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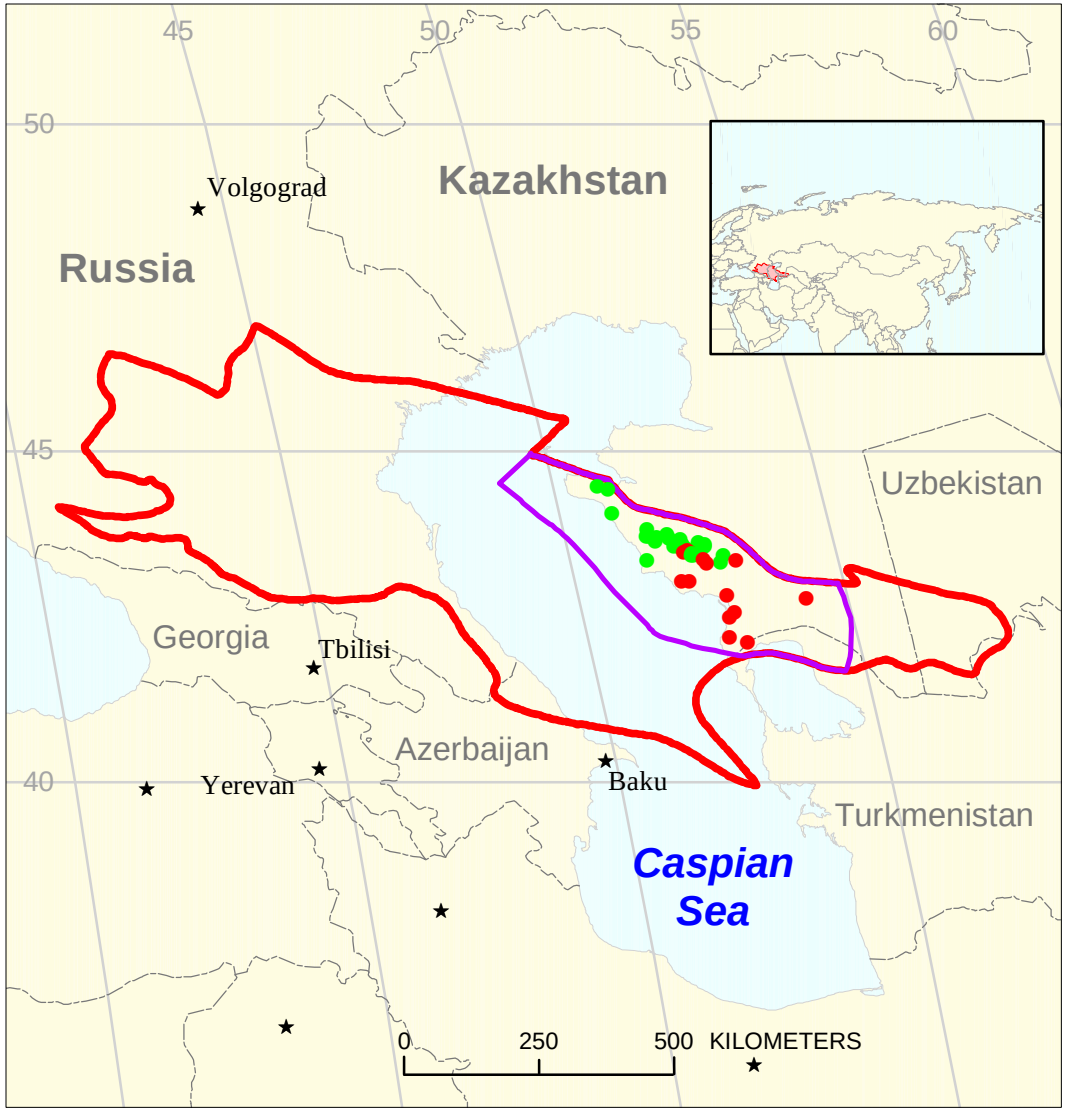
South Mangyshlak (Entire) Assessment Unit 11090201



South Mangyshlak (Entire) Assessment Unit 11090201
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
- ☐

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

TOTAL PETROLEUM SYSTEM: South Mangyshlak (110902)

ASSESSMENT UNIT: South Mangyshlak (Entire) (11090201)

DESCRIPTION: The assessment unit encompasses the South Mangyshlak subbasin and its offshore continuation into the Caspian Sea. Stratigraphically, the unit includes Triassic to Tertiary rocks that overlie the Hercynian basement. Most of discovered oil and gas reserves are narrowly concentrated on the relatively small Zhetybay step, which is a structural terrace on the northern subbasin margin.

SOURCE ROCKS: Source rocks have not been geochemically identified. Probably, the source rocks are Lower-Middle Triassic basinal facies in synrift sequences correlative to carbonate rocks outside the rifts. The thick Lower-Middle Jurassic coal-bearing formation apparently generated very little, if any, hydrocarbons.

MATURATION: Generation of hydrocarbons by source rocks probably started in Cretaceous time, continued through the early Miocene, and was terminated by pre-middle Miocene uplift and erosion. Oil composition suggests that the source rocks reached the lower oil window and in places possibly the upper gas window.

MIGRATION: Vertical migration of hydrocarbons dominated as indicated by a large number of stacked reservoirs in major fields. However, lateral migration updip is evident on margins of the subbasin, especially on its southern margin.

RESERVOIR ROCKS: The great majority of reserves are found in Middle Jurassic clastic rocks of continental to paralic origin. Sandstones are usually argillaceous, but because of relatively shallow occurrence reservoir properties are relatively good. Much smaller oil reserves are in Middle Triassic carbonates, Cretaceous sandstones, and fractured basement granites.

TRAPS: All fields of the Zhetybay step that contains principal reserves are in anticlinal traps developed over leading edges of thrust sheets in underlying Triassic rocks. Pools in Triassic carbonates on the southern margin, although found on local uplifts, are actually controlled by zones of fracturing.

SEALS: The principal regional seal that caps the productive Jurassic section is composed of Upper Jurassic shales and limestones 70 to 300 m thick. Seal is breached locally and hydrocarbons migrated into Cretaceous reservoirs. Local intraformational shale beds directly seal separate pools.

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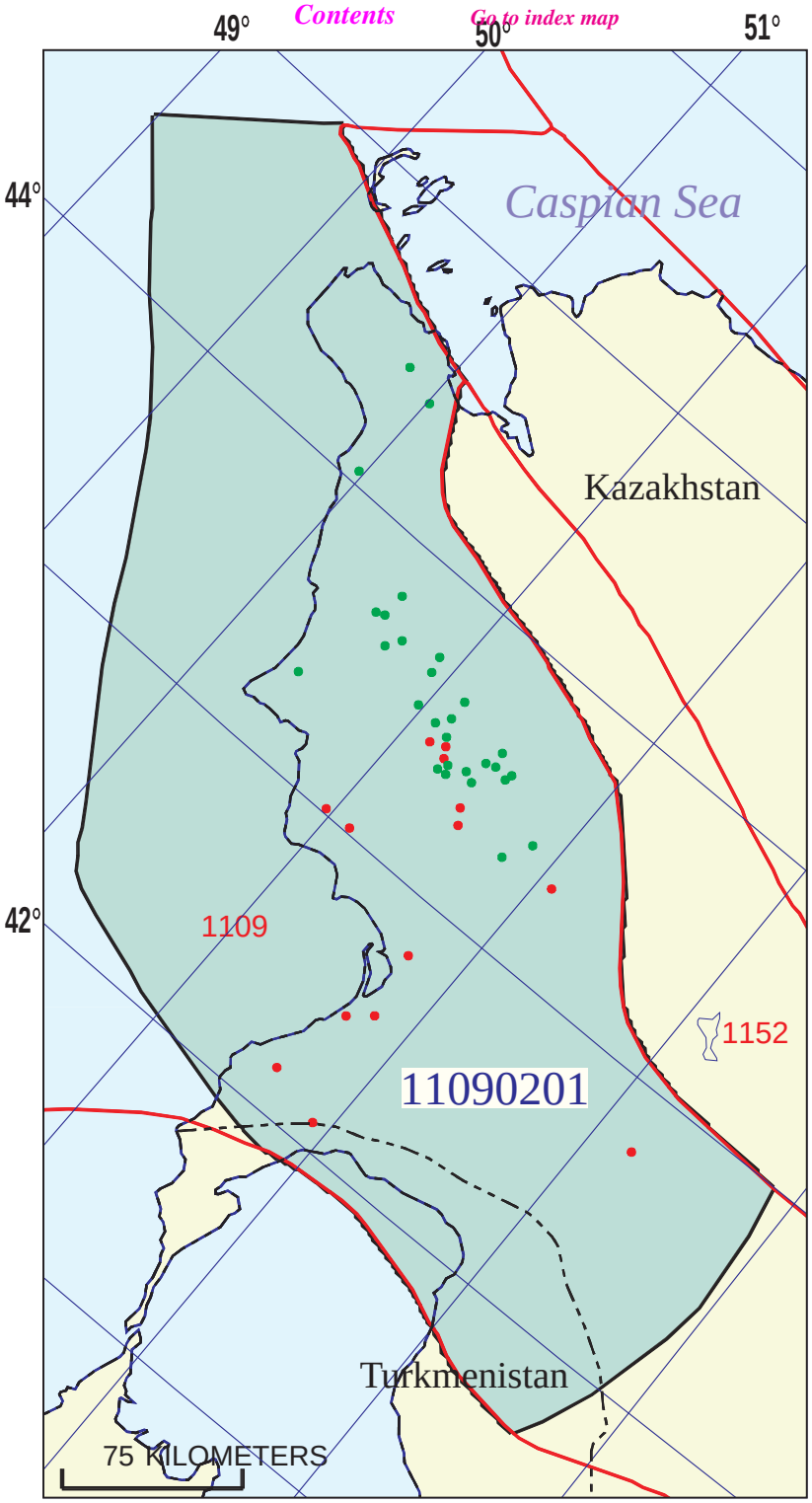
Popkov, V.I., 1991, Role of horizontal compression in formation of platform anticlines of Mangyshlak and Ustyurt: Geologiya Nefti i Gaza, no. 7, p. 2-6.

Ulmishek, G.F., 1990, Uzen field, in Beaumont, E.A., and Foster, N.H., compilers, Structural traps IV, Treatise of petroleum geology, Atlas of oil and gas fields: American Association of Petroleum Geologists, p. 281-297.

Ulmishek, G.F., 1999, Petroleum geology and resources of the Middle Caspian basin (South Mangyshlak, Terek-Caspian, and Stavropol-Prikumsk petroleum systems): U.S. Geological Survey Open-File Report 99-50-B, 37 pages, 19 figures.



South Mangyshlak (Entire) Assessment Unit - 11090201

EXPLANATION

- Hydrography
- Shoreline
- 1109 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 11090201 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:……..	7/15/98		
Assessment Geologist:……..	G.F. Ulmishek		
Region:……..	Former Soviet Union	Number:	1
Province:……..	Middle Caspian Basin	Number:	1109
Priority or Boutique……	Priority		
Total Petroleum System:……	South Mangyshlak	Number:	110902
Assessment Unit:……..	South Mangyshlak (Entire)	Number:	11090201
* Notes from Assessor	No growth function applied.		

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: 22 Gas: 8
Established (>13 fields) X Frontier (1-13 fields) _____ Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 79 2nd 3rd 7.6 3rd 3rd 5.4

Median size (grown) of discovered gas fields (bcfg):
1st 3rd 140 2nd 3rd 16.5 3rd 3rd _____

*Concern about field size (no growth) *(~200) *(~28)

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.	30	max no.	60
Gas fields:……min. no. (>0)	5	median no.	12	max no.	25

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	12	max. size	350
Gas in gas fields (bcfg):…… min. size	18	median size	70	max. size	1000

Assessment Unit (name, no.)
South Mangyshlak (Entire), 11090201

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	800	1470	3000
NGL/gas ratio (bngl/mmcfg)……	30	40	50

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	15	25	35
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	33	38
Sulfur content of oil (%)……	0	0.05	0.2
Drilling Depth (m) ……	1500	3500	5000
Depth (m) of water (if applicable)……	0	50	200

Gas Fields:	minimum	median	maximum
Inert gas content (%)……	0.3	2	7
CO_2 content (%)……	0.1	0.4	2
Hydrogen-sulfide content (%)……	0	0	0
Drilling Depth (m)……	1500	3500	5000
Depth (m) of water (if applicable)……	0	50	200

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 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%)……		60	

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%)……		60	