

Georgia State Agency of Oil & Gas



Georgian Oil & Gas Corporation



Georgia Oil & Gas Limited

UNTAPPED WORLD CLASS HYDROCARBON POTENTIAL OF CENTRAL GEORGIA



15th-16th March 2018

Granada - AAPG GTW Series

Alpine Folded Belts and Extensional Basins







GEORGIA STATE AGENCY OF OIL & GAS (SAOG), GEORGIA OIL & GAS CORPORATION (GOGC) AND GEORGIA OIL & GAS Ltd (GOG)

SAOG is the government entity that facilitates the tendering and PSC processes for the license blocks in Georgia, implements state regulations of oil and gas operations and represents the state in contracts.

GOGC is the National Oil Company that acts as the commercial partner and manages state owned share of oil and gas. Other activities of GOGC include operation of oil and gas pipelines within and through Georgia.

GOG is the operator and contractor party in numerous license blocks in central Georgia.

SAOG, GOGC and GOG have been active in establishing cooperation with universities, research groups, national petroleum companies and private petroleum companies such as Repsol and OMV (participants of this conference) to enhance the hydrocarbon discovery successes in Georgia.

GOG with participation of GOGC is running an exploration program (program) in the foreland and thrust belts of central Georgia which is in the western part of the Kura Basin. The program is integrating all the acquired geologic, tectonic, seismic, gravity, magneto-telluric, geothermal, pressure and organic and inorganic geochemical data. The quantification of the geologic and tectonic processes, time, type and amount of hydrocarbon generation, primary and secondary migration amounts and directions and accumulation histories have been currently carried out by the in-house fully quantitative basin modeling software first time in Georgia.







GENERAL GEOLOGY

Georgia is located on the TransCaucasian Massif that extends from the Black Sea to the Caspian Sea. Sedimentation started in the Jurassic and has continued until now. The compressional



forces from the south since the Mid-Jurassic resulted in subduction directly south of the Lesser Caucasus starting in the Bajocian and were later activated in the Albian, Mid-Eocene and Late Tertiary times. The compressional regime first led to folding of the Mesozoic and Tertiary strata followed by thin-skin and thick-skin thrusting starting in Middle Miocene to Pleistocene. The Mid Miocene to Late Pleistocene compressional forces formed numerous NW-SE trending strike slip faults. Most of the structures were formed in the Pliocene to Pleistocene.







SOURCE ROCKS

The proven 3 primary source rocks are Toarcian shales (mainly Type II kerogen with 0.5-2.8% TOC), Late Eocene (mainly Type II kerogen with 1.3-10% TOC) and Oligocene to Mid Miocene Maikop Formation (Type III and Type II kerogen with 0.5-11% TOC). Upper Bajocian and Uppermost Cretaceous are the secondary source rocks with mainly gas generation potentials.



Comprised of mainly marine OM, Type II, with TOC values of 0.5-2.8% (1.75% was used for modeling)

Upper Eocene Comprised of marine OM, Type II, with TOC values of 1.3-10.0% (2% was used for modeling)

Comprised of mostly marine organic matter, Type II, with terrestrial input with TOC values of 0.5-11% (1.75% was used for modeling)

RESERVOIR ROCKS

There are 6 potential reservoir rocks, namely, Aalenian sands, fractured Albian limestones, fractured Campanian to Maastrichtian limestones, fractured Middle Eocene volcanoclastics, Upper Eocene silty sandstones and Upper Maikop sandstones.







_	MESOZOIC													CENOZOIC																										
AI			JU	JR	AS	SIC	2					CR	ET	AC	EO	US										PAL	EOG	ENE	RIL	AR			_	NEO	DGI	ENE	_	_	NARY NARY	IOR34
EOZ		CANO.	FABIV		MIDDLE		-	INTR				EARLY					LATE		1		EOC	ENE	5	-	EO	CEN	E ¢		OL	IGO	CENE		-	м	100 2	ENI	5	PLIOCINE-	MINIOUNI	ENOCH
OIC	HETTANGIAN	SINEMURIAN	PLIENSBACHIAN	TOARCIAN	BAJOCIAN	CALLOVIAN	OXFORDIAN	TITHONIAN	BERRIASIAN	VALANGINIAN	BARRENHAN	APTIAN		ALBIAN	CENOMANIAN	TURONIAN	SAMONAN	CAMPANIAN	MAASTRICTIAN	DANIAN	SELANDIAN	THANETIAN		VPRESLAN		LUTETIAN	BARTONIAN	PRIABONIAN	NUTELIAN		CHATTIAN	AQUITANIAN	BURDIGALIAN	LANGINA	SERRAVALLIAN	TORIONIAN	CALCULATION OF A	ZANCLEAN	NIXXIM	AGE
	100	10.4	- 101 -	- 175.6	- 10.7 -	1 10.1	- 1907	192	HIG -	184	- 101-	1740	- 104 -				85	2	- 65		6	8	1 10		8		12	- 12	- w-	- 24		1		1507	- 046 -	1	121-	1	55	Ma)
+ + + + + + + +		*******		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u>v v v v</u>							0 7 0 7 0 7 0 0 0 0 0		040+4 040+4 040+4 040+4 040+4 040+4							2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			N.		· · · · · ·								~~~~	*****		*******		~	LITHOSTRATIGRAPH
		200-	1000m		500-1	500m	30-1	00m	ж	00-600	105	300-10	0m 25	0-1000		16	000-15	00m			50-450	1.1	3	00-1000m		30	-800en	300-800	-		2500-30	KORIEN .		8	-800m			1	/1	
																													KHADUSH		TROP	INISTRALAY	SWORDLINS	INSTRUCT	KUNATAN	MEDITAN	FUNITAN			REGIONAL TRATIGRAPHY
	shallow marino/dolf	shallow marine-both		Shelf to other shelf	Scharrial volcaric	Shalow marine		Sullaw marker rouff language		Shallow marine		Shallow marine	Sub-marine volcarsic rocks	Shallow marine/shell			Shallow marine/shelf	2			Shallow marine			Shallow marine	Shallow marine	Sub-marine volcanic rocks	Shallow marine Shallow marine	Shallow- marine	Shillow water		Shallow water/shelf	Delta Front	Shallow marine		Shallow marine		Fluviall			DEPOSITIONAL ENVIRONMENTS
						Г																	Π	••																NONE ID
						t								_						_			1					Γ.								J.				DROCAR POTENTL
																				ſ																				INT NOR
		A STATE OF THE STA		一下の日本の「日本	A A A A A A A A A A A A A A A A A A A	and the second							のためであるという				Cai Ma	mpa aast irac	an tri tu	ian cht rec	ı- :iar 1				A State of the sta							A CONTRACTOR	A A A		A LANKA		NY - Can de	No A Carlo		Strate and a second
lon	ia	n c		-U		1 100		and the	45	and a	2	in the		05/251	L19	4								1	1	4	1-1	CHE A		-10		and a		-	1					are a

HYDROCARBON GENERATION & ACCUMULATION

The quantitative basin modeling study using all the available, geologic, geophysical, geothermal, pressure and geochemical data shows that expulsion of oils have started 3.6 mabp and gas 1.7 mabp at depths of 3,600 m to 4,700 m and 4,350 m to 6,100 m, respectively.









The computed amount of recoverable prospective conventional gas is 4.23 Tm³ from the two Tertiary kitchens and 2.41 Tm³ from the Jurassic kitchen. The computed amount of recoverable prospective conventional oil is 4.83 Bbbls from the two Tertiary kitchens and 230.9 MMbbls from the Jurassic kitchen. Based on the current proven reserves the exploration efficiency for oil is 7% within the two Tertiary kitchens and practically 0% for gas.



CONVENTIONAL OIL EXPLORATION EFFICIENCY = 7% CONVENTIONAL GAS EXPLORATION EFFICIENCY = 0.01%

No new oil fields have been discovered since 1974 and no exploration has been carried out for gas although all the oil fields have considerable amounts of associated gas and some with small amounts of non-associated gas. We have estimated that exploration activities may be carried out at a cost of less than \$1.5/boe.









TYPE OF TRAPS AVAILABLE

The compressional regime since the Oligocene first led to folding of the Mesozoic and Tertiary strata followed by faulting and then thin-skin and thick-skin thrusting starting in Mid Miocene to Pleistocene. The NW-SE trending strike slip faults that were formed during the Mid Miocene to Late Pleistocene have resulted in effective migration of oil from the kitchen to the accumulation locations. Most of the structures were either formed or reshaped in the Pliocene to Pleistocene. The late generation and migration of oil and gas which are currently active have resulted in the filling of the young structures and traps.



PLANNED EXPLORATION PROGRAM

Data that exist within the area of interest are

- 1,200 km of modern 2D,
- 20 deep (down to 4,500 m) and 50 shallow wells (down to 2,500 m) with full reports,
- 3,300 km² land gravity,
- Stratigraphic and petrographic analysis of the Tertiary sediments,
- Organic geochemical analysis of oils from 8 fields,
- Source rock analysis and coal petrography and
- Basin modeling study to quantify the geologic and tectonic evolution of the area, time, type and amount of hydrocarbon generation, primary and secondary migration efficiencies and total prospective recoverable amounts of oil and gas









The planned exploration program includes

- 3,300 km² land gravity,
- 375 km 2D acquisition,
- 1,500 km magneto-telluric survey (has already started)
- Oil and source rock correlation (has already started)
- Gas analysis to determine maturity and source,
- 3D basin modeling study to determine accumulation histories of the identified leads, and locations of 3D seismic acquisitions









GOG, GOGC and SAOG are looking for research and commercial partners who will assist in the above exploration program to unearth the untapped amounts of hydrocarbons in Georgia.

We intend to present our findings results in the next year's AAPG conference on Folded Belts and Extensional Basins.

SAOG, GOGC and GOG want to express their gratitude to Repsol management and geoscientists for their contributions to our exploration and research programs.





Georgian Oil & Gas Corporation



Georgia Oil & Gas Limited

CONTACT DETAILS

Giorgi Tatishvili, head of SAOG

Phone: +995 595 000 002 e-mail: g.tatishvili@saog.gov.ge

Tornike Gotsiridze, Deputy Commercial Director of GOGC

Phone: +995 599 511 345 e-mail: t.gotsiridze@gogc.ge

Nikoloz Tevzadze, CEO of GOG

Phone: +995 599 26 48 48 e-mail: niko@noc.ge

Dr. Mehmet Arif Yukler, GOG Chief Advisor for Exploration

Phone: +995 551 50 80 01 e-mail: ayukler@georgiaoilandgas.com

Alexander Janiashvili, GOG Geologist

Phone: +995 599 095 155 e-mail: alexander@noc.ge