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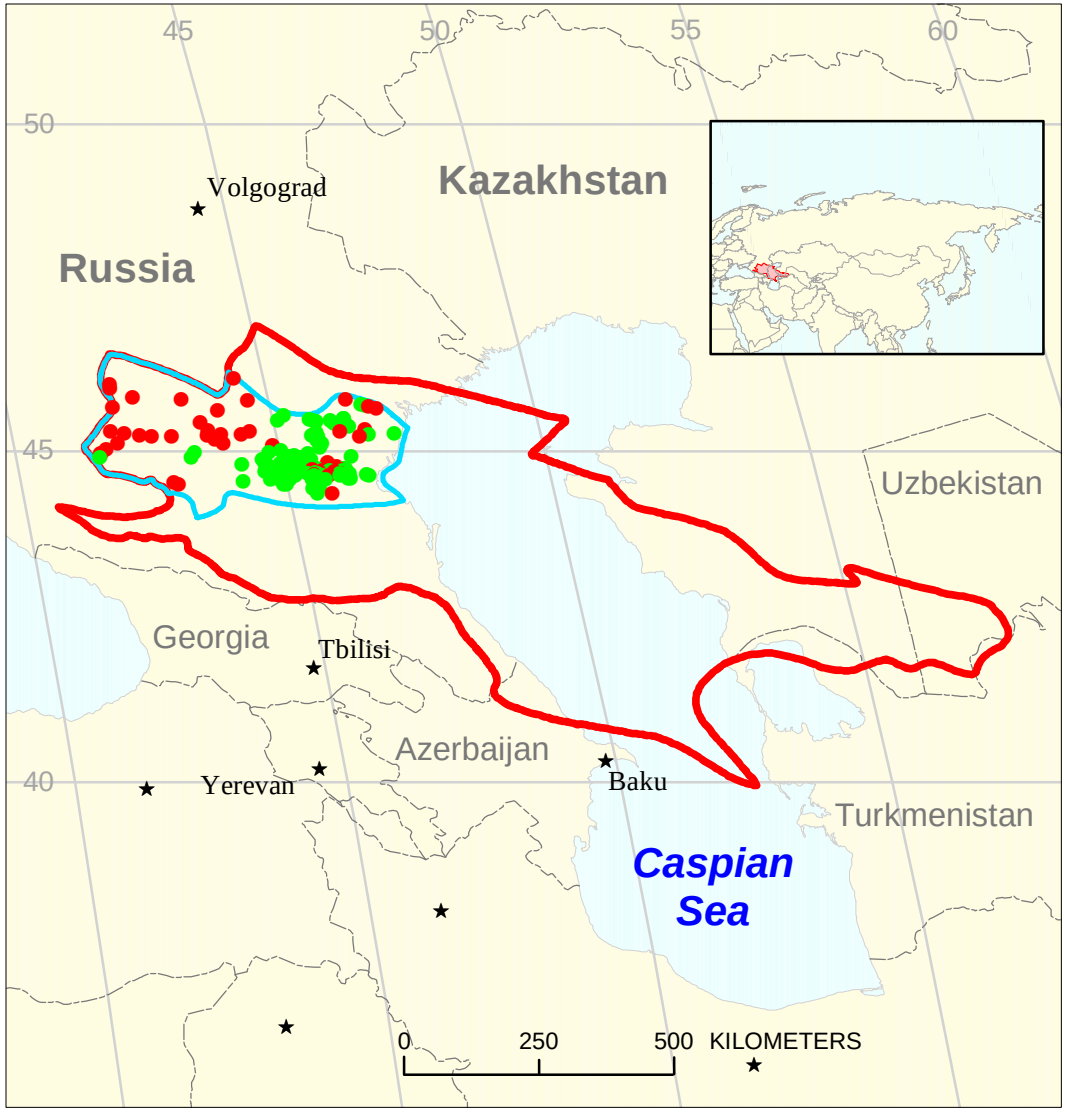
Onshore Stavropol-Prikumsk Assessment Unit 11090302



Onshore Stavropol-Prikumsk Assessment Unit 11090302

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

PETROLEUM SYSTEM: Stavropol-Prikumsk (110903)

ASSESSMENT UNIT: Onshore Stavropol-Prikumsk (11090302)

DESCRIPTION: The assessment unit encompasses all onshore area of this composite petroleum system. Major structures included in the unit are the Stavropol arch, the Prikumsk zone of uplifts, the East Manych depression, and the Karpinsky uplift. The unit contains a few large dry gas fields and many oil and gas condensate fields of small to medium size in the entire sedimentary section, from the Triassic to the Tertiary.

SOURCE ROCKS: Geochemical data identifying source rocks are absent. Interpretation of geologic data suggests the composite character of the petroleum system with mixed hydrocarbons from at least three source rocks. These are Lower Triassic anoxic marine basinal facies in the East Manych graben, Bajocian black marine shales, and anoxic marine shales in the lower part of the Oligocene-lower Miocene Maykop series. Triassic rocks are largely absent on the Karpinsky uplift.

MATURATION: The principal stage of source rock maturation was during and soon after deposition of the thick (as much as 1500 m) undercompacted Maykop shales characterized by low heat conductivity. Triassic and Bajocian source rocks are in advanced stage of maturity or slightly overmature in respect to oil generation everywhere except on the Karpinsky uplift. Maykop source rocks are in the upper part of oil window and are immature on the Stavropol arch.

MIGRATION: Vertical migration dominated including downward migration from Maykop source rocks into underlying Upper Cretaceous and upper Albian reservoirs. Oil and gas fields on the Karpinsky uplift were probably formed due to lateral migration.

RESERVOIR ROCKS: Reservoir rocks are diverse and are present in all parts of the sedimentary succession. Carbonate reservoir rocks are present in the Triassic and Neocomian. Middle Jurassic clastics are also productive, but most oil reserves are concentrated in sandstone reservoirs of the upper Barremian to Albian section. Large, but almost depleted gas reserves on the Stavropol arch are in the basal Maykop sandstone bed. A few oil pools have been found in self-sourced lower Maykop fractured shales.

TRAPS: Structural traps contain almost all reserves. They are either basement-related, some times faulted local anticlinal uplifts or drape structures over Triassic erosional highs. Few stratigraphic traps have been found.

SEALS: Thick (to 1600 m) plastic shales of the Maykop series constitute a perfect regional seal that controls distribution of oil and gas in underlying rocks. Except for a few small pools of biogenic (?) gas, no hydrocarbons have been found above the Maykop in this unit.

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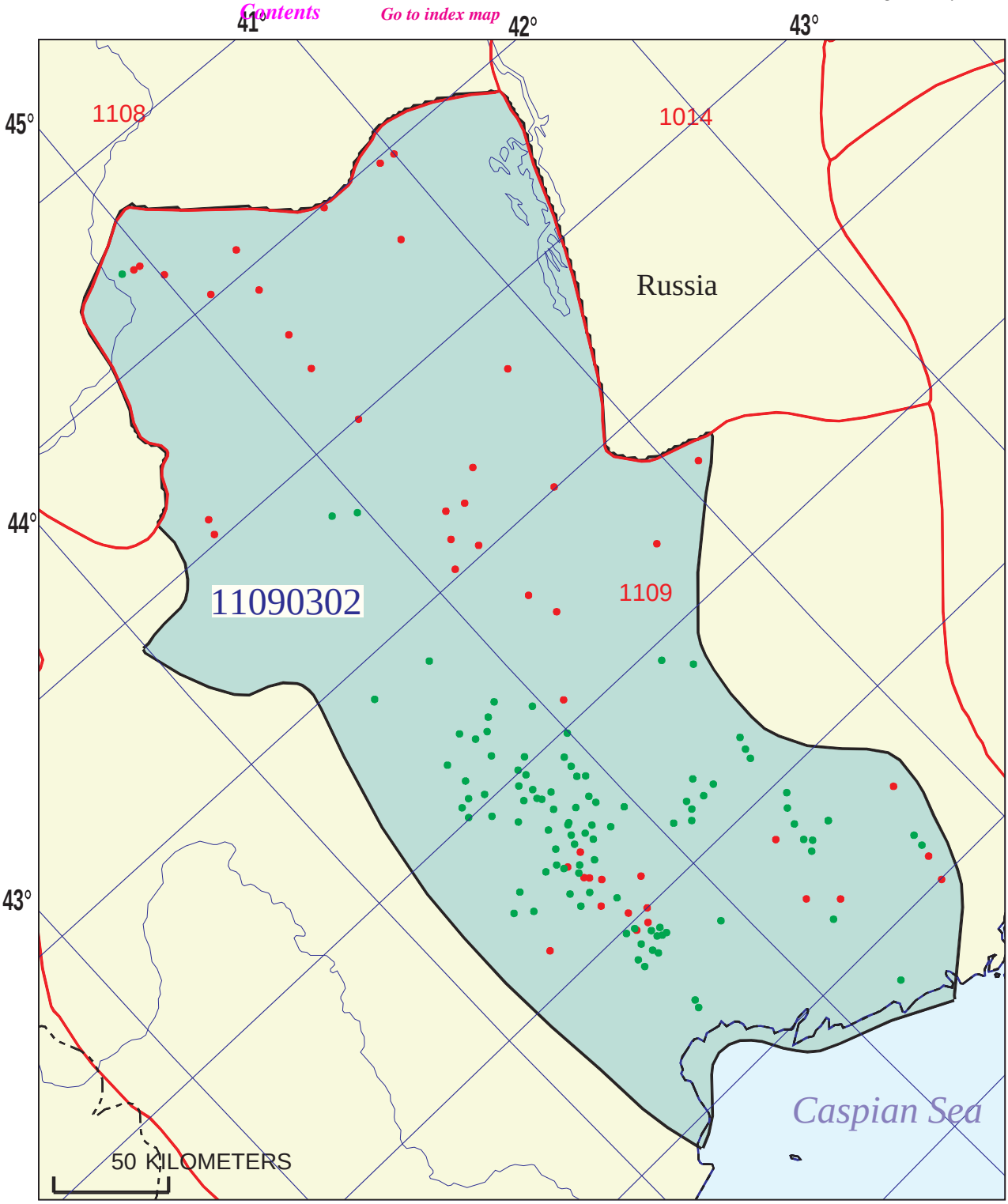
Letavin, A.I., 1978, Tafrogennyi kompleks molodoy platformy yuga SSSR (Taphrogenic complex of the young platform of the southern USSR): Moscow, Nauka, 148 p.

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.

Ulmishek, G., and Harrison, W., 1981, Petroleum geology and resource assessment of the Middle Caspian basin, USSR, with special emphasis on the Uzen field: Argonne National Laboratory Report ANL/ES-116, 147 p.

U.S. GEOLOGICAL SURVEY WORLD PETROLEUM ASSESSMENT 2000— DESCRIPTION AND RESULTS
U.S. Geological Survey World Energy Assessment Team



Onshore Stavropol-Prikumsk Assessment Unit - 11090302

EXPLANATION

- Hydrography
- Shoreline
- 1109 — Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 11090302 — 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:……	Stavropol-Prikumsk	Number:	110903
Assessment Unit:……	Onshore Stavropol-Prikumsk	Number:	11090302
* Notes from Assessor	No growth function applied.135 fields have been discovered in the assessment unit. Reserves data are available only on 34 oil and 20 gas fields; among those, 17 oil and 18 gas fields exceed 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?……. 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: 34 Gas: 20
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 180 2nd 3rd 44.5 3rd 3rd 19

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.	30	max no.	50
Gas fields:……min. no. (>0)	10	median no.	15	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	7	max. size	80
Gas in gas fields (bcfg):…… min. size	18	median size	30	max. size	300

Assessment Unit (name, no.)
Onshore Sravropol-Prikumsk, 11090302

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	2000	3000
NGL/gas ratio (bngl/mmcfg)……	50	60	70

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	5	10	15
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)……	35	40	47
Sulfur content of oil (%)……	0.05	0.1	0.2
Drilling Depth (m) ……	2000	3500	5000
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……	0.1	2	7
CO_2 content (%)……	0.1	0.3	5
Hydrogen-sulfide content (%)……	0	0	0
Drilling Depth (m)……	2000	3500	5000
Depth (m) of water (if applicable)……			

Assessment Unit (name, no.)
Onshore Stavropol-Prikumsk, 11090302

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

1. Russia 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%)……		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	