

## Pulse of Askaraysk

N<sup>o</sup>4 (969). January 27, 2012  
Gazprom Dobycha Astrakhan  
Weekly



## RESULTS EXCEED EXPECTATIONS

In 2011 Fluxocore<sup>®</sup> 110, a new acidizing composition for clay cake removal, was used to enhance gas recovery for the first time at the Astrakhan gas condensate field. The filter cake remover is an acidic composition based on synthetic (pure) hydrochloric acid with a chemical complex added. The complex includes additives that destruct and disperse clay and polymers, a corrosion inhibitor, and surface-active agents that make well-bore and bottom-hole cleaning and desliming most effective, thus increasing gas discharge to the wellhead.

Eight hydrochloric acid baths with Fluxocore<sup>®</sup>110 were performed at production wells, and two well-operations of well completion after drilling were performed to clean the well-bore and bottom-hole.

In spite of low injection volume of acidic composition (20-30 cubic meters) the well output was increased due to the use of new highly efficient composition.

‘The chemical has exceeded our expectations’, says Ruslan Zontov, Head of the department for field efficiency development at Gazprom Dobycha Astrakhan Engineering Centre. ‘In fact these low-volume acid baths have produced the same effect as large-volume treatments. The average flow rate has been increased by 40%’.

At five of the wells the work was carried out as a part of the rationalization project using their own resources and manpower, without contractors. The main goal of such work is to prevent clogging of the interior of direct-flow butterfly valves of Christmas tree that reduces the flow cross-section, obstructing the gas liquid mixture outflow. As a rule such wells had to be shut down because they were some of the most difficult ones, due to the fact that coil tubing could not be used on most of them for a

number of reasons. The situation changed when the new composition was introduced as there was a possibility to clean butterfly valves without interrupting of production. Since these works were just completed in the late December, well surveys are still in process; depending on their results the technology will be adjusted and corrected.

Incremental gas recovery in the gas production department through introduction of acidizing composition Fluxocore<sup>®</sup> 110 for clay cake removal exceeded 68 million cubic meters of gas liquid mixture.

Enhanced gas recovery can also be facilitated by the new diverter used to prepare self-diverting acidic compositions. Surfogel<sup>®</sup> is an analogue of the well-proven Schlumberger VDA system. It has been fully tested, and it is planned to be implemented in 2012 - 2013. In January there was a working meeting at the engineering centre for experts to discuss technologies and injection volumes for the upcoming work.

‘Due to high efficiency of the VDA chemical and lack of competition Schlumberger did not sell the chemical but carried out a full range of well treatment with the self-diverting acidic composition that was rather costly’, comments Ruslan Zontov. ‘The unique conditions of our

field determine the specific aspects of our cooperation with manufacturers - it has already happened twice that we had to send the diverter back to be adjusted. And finally we get the chemical which satisfy all our requirements. Besides, the locally produced analogue chemical turned out to be even better in terms of the functional properties, and much cheaper than the imported one'.

When hydrochloric acid is injected into the formation it follows the basic laws of physics and the line of the least resistance, so it moves to high-permeability formation zones. The primary purpose of the diverter is to re-direct acidizing composition to treat the formation zones that were previously inactive. An additive is added to hydrochloric acid to increase its viscosity. After the injection hydrochloric acid interacts with formation carbonate and increases viscosity threefold. Therefore high-permeability formation zone where it heads to is temporarily blocked. And the next portion of hydrochloric acid will inevitably move to another zone, which is exactly what the engineers want. Sequence of portions of hydrochloric acid with the diverter and hydrochloric acid without the diverter can take two, three or more cycles, thus switching to more and more formation zones. Alongside with certain advantages previously used Russian technologies with polymer systems had some significant drawback. Any polymer is a sort of glue: once being pumped into the formation it can never be taken out completely (even with hydrochloric acid treatment). And it is especially problematic since the formation fluid of the Astrakhan gas condensate field is chemically active as it is saturated with gas and hydrogen sulphide. The use of such systems can lead to secondary precipitates. As far as Schlumberger system and Russian composition are concerned they are surfactants capable of changing viscosity under pH changing and that is even more important they can be removed from the formation easily with in-well air stripping.

It is well-known that the use of new chemicals in the field raises serious concerns of specialists at the gas treatment plant since the chemicals even in the smallest amounts can have a negative impact on treatment processes. It is to be avoided by all means. Thus these new chemical (as well as all the other ones) was not only tested by the department for field



efficiency development of the engineering centre, but also by the department for physical and chemical research that examines the impact of different functional liquids on refinery processes. In both cases the tests were completed successfully. The first treatment with the Surfogel® diverter is planned for the late January. We hope the results will be as good as the results of the filter cake remover application. The viscosity range of the diverter produced in Russia is much higher than that of the foreign analogue, so the diverting properties should be better. This year it is also planned to introduce a new deep penetrating composition - an improved analogue of KSPEO-2B that has already passed laboratory tests successfully.

**Lyubov Nikeshina**