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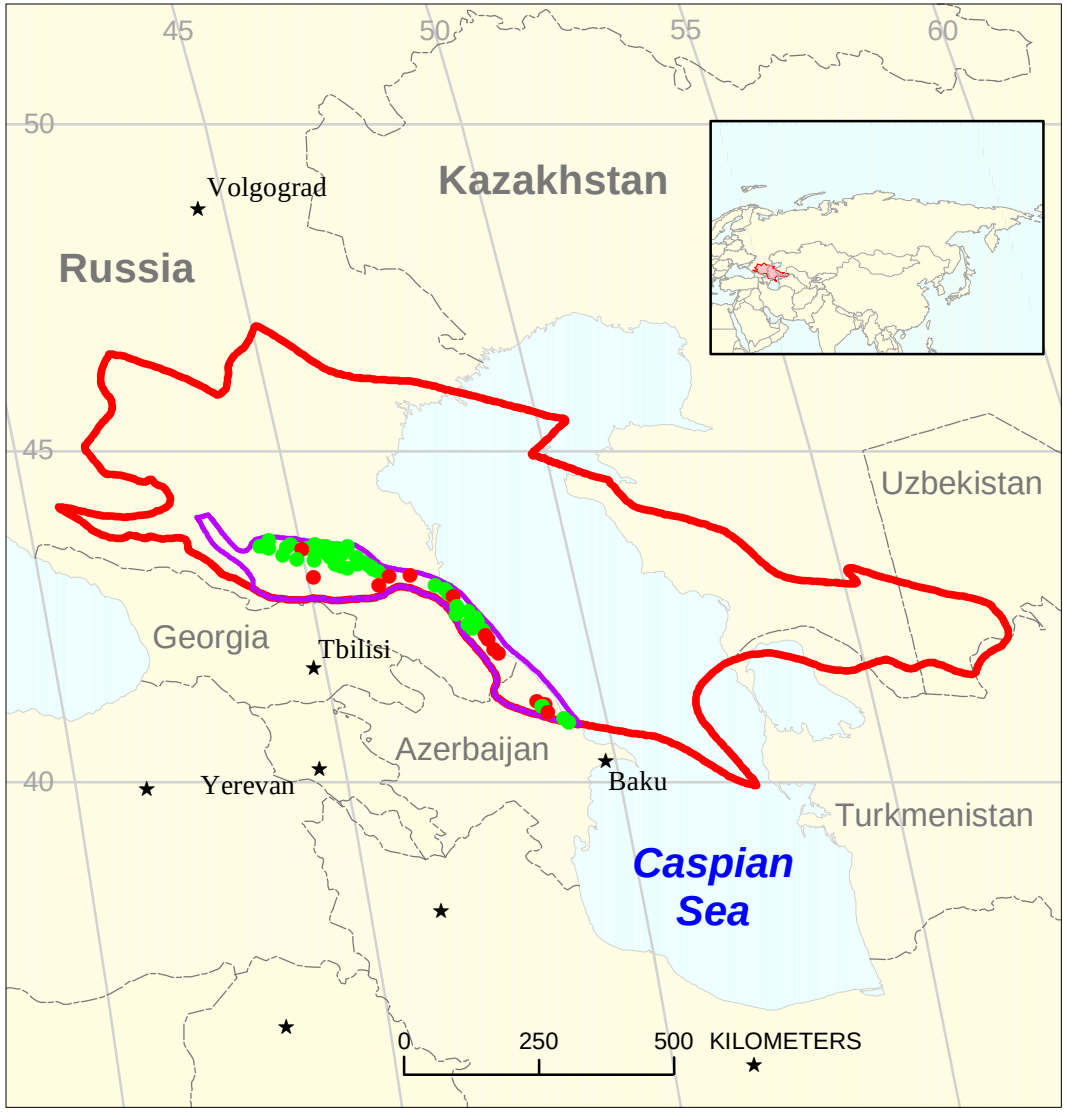
Foldbelt-Foothills
Assessment Unit 11090101



Foldbelt-Foothills Assessment Unit 11090101

Middle Caspian Basin Geologic Province 1109

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: Middle Caspian Basin (1109) **GEOLOGIST:** G.F. Ulmishek

TOTAL PETROLEUM SYSTEM: Terek-Caspian (110901)

ASSESSMENT UNIT: Foldbelt-Foothills (11090101)

DESCRIPTION: The assessment unit occupies the front thrust system of the Great Caucasus foldbelt. It includes the entire sedimentary section except for subsalt rocks in the Upper Jurassic evaporite basin; these rocks are included in a separate assessment unit. The foldbelt-foothills unit contains the principal reserves of the petroleum system.

SOURCE ROCKS: Marine anoxic overpressured shales of the lower part of the Oligocene-lower Miocene Maykop series are the main source rocks of the system. The shales contain as much as 4 to 5 percent TOC and Type II kerogen. The presence of additional source rocks in older strata, especially in the Eocene Kuma Formation, is possible, but these rocks are much less important.

MATURATION: Maturation of Maykop source rocks was achieved in late Miocene-Pliocene time during deposition of a very thick orogenic molasse formation in the foredeep. Presently, the source rocks in depressions of the foredeep occur in the lower part of oil window and in the gas window.

MIGRATION: Vertical migration dominates in the assessment unit. From overpressured Maykop source rocks, oil and gas migrated both stratigraphically downward into Cretaceous reservoirs and upward into middle Miocene reservoirs.

RESERVOIR ROCKS: Most important reservoir rocks containing more than one-half of hydrocarbon reserves are Upper Cretaceous limestones that are intensely fractured on crests of anticlines. Matrix permeability of the limestones is very low and they are not productive outside the fracture zones. About one-third of oil reserves are in middle Miocene sandstones with porosities of 15 to 30 percent and high permeabilities. Upper Tithonian carbonates and Lower Cretaceous clastics contain the rest of hydrocarbons.

TRAPS: All discovered fields are controlled by high-amplitude, thrust-related, detached anticlinal folds commonly complicated by plastic flow of Maykop shales. Limits of fracturing of Upper Cretaceous limestones and pinch outs of middle Miocene sandstone beds often modify outlines of separate pools.

SEALS: Thick (as much as 1600 m) plastic shales of the Maykop series constitute a perfect regional seal that controls distribution of oil and gas in underlying rocks. Oil pools in middle Miocene rocks are shallow and are devoid of a regional seal. Rather commonly, oil in these pools is partially biodegraded.

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Sobornov, K.O., 1995, Geologic framework of the petroleum productive thrust belt of eastern Caucasus: Geologiya Nefti I Gaza, no. 10, p. 16-21.

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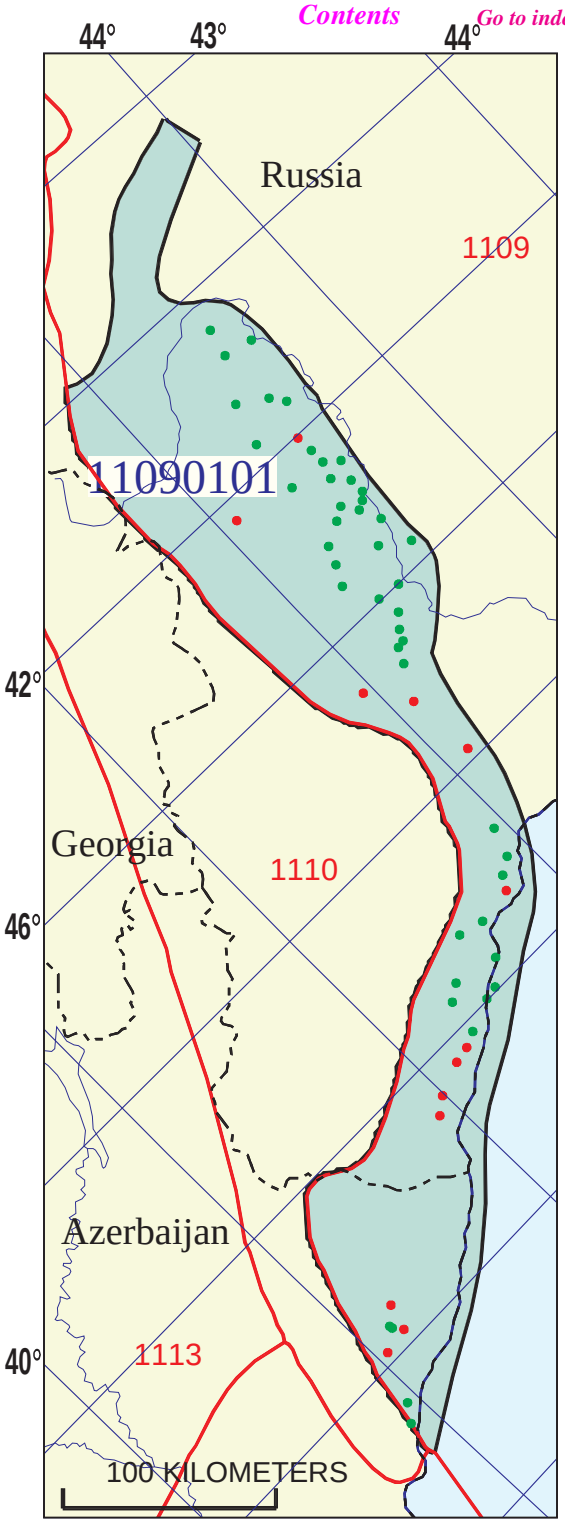


Foldbelt-Foothills
Assessment Unit - 11090101

EXPLANATION

- Hydrography
- Shoreline
- 1109 — Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 11090101 — 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:……..	7/13/98		
Assessment Geologist:……..	G.F. Ulmishek		
Region:……..	Former Soviet Union	Number:	1
Province:……..	Middle Caspian Basin	Number:	1109
Priority or Boutique……	Priority		
Total Petroleum System:……	Terek-Caspian	Number:	110901
Assessment Unit:……..	Foldbelt-Foothills	Number:	11090101
* Notes from Assessor	No growth function applied. Available statistics includes data on 23 oil and 6 gas fields exceeding minimum size.		

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?……. 7 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: 23 Gas: 6
Established (>13 fields) X Frontier (1-13 fields) _____ Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 135 2nd 3rd 52 3rd 3rd 9
Median size (grown) of discovered gas fields (bcfg):
1st 3rd 31.5 2nd 3rd 664 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)	15	median no.	25	max no.	45
Gas fields:……min. no. (>0)	10	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	7	median size	50	max. size	1100
Gas in gas fields (bcfg):…… min. size	42	median size	300	max. size	5000

Assessment Unit (name, no.)
Foldbelt-Foothills, 11090101

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	2000	2500	3500
NGL/gas ratio (bngl/mmcfg)……	50	60	70

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)……	25	38	45
Sulfur content of oil (%)……	0.1	0.2	1.5
Drilling Depth (m) ……	2000	3800	5500
Depth (m) of water (if applicable)……	0	20	50

Gas Fields:	minimum	median	maximum
Inert gas content (%)……	1	2	6
CO_2 content (%)……	0.5	3	15
Hydrogen-sulfide content(%)……		0.9	
Drilling Depth (m)……	1500	2800	5500
Depth (m) of water (if applicable)……	0	20	50

Assessment Unit (name, no.)
Foldbelt-Foothills, 11090101

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

1. Russia represents 81 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		92	
Portion of volume % that is offshore (0-100%)……		45	

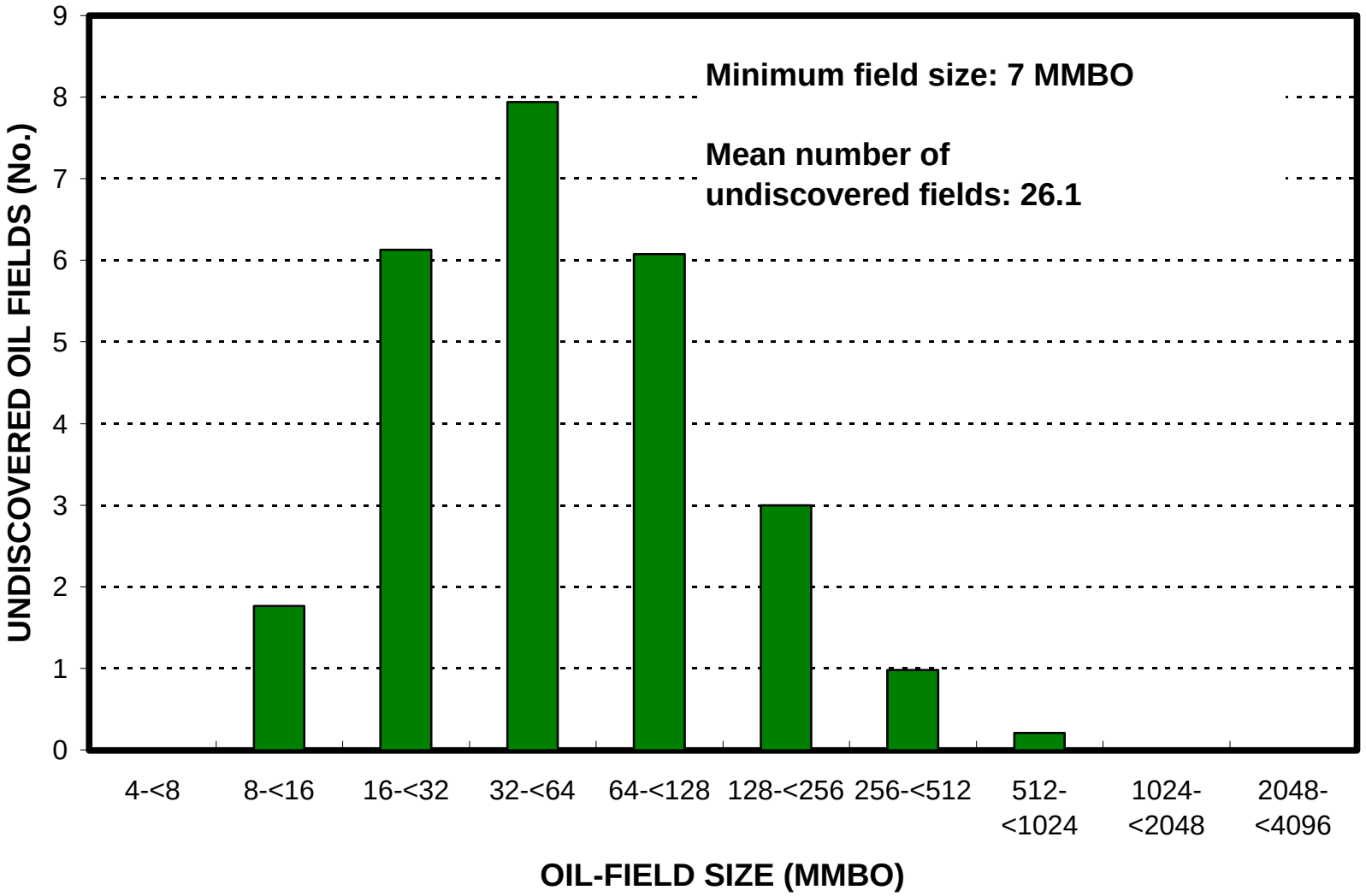
Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		100	
Portion of volume % that is offshore (0-100%)……		20	

2. Azerbaijan represents 19 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		8	
Portion of volume % that is offshore (0-100%)……		100	

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	

Foldbelt-Foothills, AU 11090101
Undiscovered Field-Size Distribution



Foldbelt-Foothills, AU 11090101
Undiscovered Field-Size Distribution