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North and West Margins Subsalt Barrier Reefs Assessment Unit 10160102

North and West Margins Subsalt Barrier Reefs Assessment Unit 10160102

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: North and West Margins Subsalt Barrier Reefs (10160102)

DESCRIPTION: The assessment unit includes prospect in three superimposed barrier reefs of Late Devonian to Early Permian age. The reef system is progradational in some areas and retrogradational in other areas. The reefs contain mainly gas condensate fields of small to medium size. Most discoveries are in the Lower Permian reef and a few fields are found in the Bashkirian reef. The Devonian-Lower Carboniferous reef is unexplored.

SOURCE ROCKS: Source rocks are probably off-reef basinal black-shale facies contemporaneous with the barrier reefs and back-reef carbonate platform. Geochemical characteristics of the source rocks are poorly known because of deep occurrence.

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: Apparently hydrocarbons migrated laterally from source rocks into the adjacent reefs.

RESERVOIR ROCKS: Reservoir rocks are carbonates of the reef crest and the overlying Filippov (lowermost Kungurian) dolomite bed. Porosity and permeability of reefs are variable.

TRAPS: Local highs of the barrier reef crest form the traps. The regional basinward tilt and relatively small amplitude of the back-reef slope limit the trap sizes.

SEAL: Thick Kungurian salt constitutes the regional seal. Pools in the Bashkirian reef are sealed by lower Moscovian shales (Verey Horizon).

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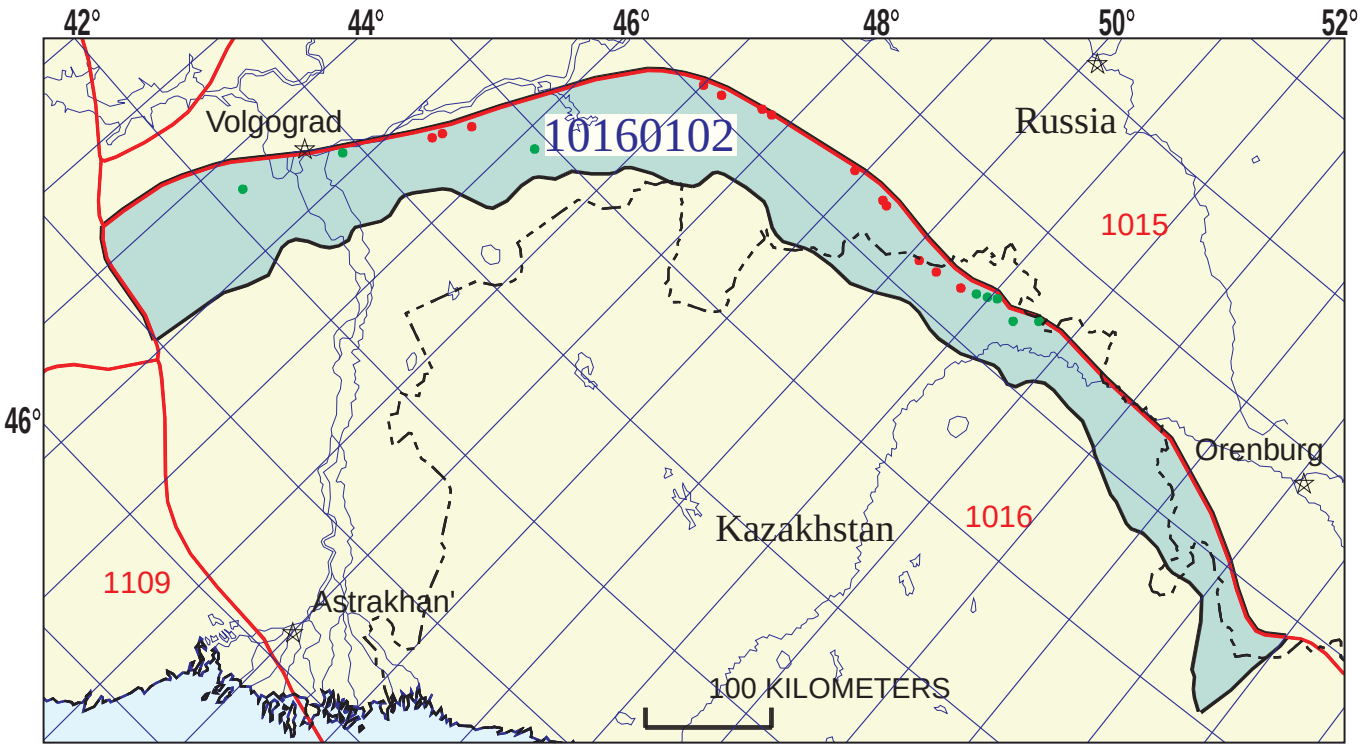
Grachevsky, M.M., Berlin, Yu.M., Dubovskoy, I.T., and Ulmishek, G.F., 1976, Correlation of formations composed of different facies in oil and gas exploration (Korrelyatsiya raznofatsialnykh tolshch pri poiskakh nefti i gaza): Moscow, Nedra, 296 p.

Mikhalkova, V.N., Brazhnikov, O.G., and Berestetskaya, A.M., 1990, Directions of exploration for oil and gas fields in the western part of the North Caspian basin: Geologiya Nefti i Gaza, no. 5, p. 10-13.

Punanova, S.A., Chakhmakhchev, V.A., Zonn, M.S., and Agafonova, Z.G., 1996, Geochemistry and petroleum potential of Paleozoic rocks of the western flank of the North Caspian basin: Geologiya Nefti i Gaza, no. 3, p. 37-43.



North and West Margins Subsalt Barrier Reefs Assessment Unit - 10160102

EXPLANATION

- Hydrography
- Shoreline
- 1016 — Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 10160102 — 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:……	North and West Margins Subsalt Barrier Reefs	Number:	10160102
* 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?……. 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: 6 Gas: 7

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

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 20 2nd 3rd 14 3rd 3rd _____

Median size (grown) of discovered gas fields (bcfg):
1st 3rd 75 2nd 3rd 80 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)	10	median no.	25	max no.	50
Gas fields:……..	min. no. (>0)	10	median no.	25	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	10	median size	20	max. size	150
Gas in gas fields (bcfg):……..	min. size	60	median size	100	max. size	1000

Assessment Unit (name, no.)
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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)……	1000	1500	2000
NGL/gas ratio (bngl/mmcfg)……	30	60	90

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	10	15	20
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)……	30	40	50
Sulfur content of oil (%)……	0.2	0.5	1
Drilling Depth (m) ……	3000	3500	5500
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……	0.5	1.2	2.5
CO_2 content (%)……	0.5	1	1.5
Hydrogen-sulfide content (%)……	0.1	0.5	2
Drilling Depth (m)……	3000	3500	4500
Depth (m) of water (if applicable)……			

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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 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):…		20	
Portion of volume % that is offshore (0-100%)……		0	

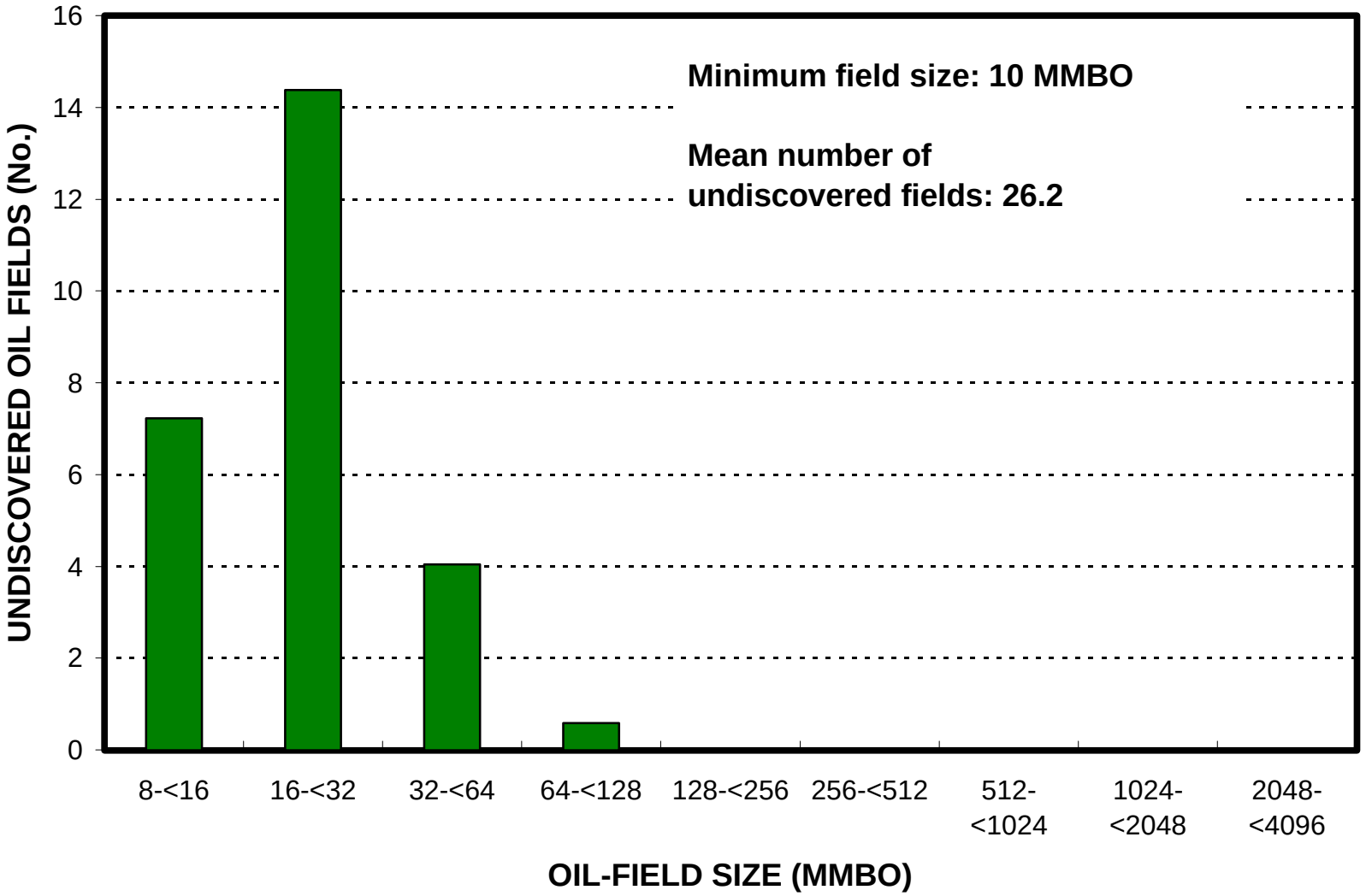
Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		20	
Portion of volume % that is offshore (0-100%)……		0	

2. Russia 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):…		80	
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):…		80	
Portion of volume % that is offshore (0-100%)……		0	

North and West Margins Subsalt Barrier Reefs, AU 10160102
Undiscovered Field-Size Distribution



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Undiscovered Field-Size Distribution