early maturity stage (Ro 0.6 to 0.7 percent). Maximum maturation was reached in Late Cretaceous-Eocene time.

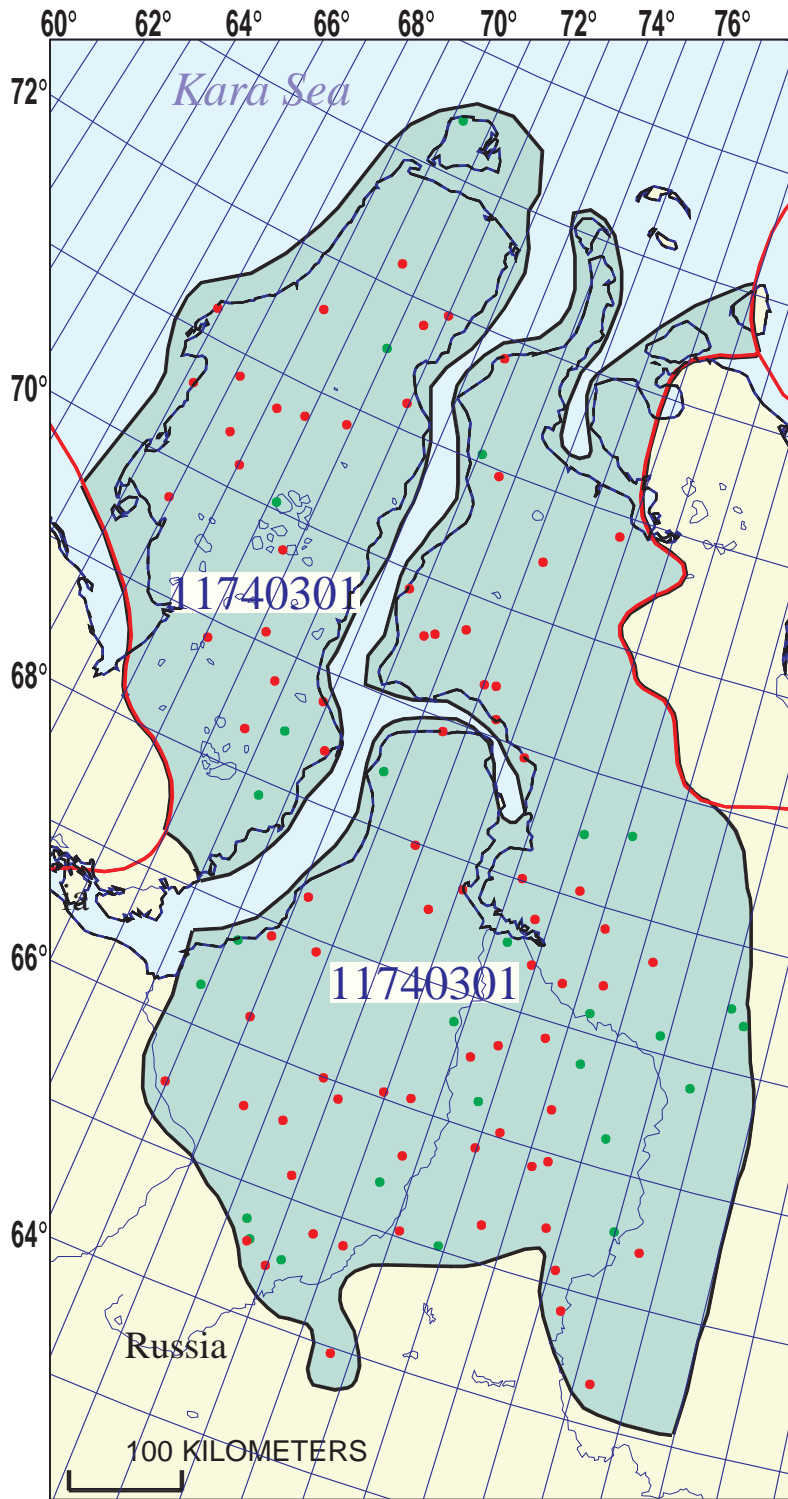
RESERVOIR ROCKS: The principal reserves of dry gas are found in sandstones of the upper Albian-Cenomanian Pokur Formation. Reservoir properties of the sandstones are excellent, porosity is 25 to 35 percent, permeability is 1 D and more. Porosity and permeability decrease in Neocomian and older reservoirs, but still remain relatively high.

TRAPS: Almost entire gas reserves are in very large anticlinal structures of regional dimension. An important stage of their formation was a compressional event that started in Oligocene time.

SEALS: Gas accumulations in the Pokur Formation are sealed by thick (150 to 600 m) marine siliceous shales of the Turonian-Coniacian Kuznetsov Formation. The regional seal for Neocomian reservoirs is composed of lower Albian shales.

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- Cramer, B., Poelchau, H.S., Gerling, P., Lopatin, N.V., and Litke, R., 1999, Methane released from groundwater—The source of natural gas accumulations in northern West Siberia: *Marine and Petroleum Geology*, v. 16, no. 3, p. 225-244.
- Litke, R., Cramer, B., Gerling, P., Lopatin, N.V., Poelchau, H.S., Schaefer, R.G., and Welte, D.H., 1999, Gas generation and accumulation in the West Siberian basin: *American Association of Petroleum Geologists Bulletin*, v. 83, no. 10, p. 1642-1665.
- Rovenskaya, A.S., and Nemchenko, N.N., 1992, Prediction of hydrocarbons in the West Siberian basin: *Bulletin Centre de Recherche Exploration-Production Elf Aquitaine*, v. 16, p. 285-318.



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EXPLANATION

- Hydrography
- Shoreline
- 1174 — Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 11740301 — Assessment unit code and boundary

Projection: Equidistant Conic. Central meridian: 100. Standard Parallel: 58 30

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

Date:..... 12/6/99
 Assessment Geologist:..... G.F. Ulmishek
 Region:..... Former Soviet Union Number: 1
 Province:..... West Siberian Basin Number: 1174
 Priority or Boutique..... Priority
 Total Petroleum System:..... Northern West Siberian Mesozoic Composite Number: 117403
 Assessment Unit:..... Northern West Siberian Onshore Gas Number: 11740301
 * Notes from Assessor No standard U.S. growth functions were applied; however, field growth is recognized.

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?..... 20 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: 16 Gas: 62
 Established (>13 fields) X Frontier (1-13 fields) Hypothetical (no fields)

Median size (grown) of discovered oil fields (mmboe):
 1st 3rd 700 2nd 3rd 61 3rd 3rd 65
 Median size (grown) of discovered gas fields (bcfg):
 1st 3rd 14670 2nd 3rd 1600 3rd 3rd 336

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>1.0</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):..... 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) 3 median no. 15 max no. 35
 Gas fields:.....min. no. (>0) 25 median no. 110 max no. 300

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 20 median size 60 max. size 750
 Gas in gas fields (bcfg):.....min. size 120 median size 350 max. size 50000

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)..... | 3000 | 5500 | 8000 |
| NGL/gas ratio (bnl/mmcf)..... | 30 | 60 | 90 |
| <u>Gas fields:</u> | minimum | median | maximum |
| Liquids/gas ratio (bnl/mmcf)..... | 12 | 25 | 38 |
| 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)..... | 25 | 42 | 55 |
| Sulfur content of oil (%)..... | 0.2 | 1.2 | 2.2 |
| Drilling Depth (m) | 1000 | 2500 | 4000 |
| Depth (m) of water (if applicable)..... | | | |
| <u>Gas Fields:</u> | minimum | median | maximum |
| Inert gas content (%)..... | 1.5 | 2 | 3 |
| CO ₂ content (%)..... | 0.3 | 0.4 | 0.6 |
| Hydrogen-sulfide content (%)..... | 0 | 0 | 0 |
| Drilling Depth (m)..... | 1000 | 2000 | 4500 |
| Depth (m) of water (if applicable)..... | | | |

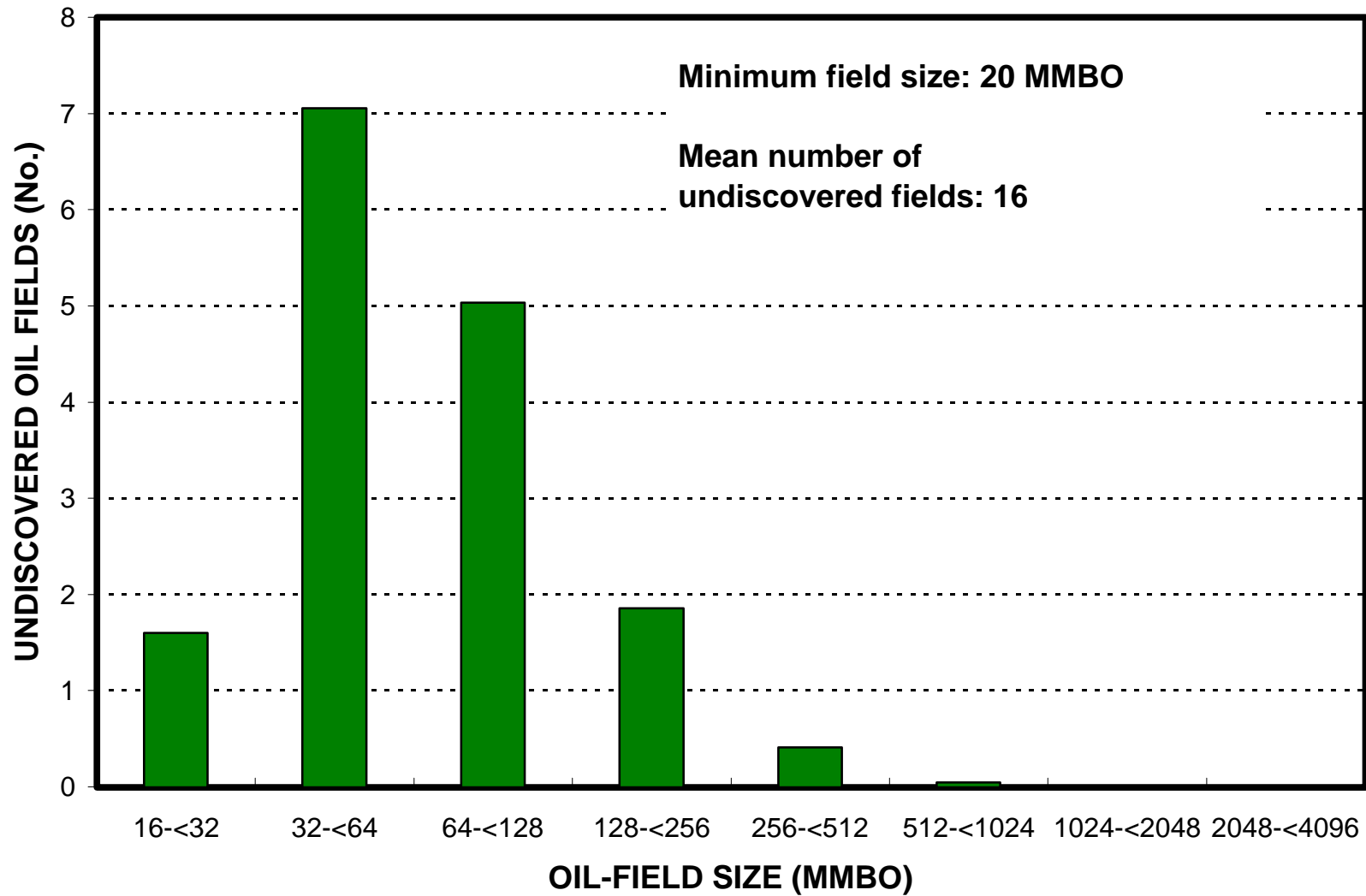
**ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT
TO COUNTRIES OR OTHER LAND PARCELS** (uncertainty of fixed but unknown values)

1. Russia 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):... | _____ | 100 | _____ |
| Portion of volume % that is offshore (0-100%)..... | _____ | 0 | _____ |
| <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%)..... | _____ | 0 | _____ |

Northern West Siberian Onshore Gas, AU 11740301

Undiscovered Field-Size Distribution



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Undiscovered Field-Size Distribution

