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ACTIVE CONTROL METHODS OF GAS POOL FORMATION

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Background

Modern specifics of storage exploitation make them consider conjectures of the market, which in its turn requires the UGS system enhance maneuverability.

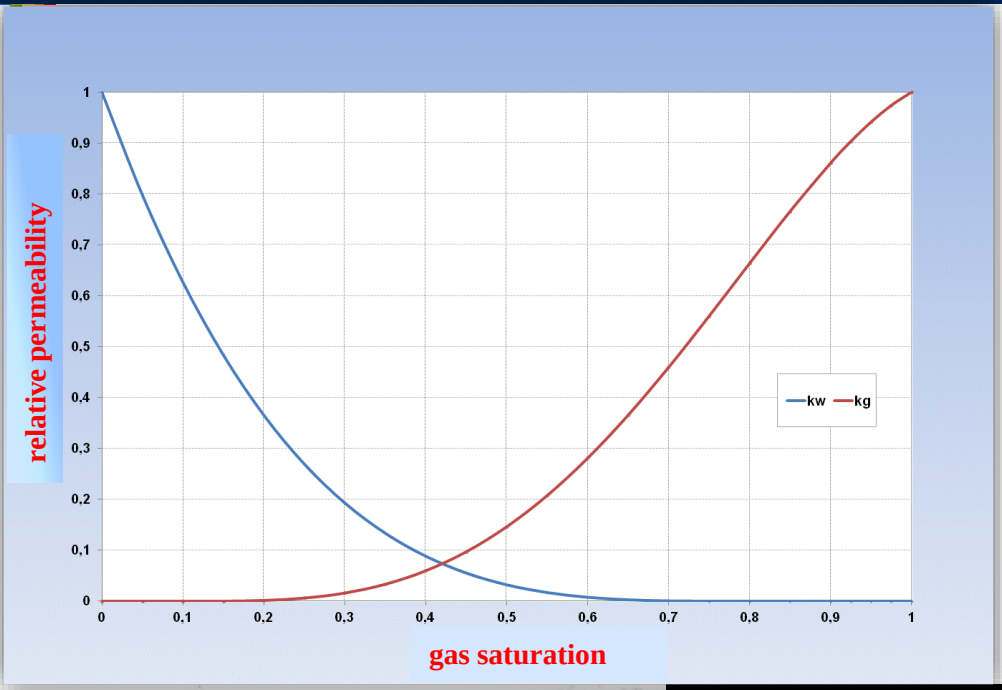
In connection with this, a very important task is to increase the daily production capacity of underground gas storage facilities of the Russian Federation.

Active methods *of regulating the formation of the gas deposits of UGS are methods of impact on the reservoir by an extraneous agent to change the original state of stratum-well system in the direction of increasing the efficiency of creation and exploitation of UGS.*

Aim

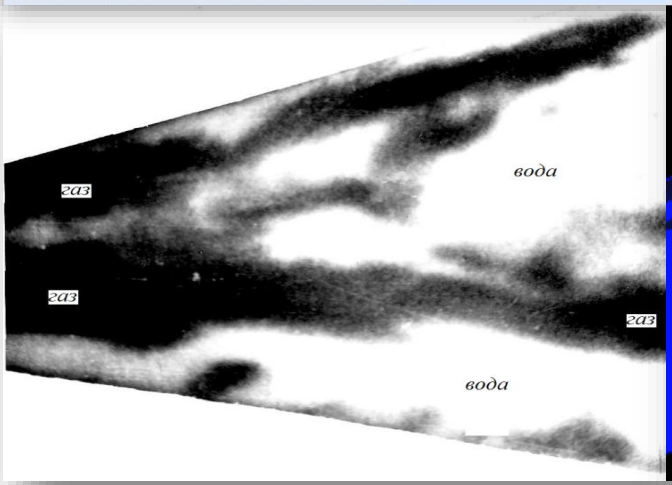
Thus, we can formulate the main task of the research, as developing of new active methods and technological solutions to improve the efficiency, reliability and maneuverability of underground gas storage facilities exploitation.

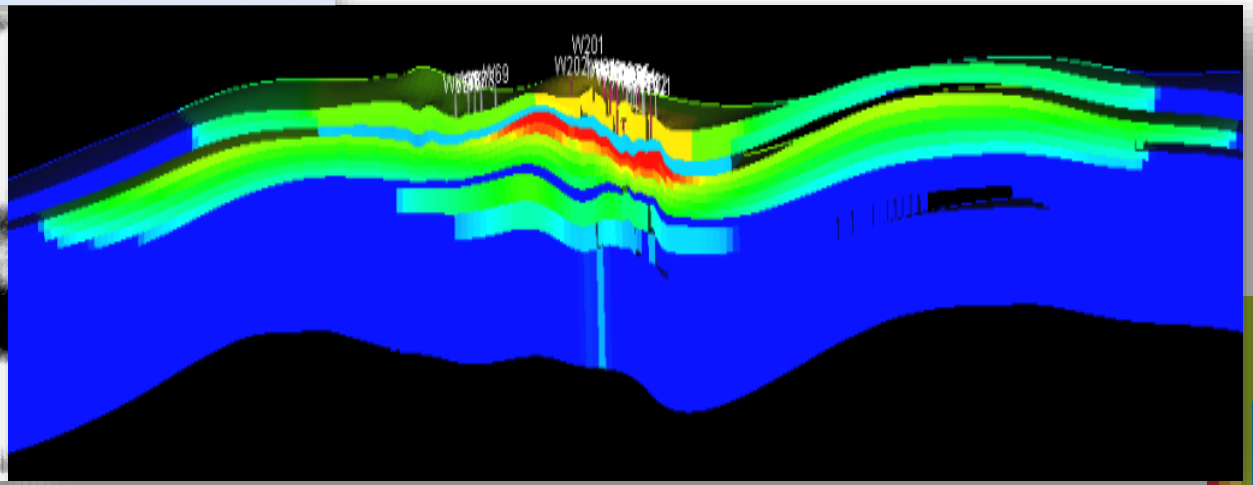
Methods7



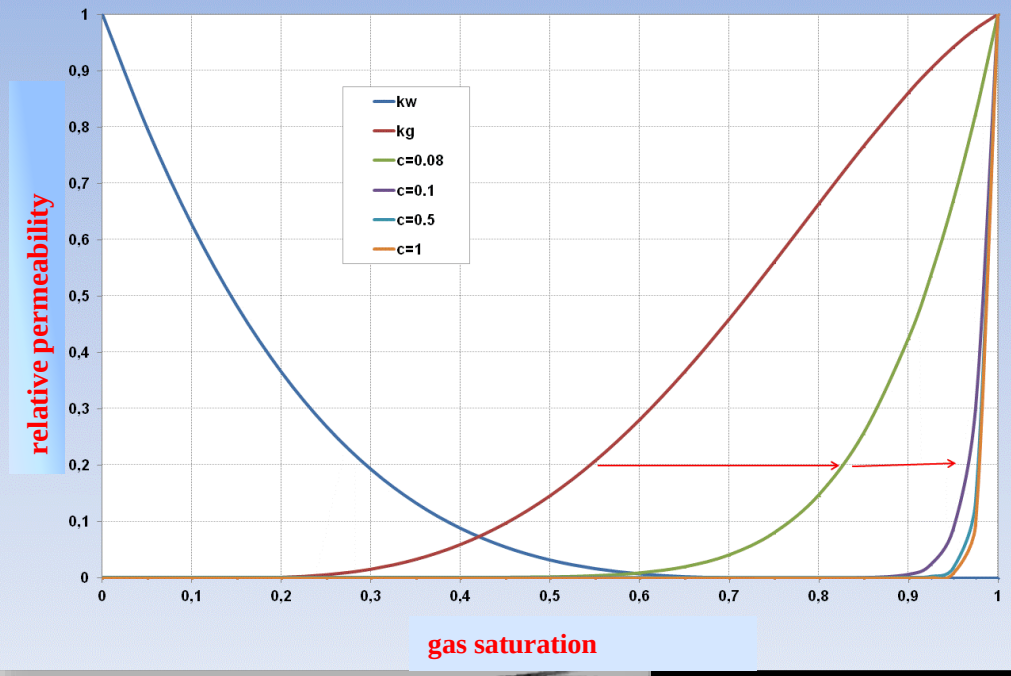
The received experimental curves of relative permeabilities (RP) for the different rocks are often used for calculations, suggesting that the RP curves for the rocks of the same class are approximately identical.

The figures show a typical correspondence of RP for fluid and gas from water saturation of sandstone, and the results of physical modeling of the GWC movement in the sector (radial) models and three-dimensional hydrodynamic model.

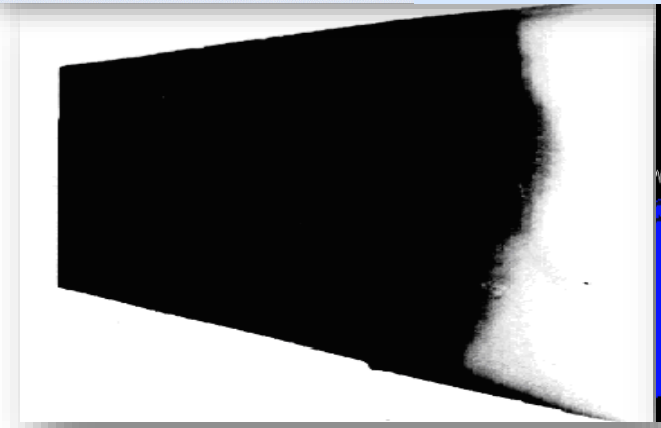


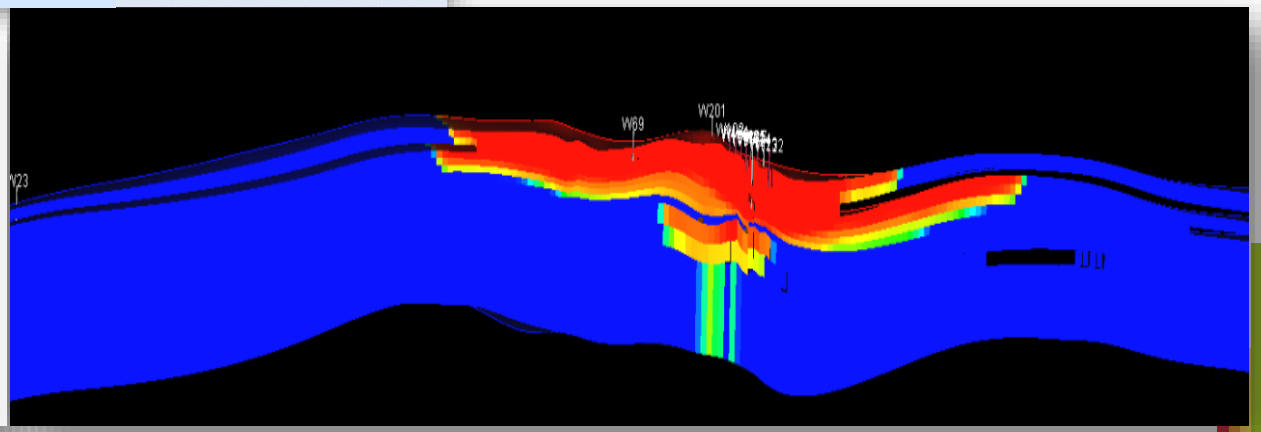


Methods



The figures show that the movement of GWC slowed down considerably, thereby improving the stability of its movement both in layers and throughout the thickness of the stratum and fostered forming a highly gas-saturated zone. In practice, this will foster creating compact volumes of gas and minimizing the spreading of gas.





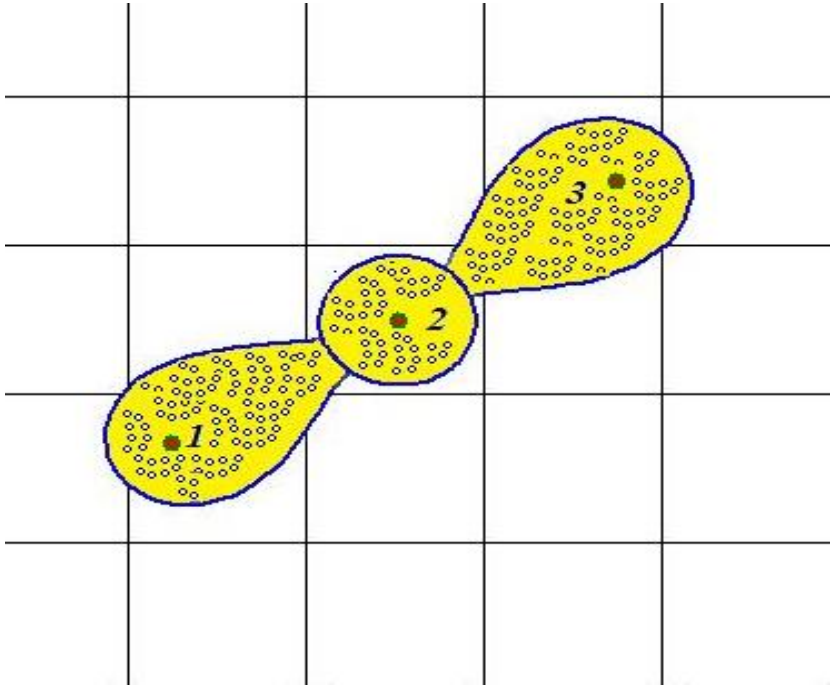
Methods

However, the application of this technology is not limited by the screen formation to improve the efficiency of a single well.

It is possible to use dispersed systems for the formation of an areal screen through a chain of wells.

Formation of a continuous screen is carried out by injection of foaming solution with individual markers into injection wells, so they appear in the relief wells indicating the formation of the screen and its continuity between those wells.

Figure - Forming of a continuous screen; 1, 3 - injection wells, 2 - relief well



Results

Such measures allowed us to raise the daily production by 30% and assure water-free operation of a series of wells which had been scarcely involved in drawing due to high water factor within the previous seasons.

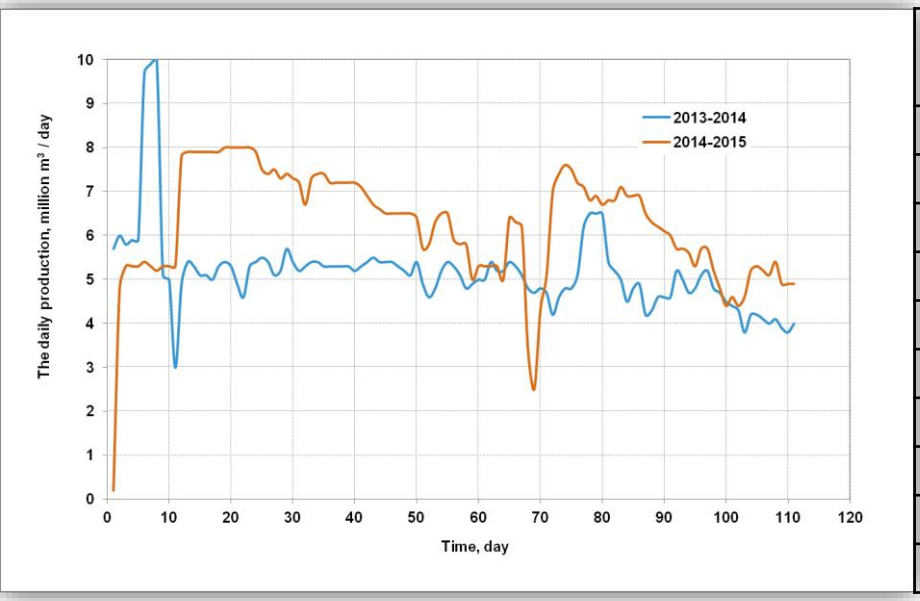


Figure. Comparison of the daily productions for the drawing of the seasons 2013-2014 years и 2014-2015 years

Well	Drawing – For the season 2014 - 2015		Drawing – For the season 2013 - 2014	
GGP-1	Gas Q	At work	Gas Q	At work
N of the well	t. m³	hour	t. m³	hour
90	6735,9	1986,4	623	87,75
83	13774,9	3197,7	2269,6	5487,3
89	19772,1	4400,1	492,8	104,98
101	1033,2	2018,4	605,37	330,22
100	2113,7	1671,1	383	198,3
107	15897,7	4016,6	342	68,8
105	2656,4	2009,6	966	310,1
114	14130,4	2191	1703	310,1

Chart – Comparison of the well works in the seasons before and after works

Conclusion

- *The economic efficiency was calculated to evaluate the success of the activities in monetary terms. It confirmed the commercial benefit of more that 500 mln. rubles with small enough material costs for the preparation and execution of works.*
- *Obvious results attained by the use of SAS solutions for the intensification of fluid repression with gas allowed to develop complex recommendations and measures for their further use at this storage.*

In conclusion, it is worth mentioning that the said technology, being very cost effective, proved fairly efficient and we believe it must be further improved to develop any new agent compounds and expand the sphere of usage, as the world practice of UGS knows quite a few storage facilities where foam barrier could isolate the gas deposits and prevent the evasion of gas off the trap.