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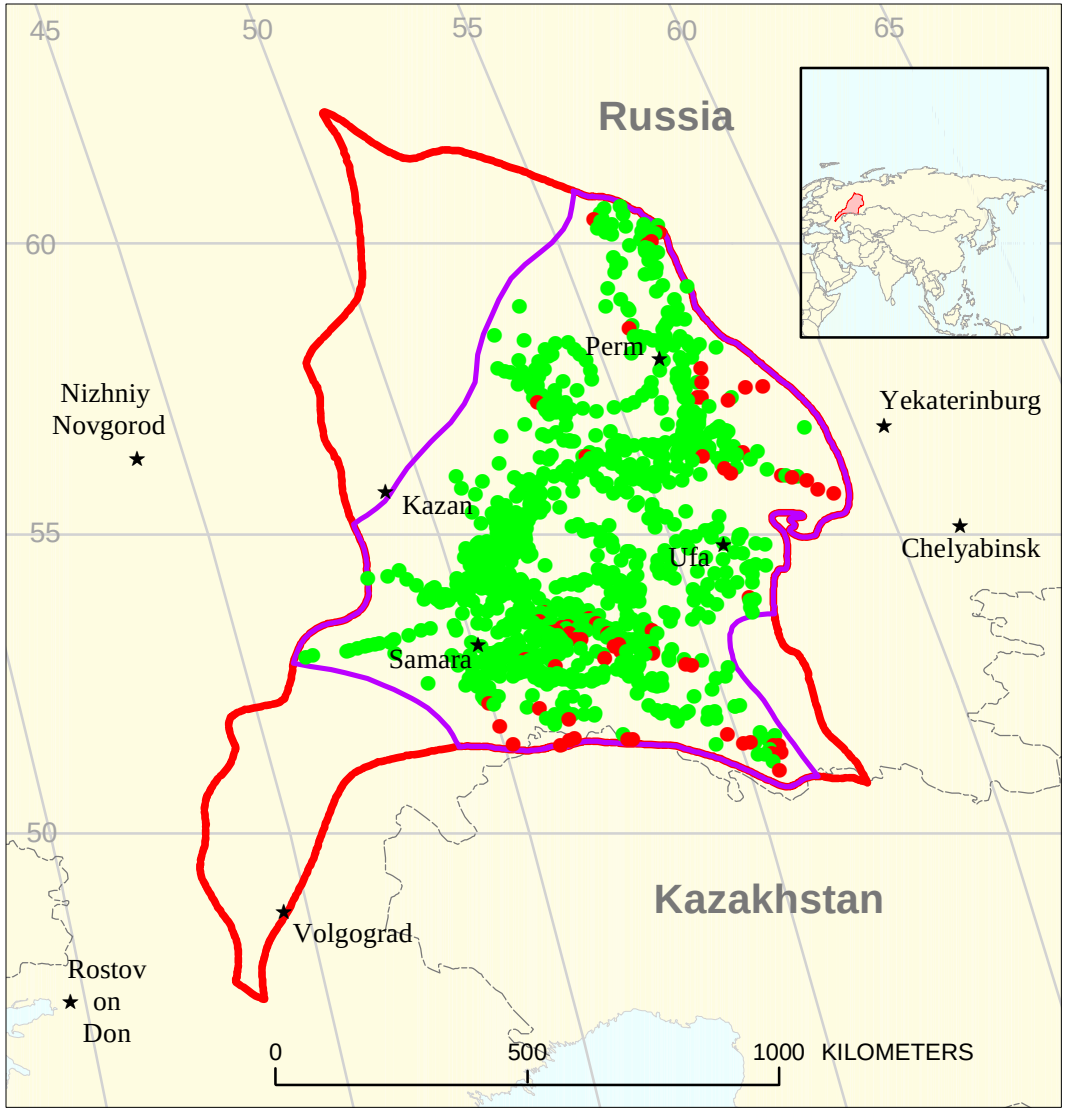
Supra-Domanik Carbonates/Clastics Assessment Unit 10150101



Supra-Domanik Carbonates/Clastics Assessment Unit 10150101

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: Volga-Ural Domanik-Paleozoic (101501)

ASSESSMENT UNIT: Supra-Domanik Carbonates/Clastics (10150101)

DESCRIPTION: The unit encompasses the largest part of the petroleum system area north and east of the Zhigulev-Pugachev arch. It overlies stratigraphically the Sub-Domanik Devonian clastics assessment unit (10150103) and includes Upper-Devonian-Permian carbonate and clastic rocks above the Domanik Formation. The unit is maturely explored and contains more than one-half of the oil and most of the gas reserves of the province.

SOURCE ROCKS: The principal source rock is the middle Frasnian Domanik Formation, which stratigraphically widens into the Tournaisian in the Kama-Kinel basins. The formation is 25 to 40 m thick and contains as much as 25 percent TOC.

MATURATION: The Domanik Formation is in the oil window over most of the assessment unit area and dips into the gas window to the southeast. Probably, maturation was reached mainly during deposition of thick Upper Permian-Triassic orogenic clastics, but could have slightly advanced in Jurassic-Paleogene time, which was followed by regional uplift and erosion.

MIGRATION: Early expulsion of immature oil is probable because of the sulfurous nature of Domanik kerogen. Geologic data also indicate an important stage of migration in the Neogene related to intensive faulting and fracturing of source rocks. The assessment unit is characterized by extensive vertical migration of hydrocarbons owing to the lack of significant regional seals.

RESERVOIR ROCKS: A larger part of oil reserves is in clastic reservoir rocks, dominantly in Visean nonmarine to nearshore sandstones that possess excellent reservoir properties. Somewhat smaller oil reserves and most of the gas reserves of the unit are found in Bashkirian to Lower Permian shallow-shelf carbonates and in Frasnian reefs.

TRAPS: Many oil reserves are found in reefs and, especially, in drape structures over the reefs. Basement-related structures control smaller oil reserves and several gas accumulations. The supergiant Orenburg gas condensate field is in a very large anticlinal structure that overlies an inverted graben-rift of Ordovician age. Stratigraphic pinch outs in clastic formations, which are related to erosional river-valley sandstone fills, deltas, and progradational clinoforms, are common, but have received little exploration efforts.

SEALS: Most of the assessment unit area is devoid of high-quality regional seals, which results in degassing and partial biodegradation of many oil pools that are capped by local shales and dense carbonates. Light oil and gas accumulations are found mainly in southern areas where Permian salt formations are present and provide excellent seals.

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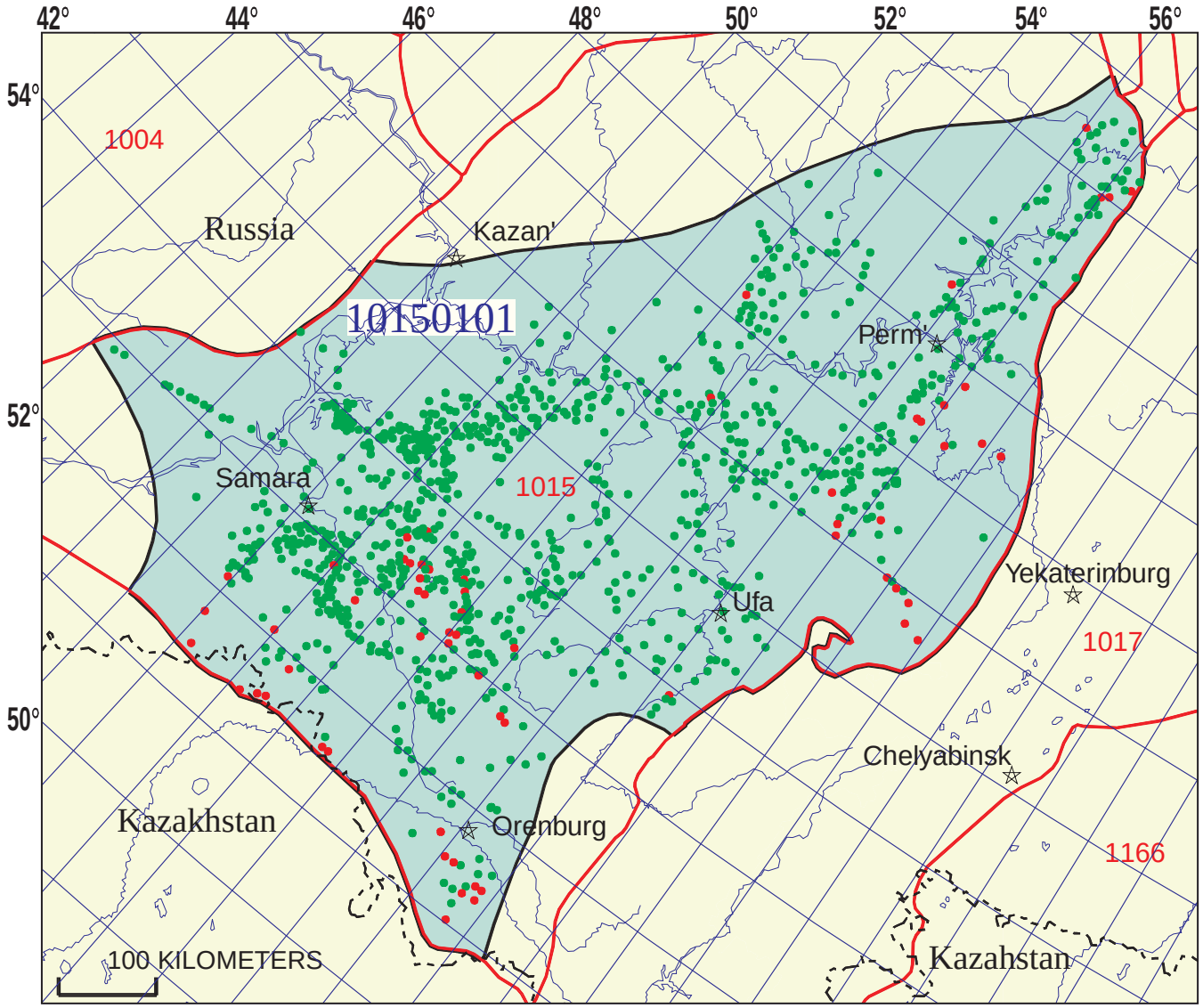
Mkrtchyan, O.M., 1980, Regularities in distribution of structural features in the eastern Russian plate (Zakonomernosti razmeshcheniya strukturnykh form na vostoke Russkoy plity): Moscow, Nauka, 136 p.

Ulmishek, G.F., 1988, Upper Devonian-Tournaisian facies and oil resources of the Russian craton's eastern margin, *in* McMillan, N.J., Embry, A.F., and Glass, D.J., eds., Devonian of the world, Volume I–Regional syntheses: Calgary, Alberta, Canadian Society of Petroleum Geologists, p. 527-549.



Supra-Domanik Carbonates/Clastics Assessment Unit - 10150101

EXPLANATION

- Hydrography
- Shoreline
- 1015 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 10150101 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:……..	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:……	Volga-Ural Domanik-Paleozoic	Number:	101501
Assessment Unit:……..	Supra-Domanik Carbonates/Clastics	Number:	10150101
* Notes from Assessor	Fields not grown. Nitrogen and helium comprise inert gas.		

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?……. 1 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: 663 Gas: 39
Established (>13 fields) X Frontier (1-13 fields) _____ Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 30 2nd 3rd 10 3rd 3rd 5
Median size (grown) of discovered gas fields (bcfg):
1st 3rd 24.5 2nd 3rd 50 3rd 3rd 86

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)	100	median no.	350	max no.	700
Gas fields:……min. no. (>0)	4	median no.	15	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	1	median size	2.5	max. size	100
Gas in gas fields (bcfg):……min. size	6	median size	30	max. size	600

Assessment Unit (name, no.)
Supra-Domanik Carbonates/Clastics, 10150101

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	150	250	350
NGL/gas ratio (bngl/mmcfg)……	30	60	90

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	20	30	40
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)……	18	28	45
Sulfur content of oil (%)……	2	3	4
Drilling Depth (m) ……	1300	2500	5000
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……	3	6	8
CO_2 content (%)……	0.3	0.6	1
Hydrogen-sulfide content (%)……	1	2	3
Drilling Depth (m)……	1700	2600	4000
Depth (m) of water (if applicable)……			

Assessment Unit (name, no.)
Supra-Domanik Carbonates/Clastics, 10150101

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

1. Russia represents 99 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	

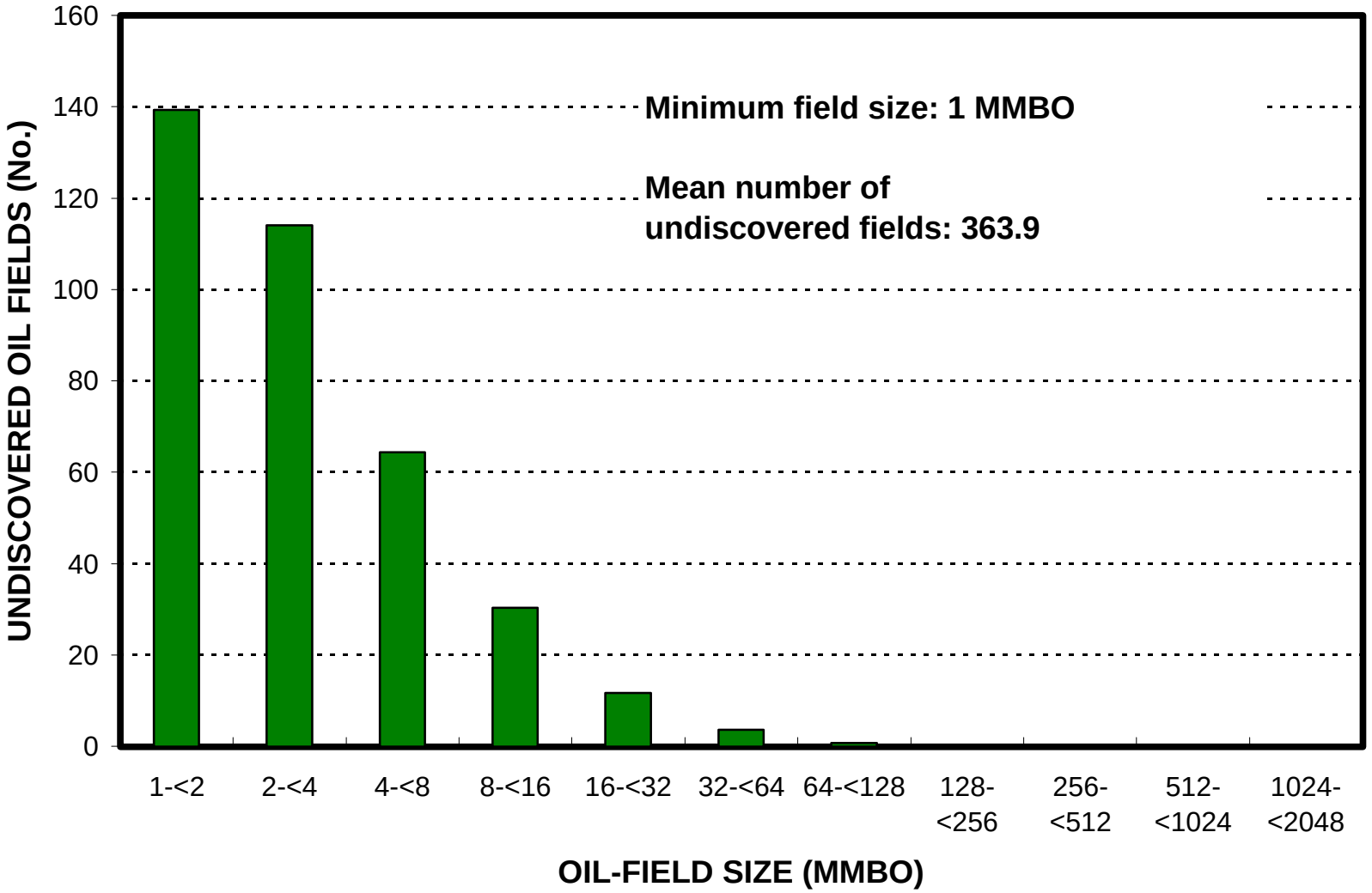
Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		100	
Portion of volume % that is offshore (0-100%)……		0	

2. Kazakhstan represents 1 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		0	
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):…		0	
Portion of volume % that is offshore (0-100%)……		0	

Supra-Domanik Carbonates/Clastics, AU 10150101
Undiscovered Field-Size Distribution



Supra-Domanik Carbonates/Clastics, AU 10150101
Undiscovered Field-Size Distribution