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Permian Reefs/Thrust Folds Assessment Unit 10150201

Permian Reefs/Thrust Folds Assessment Unit 10150201

Volga-Ural Region Geologic Province 1015

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: Volga-Ural Region (1015) **GEOLOGIST:** G.F. Ulmishek

PETROLEUM SYSTEM: Belsk Basin (101502)

ASSESSMENT UNIT: Permian Reefs/Thrust Folds (10150201)

DESCRIPTION: The assessment unit includes Lower Permian and Upper Carboniferous rocks of the Belsk basin, which is the southern depression of the Ural foredeep. These rocks produce oil in the northern part and gas in the southern part of the basin. Many of the fields have been depleted.

SOURCE ROCKS: Although geochemical data are absent, the geology of the fields indicates that the principal source rock is Lower Permian (Asselian-Artinskian) deep-water, organic-rich black shales developed in the axial zone of the foredeep. Eastward, the black shales pass into thick coarse orogenic clastics; westward, they pass into shallow-shelf carbonates and reefs.

MATURATION: Probably, maximum maturation was achieved after deposition of thick Upper Permian-Triassic orogenic clastics. After that, a large part of the rock column has been removed by erosion, especially in northern areas of the Belsk basin. Geologic data suggest that at peak maturity source rocks were in oil window in the northern part of the basin and in wet gas window in its southern part.

MIGRATION: Only short-distance lateral migration from source rocks into adjacent reef reservoirs is recorded.

RESERVOIR ROCKS: Most of oil and gas accumulations are in carbonate reef reservoirs that have variable, but commonly rather high porosity and permeability. Several fields have been found in Lower Permian self-sourced strongly fractured shale reservoirs.

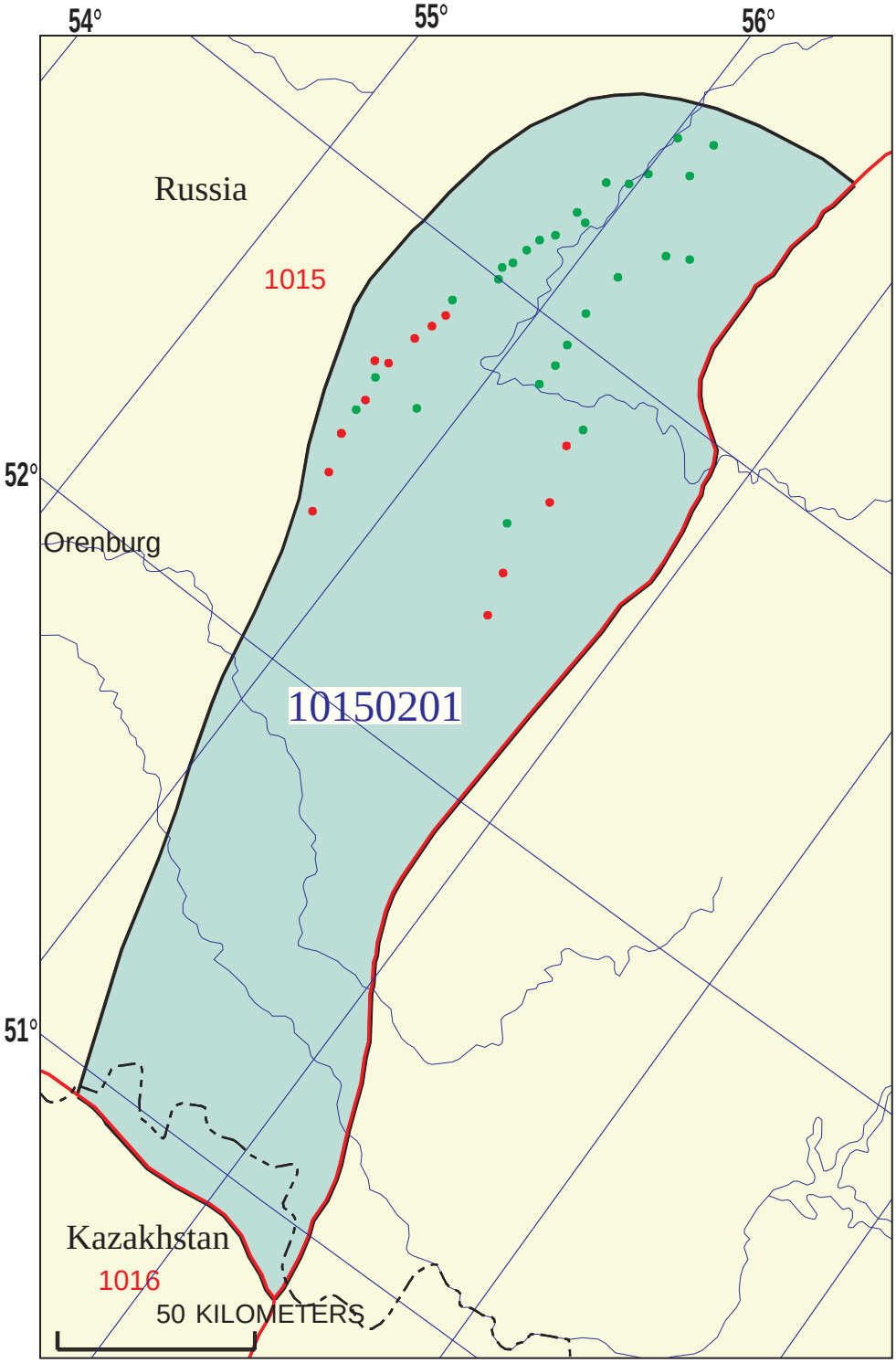
TRAPS AND SEALS: The great majority of traps are pinnacle reefs that form a chain extending along the entire Belsk basin. Height of the largest reefs reaches several hundred meters. Traps containing fractured shale reservoirs are thrust-related recumbent folds. In both types of traps, hydrocarbon accumulations are sealed by Kungurian (uppermost Lower Permian) evaporites including salt. No fields are present north of the pinch-out line of evaporites.

REFERENCES:

Grachevsky, M.M., Ulmishek, G.F., and Khatyanov, F.I., 1967, Barrier reefs of the Ural foredeep: Doklady Akademii Nauk SSSR, v. 176, no. 3, p. 653-656.

Ilyin, V.D., and Fortunatova, N.K., 1988, Methods for prediction and exploration of petroliferous reef complexes (Metody prognozirovaniya i poiskov neftegazonosnykh rifovykh kompleksov): Moscow, Nedra, 201 p.

Shamov, D.F., 1957, Facies of Sakmarian-Artinskian rocks of the Ishimbay area near the Urals: Trudy Ufimskogo Neftyanogo Instituta, v. 11, p.3-77.



Permian Reefs/Thrust Folds Assessment Unit - 10150201

EXPLANATION

- Hydrography
- Shoreline
- 1015 — Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 10150201 — Assessment unit code and boundary

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

USGS science for a changing world

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

Date:……..	6/3/99		
Assessment Geologist:……..	G.F. Ulmishek		
Region:……..	Former Soviet Union	Number:	1
Province:……..	Volga-Ural Region	Number:	1015
Priority or Boutique……	Priority		
Total Petroleum System:……	Belsk Basin	Number:	101502
Assessment Unit:……..	Permian Reefs/Thrust Folds	Number:	10150201
* Notes from Assessor	Reserve data are lacking from the Petroconsultants' file. Fields not grown.		
	Inert gas is nitrogen.		

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?……. 3 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: 3 Gas: 5
Established (>13 fields) _____ Frontier (1-13 fields) X Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd NA 2nd 3rd NA 3rd 3rd NA
Median size (grown) of discovered gas fields (bcfg):
1st 3rd 270 2nd 3rd 920 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)	1	median no.	5	max no.	10
Gas fields:……min. no. (>0)	5	median no.	20	max no.	35

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	6	max. size	80
Gas in gas fields (bcfg):……min. size	18	median size	50	max. size	1000

Assessment Unit (name, no.)
Permian Reefs/Thrust Folds, 10150201

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	500	800	1200
NGL/gas ratio (bngl/mmcfg)……	30	60	90

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	40	60	80
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)……	35	40	45
Sulfur content of oil (%)……	0.2	0.5	1
Drilling Depth (m) ……	2000	2700	3500
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……	3	8	20
CO_2 content (%)……	2	3	4
Hydrogen-sulfide content (%)……	0.1	0.2	1
Drilling Depth (m)……	2500	4000	5500
Depth (m) of water (if applicable)……			

Assessment Unit (name, no.)
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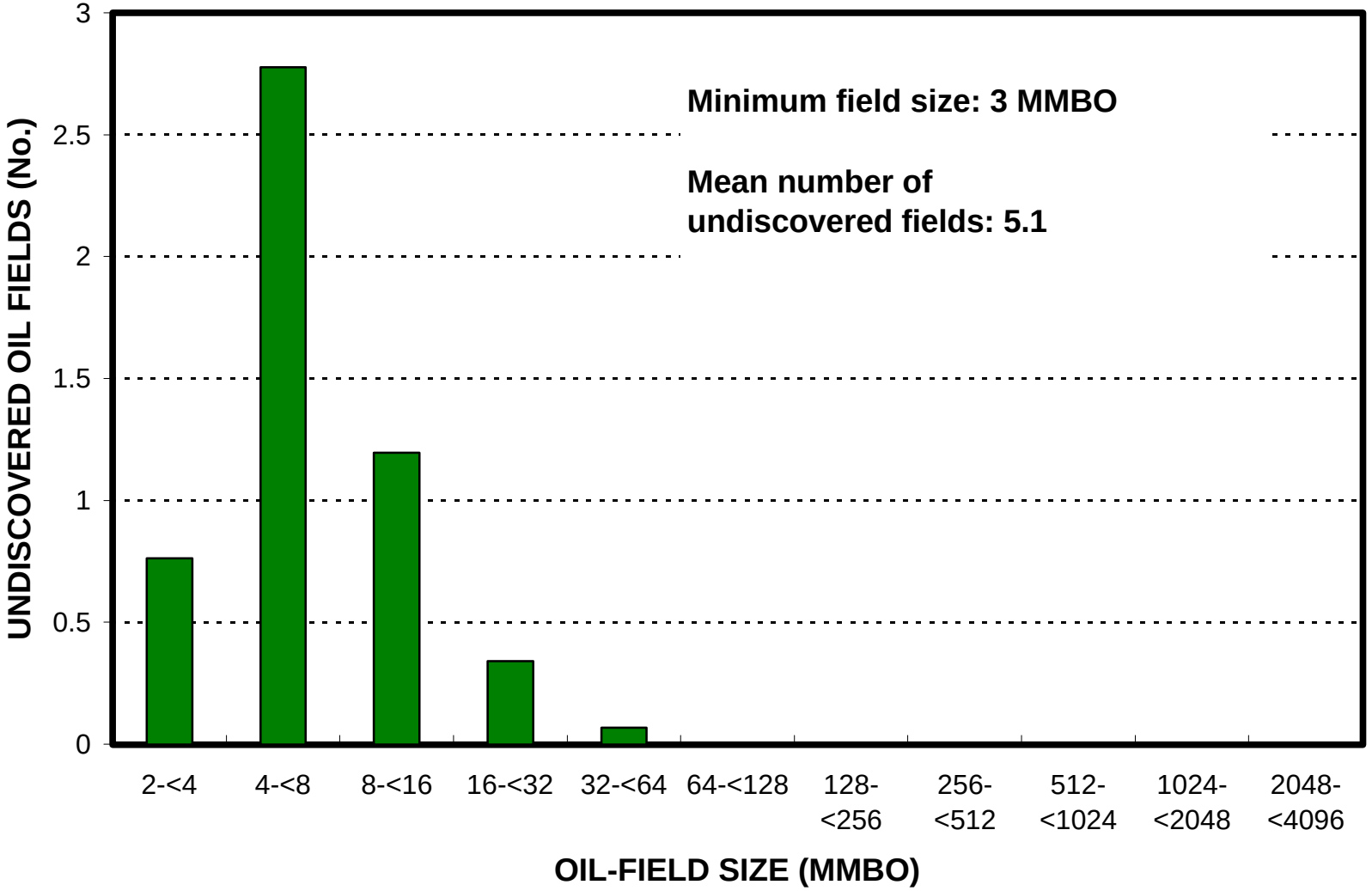
ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

1. Russia represents 100 areal % of the total assessment unit

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	

Permian Reefs/Thrust Folds, AU 10150201
Undiscovered Field-Size Distribution



Permian Reefs/Thrust Folds, AU 10150201
Undiscovered Field-Size Distribution