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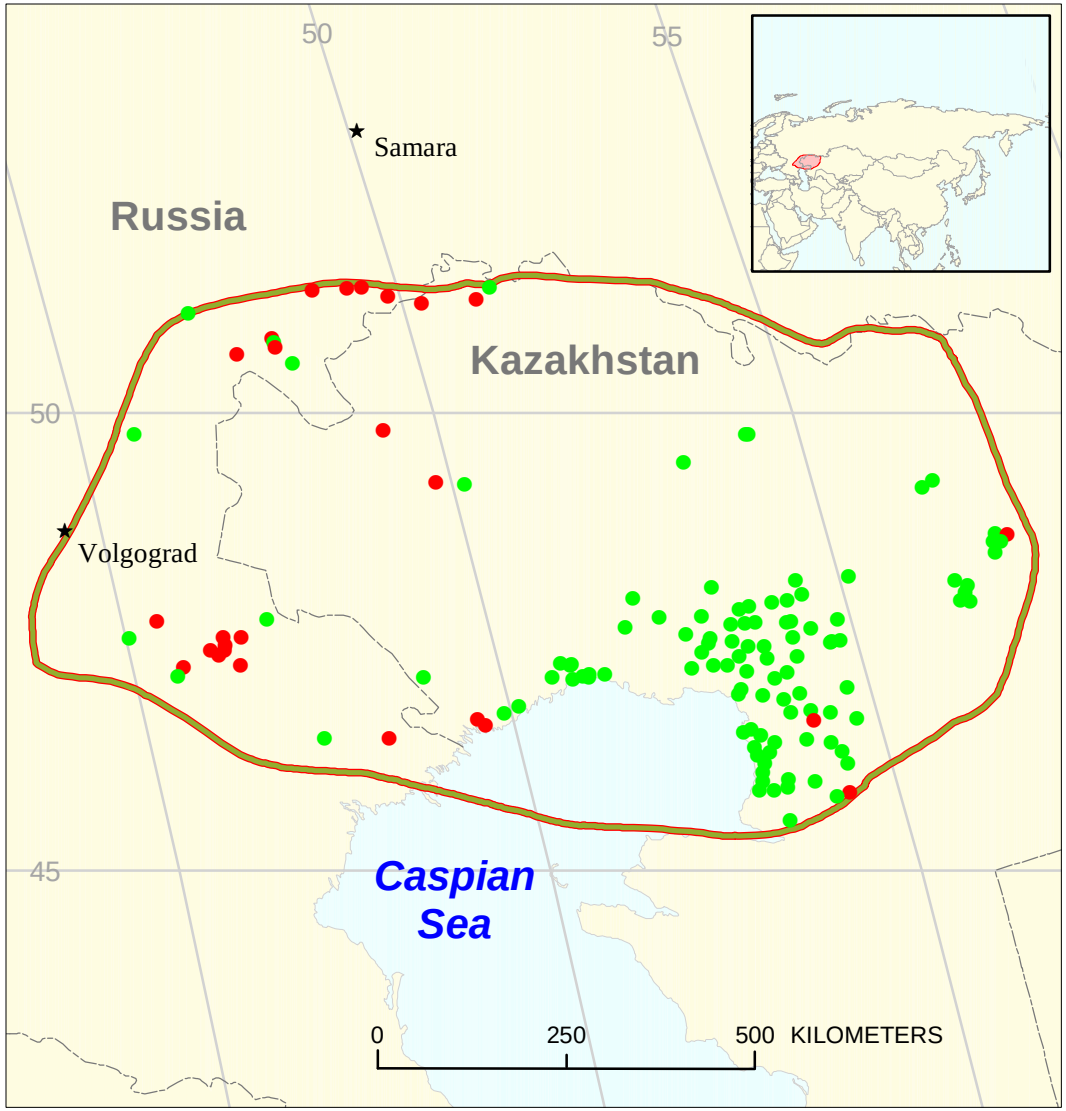
Suprasalt
Assessment Unit 10160106



Suprasalt Assessment Unit 10160106

North Caspian Basin Geologic Province 1016

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: North Caspian Basin (1016) **GEOLOGIST:** G.F. Ulmishek

TOTAL PETROLEUM SYSTEM: Paleozoic North Caspian (101601)

ASSESSMENT UNIT: Suprasalt (10160106)

DESCRIPTION: The assessment unit covers the entire basin area and includes Upper Permian through Tertiary rocks that constitute the suprasalt sequence. Discovered oil and gas fields are associated with salt domes; the majority of the fields are located in eastern basin areas (Emba region). Most of reserves are found in Jurassic and Cretaceous clastic reservoirs.

SOURCE ROCKS: Geologic and limited geochemical data suggest that most probably the suprasalt sequence does not contain source rocks. Therefore, oil and gas have been generated by Paleozoic basinal black-shale facies of the subsalt sequence.

MATURATION: Maturation mainly took place in Late Permian-Triassic time, during deposition of thick Hercynian orogenic clastics. Presently, source rocks probably occur in the lower part of oil window and in the gas window.

MIGRATION: Vertical migration of hydrocarbons through thick rock sequences controlled the formation of fields. Probably, migration was localized to windows in salt between domes, from which the salt was withdrawn by plastic flow.

RESERVOIR ROCKS: Jurassic and Cretaceous sandstones contain most of oil and gas. In discovered fields, they occur shallow and have high porosity and permeability. Upper Permian and Triassic sandstones usually possess poorer reservoir properties.

TRAPS: All traps, although morphologically different, are invariably connected with salt tectonics. Drapes above crests of salt domes and pinch outs of sandstones against salt walls and on slopes of the domes are most common. A few fields below salt overhangs have been found in recent years.

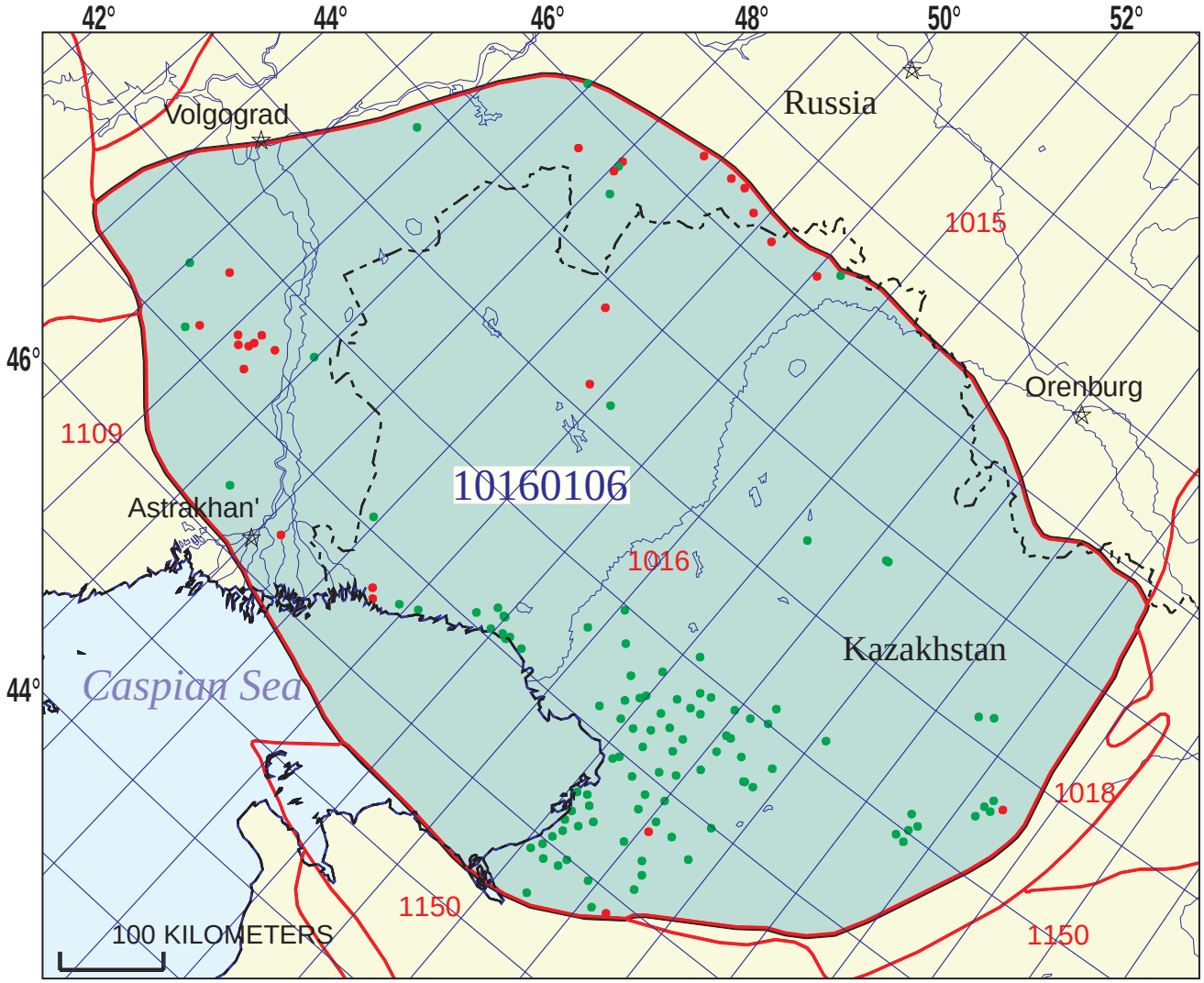
SEALS: Regional seals are absent and hydrocarbon pools are sealed by intraformational shale beds. Most of discovered oils are partially biodegraded.

REFERENCES:

Dalyan, I.B., 1998, New data on uplifts and semi-arch structures in Upper Permian rocks in the eastern North Caspian basin: Geologiya Nefti i Gaza, no. 9, p. 22-26.

Groshev, V.G., Sinelnikov, A.V., Volozh, Yu.A., Lipatova, V.V., Iskuzhiev, B.A., and Nikolenko, V.P., 1993, Evolution of the Korytas interdome zone: new possibilities for hydrocarbon exploration in Upper Permian-Triassic rocks of the North Caspian basin: Geologiya Nefti i Gaza, no. 8, p. 10-16.

Murzagaliev, D.M., 1994, Goals of petroleum exploration in the Emba-Uil area: Geologiya Nefti i Gaza, no. 4, p. 16-19.



Suprasalt
Assessment Unit - 10160106

EXPLANATION

- Hydrography
- Shoreline
- 1016 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 10160106 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:……..	1/12/99		
Assessment Geologist:……..	G.F. Ulmishek		
Region:……..	Former Soviet Union	Number:	1
Province:……..	North Caspian Basin	Number:	1016
Priority or Boutique:……..	Priority		
Total Petroleum System:……	Paleozoic North Caspian	Number:	101601
Assessment Unit:……..	Suprasalt	Number:	10160106
* Notes from Assessor			

CHARACTERISTICS OF ASSESSMENT UNIT

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

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: 67 Gas: 10

Established (>13 fields)	Frontier (1-13 fields)	Hypothetical (no fields)
X		

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 5 2nd 3rd 12 3rd 3rd 10

Median size (grown) of discovered gas fields (bcfg):
1st 3rd 25 2nd 3rd 70 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)	20	median no.	120	max no.	300
Gas fields:……	min. no. (>0)	20	median no.	90	max no.	200

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	15	max. size	500
Gas in gas fields (bcfg):……	min. size	18	median size	40	max. size	800

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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	1200	2000
NGL/gas ratio (bngl/mmcfg)……	30	60	90

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	10	21	45
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)……	14	28	45
Sulfur content of oil (%)……	0.3	1	2
Drilling Depth (m) ……	200	2000	4500
Depth (m) of water (if applicable)……	0	15	25

Gas Fields:	minimum	median	maximum
Inert gas content (%)……	1	3	8
CO_2 content (%)……	0.1	1.5	14
Hydrogen-sulfide content (%)……	0	0	0
Drilling Depth (m)……	1000	2000	4500
Depth (m) of water (if applicable)……	0	15	25

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. Kazakhstan represents 80 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		90	
Portion of volume % that is offshore (0-100%)……		10	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		80	
Portion of volume % that is offshore (0-100%)……		10	

2. Russia represents 20 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		10	
Portion of volume % that is offshore (0-100%)……		15	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		20	
Portion of volume % that is offshore (0-100%)……		15	

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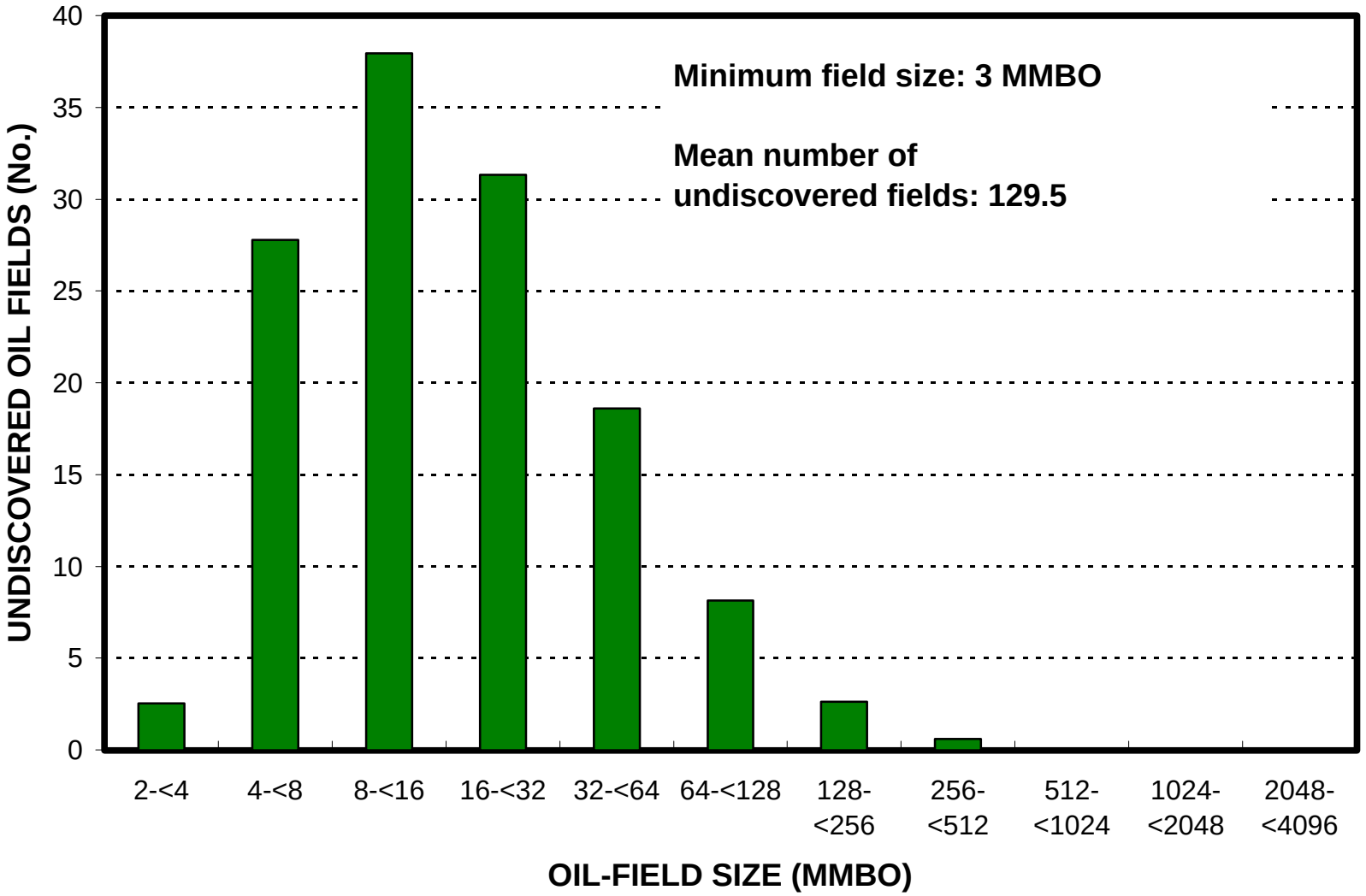
Undiscovered Field-Size Distribution



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Undiscovered Field-Size Distribution