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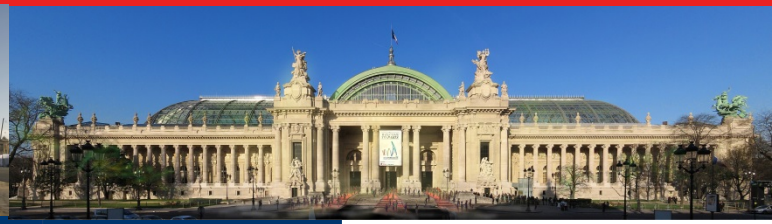

An Experience of Surface Active Substance Barriers Placed for Screening Out Stratum Water Advents to UGS Deposits

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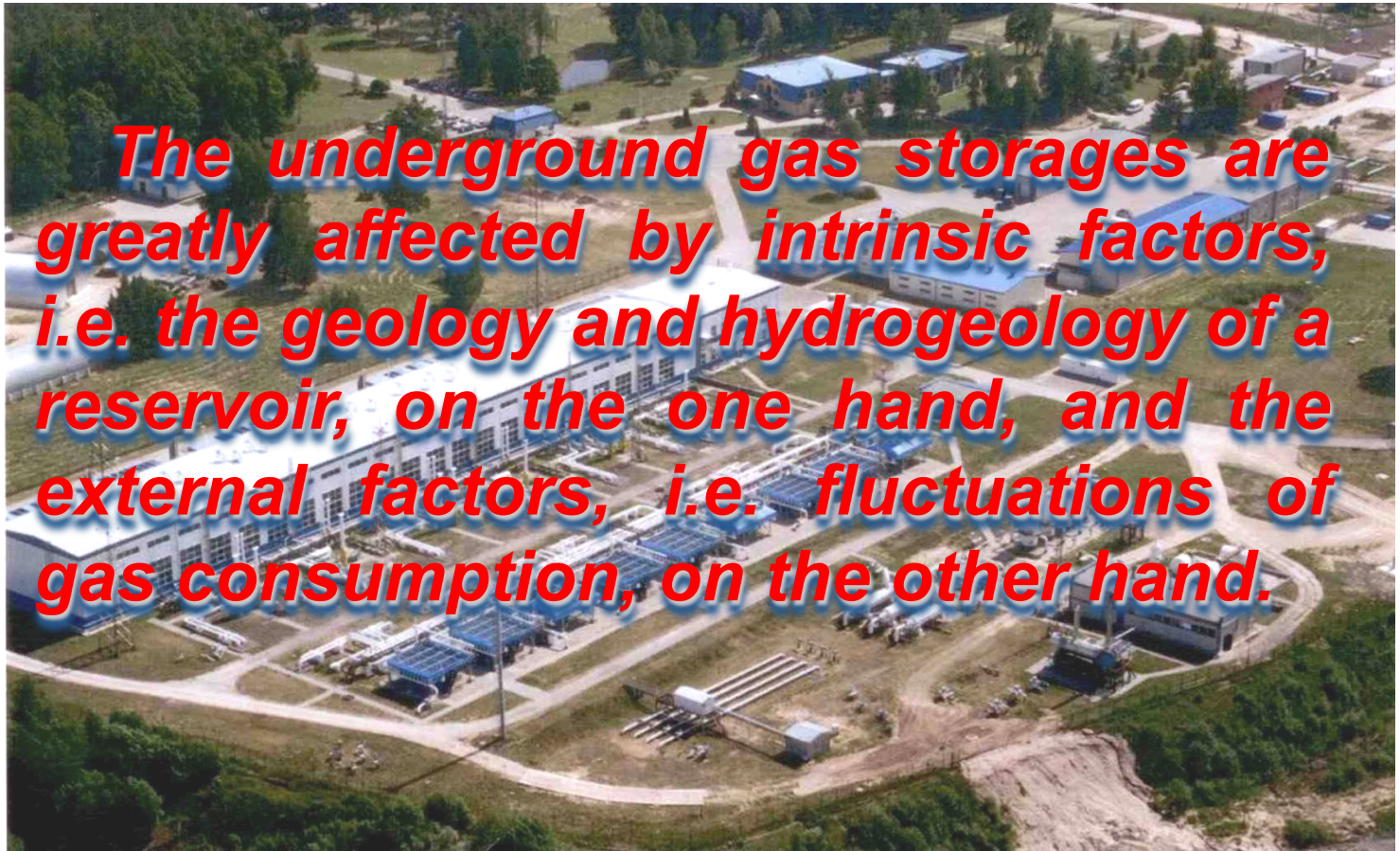
Background

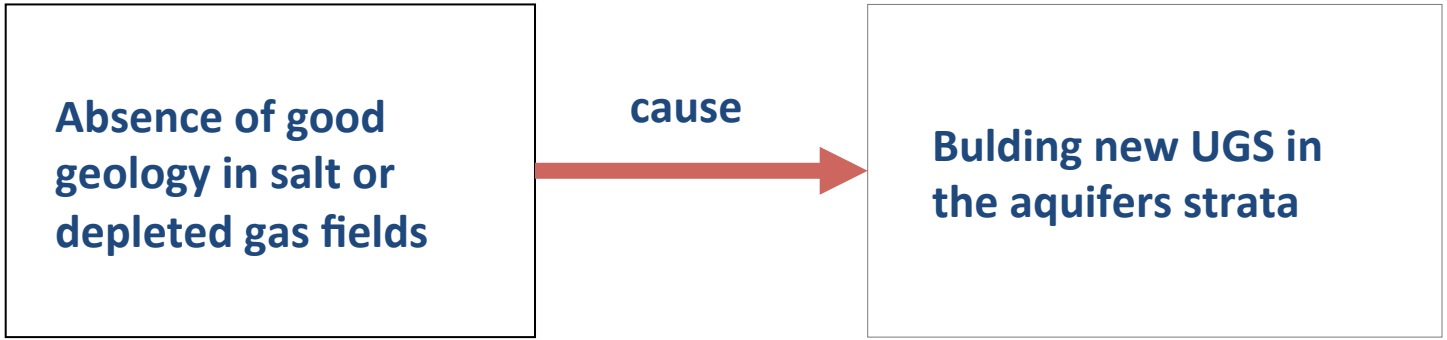

The underground gas storages are greatly affected by intrinsic factors, i.e. the geology and hydrogeology of a reservoir, on the one hand, and the external factors, i.e. fluctuations of gas consumption, on the other hand.

Backround

Important UGS task is:

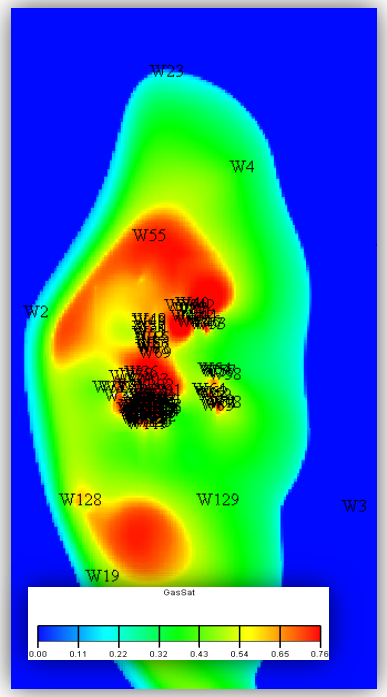
- to assure variable operability modes with higher peaks, with potential gas injection in thaw periods and regular under-consumption of working gas in warmer winters.

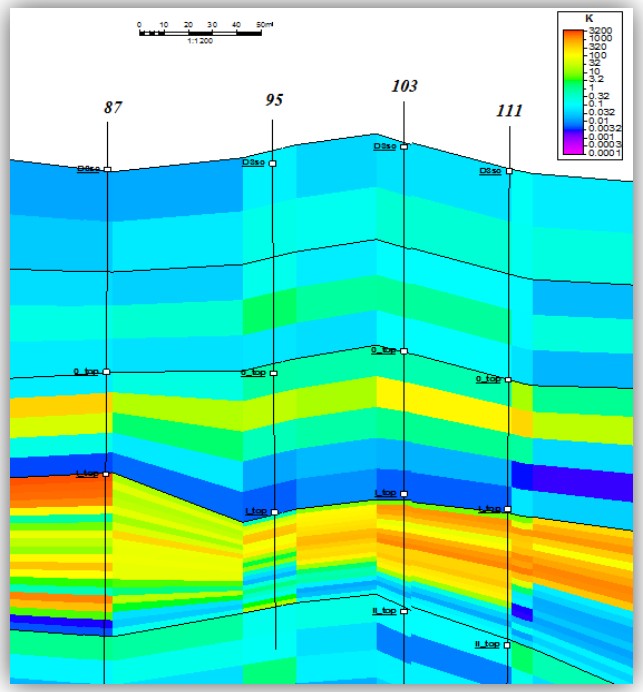
Such operation modes are characteristic of UGS in depleted fields with gas extension drive and storages in salt caverns.



Aim

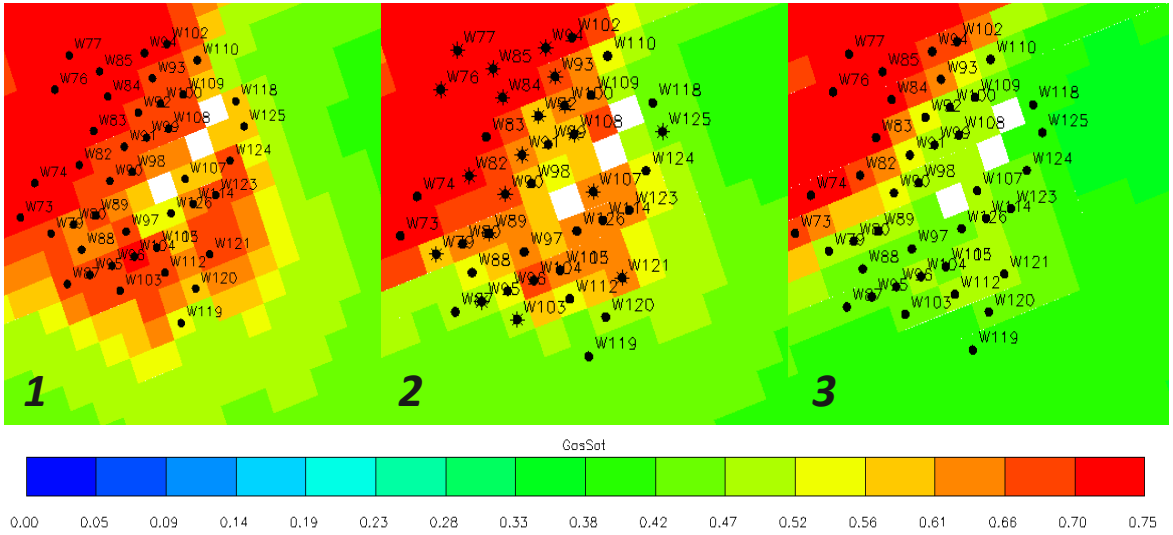
Gas is injected into sandstone of the upper part of Upper Devonian Shchigry level.
The terrigene formation has complex lithology due to specific sedimentation.





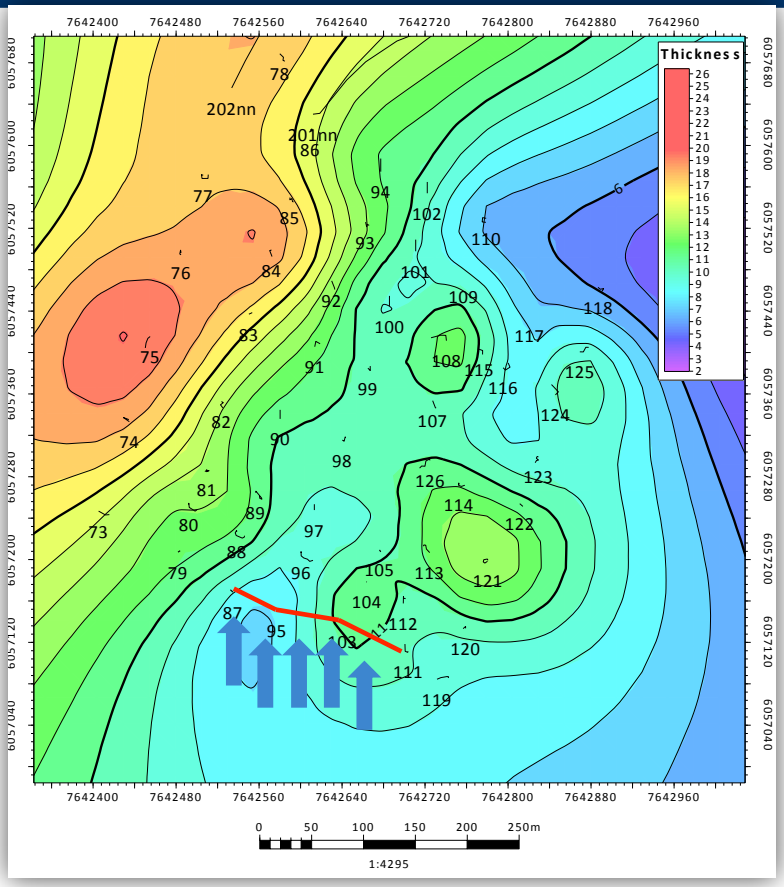
Aim

Inhomogeneity of the collector parameters of the collector layer lead to results in selective penetration of gas into the most penetrable veins, due to which gas distributes over a vast area. Over the high penetration areas, the gas apparently runs off the design layout of USG. In the 2013-2014 period, the drawing volume constituted just 36% of the design active storage capacity in 292 days.



The purpose of using the foam systems with this storage is to compact the deposit, i.e. minimize the flow and technology losses.

Methods



Designing and Implementation of the screen was performed for the first time in the world's underground gas storage operation experience and will have wide perspectives.

Formation of the screen was realized through the chain of wells.

Chart – Calculated volumes of Surface Active Substance and gas the screen designing

№s.n	Wells numbers	The volume of the injected solution, m^3	The volume of the injected gas in the reservoir conditions, m^3	SAS mass, kg	
				OP-10	CSSL
1	87	156	624	780	468
2	95	1208	4832	6040	3624
3	103	332	1328	1660	996
4	111	1525	2952	3690	2214
6	In total	3221	9736	12170	7302

Methods

Processing of the chosen wells and designing of the intrastratal screen were performed on the ground of the patented technology.

Results

According to the results of the geophysical studies it was found that the performed works helped to increase gas saturation capacity of the wells of that area.

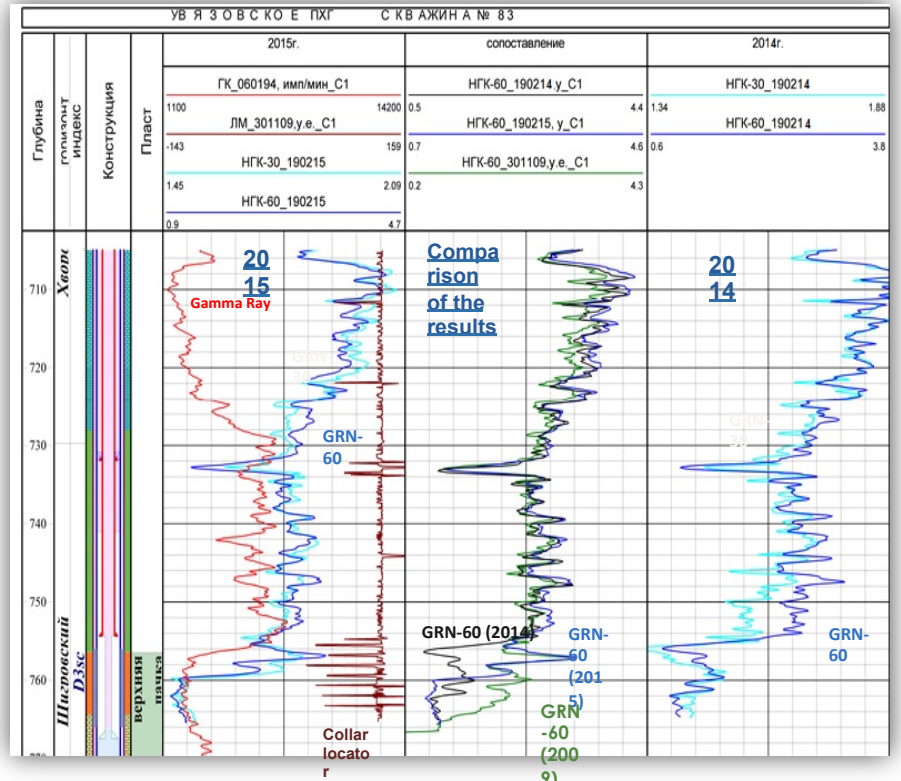


Chart – Comparison of the well works in the seasons before and after works

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
83	13774,9	3197,7	2269,6	5487,3
89	13888,0	3345,8	492,8	104,98
101	1033,2	2018,4	605,37	330,22

Conclusion

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.

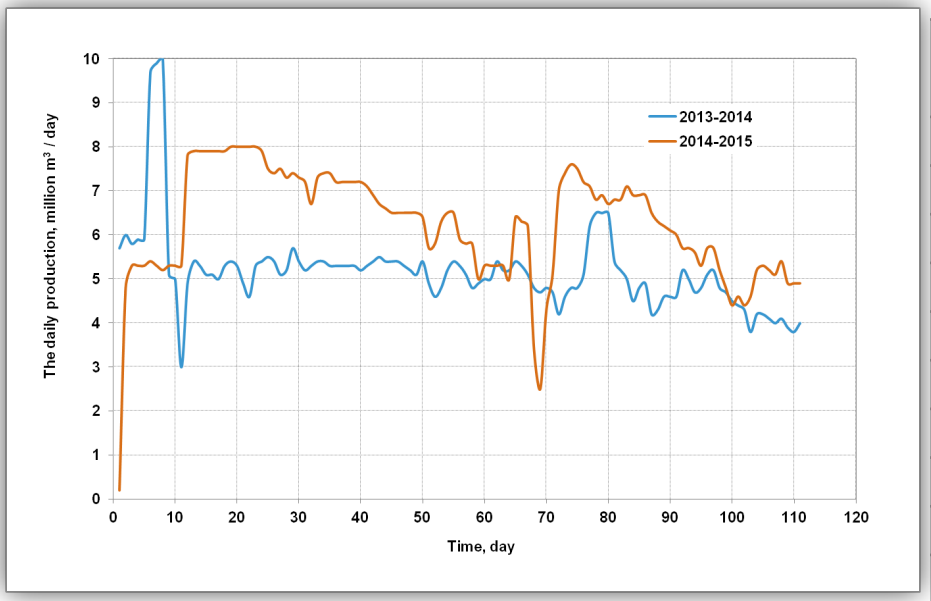


Figure. Comparison of the daily productions for the drawing of the seasons 2013-2014 years и 2014-2015 years

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
88	2538,3	2092,9	218	71,89
96	1956,8	2045,3	149	305,2
97	4531,2	1174,5	354	74,18
100	2113,7	1671,1	383	198,3
107	8345,8	2161,5	342	68,8
105	2656,4	2009,6	966	310,1
114	13933	2128,3	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.

- ***THANK YOU FOR YOUR ATTENTION!!!***

- ***For questions: r.nikitin@phg.gazprom.ru***