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# Innovative Approach for Multilateral Well Completion with TAML 3 Junction Installation in Open Hole in Russia's Yaro-Yakhinskoe gas cap deposit.

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## Summary

Multilateral well completion technologies are becoming more common throughout the lifecycle of gas cap deposit fields due to inherent complexity of such reservoirs. Extended lateral drilling of a multilateral well tends to increase the contact area with the formation and, as a result, the production rate of a well. Saving the need of design, construction, and maintenance of the surface infrastructure and upper sections of a potential new well [1].
Various factors are considered while designing such a well: starting from reservoir properties, thermobaric conditions, M-factor, thickness of the oil rims, fluid composition, and surface infrastructure limit. So, a Multilateral well might be a good solution under certain circumstances.[2]
In Russia, the most popular Multilateral completion technology nowadays is level 1 according to TAML international classification (with both lateral cased). The noteworthy strengths of the system include its reliability, simple deployment, and proven cost-effectiveness. However, its widespread use is hindered by such constraints as a fundamental limitation associated with the inability to perform following downhole operations (DHL, HCT, processing of BHZ, etc.) in one of the boreholes, which directly affects the effective lifetime of such a well.
Technologies TAML 2 and 3 are the next levels in the international classification describing the construction of a Multilateral well with an exit from previous casing (mainbore). [3]
However, the TAML 2 system was not considered for this case due to the lack of mechanical integrity of the junction. The basic TAML 3 system requires both a longer well completion time and additional operations entailing associated risks.
In view of the above, a further development of TAML 1 technology was considered as a solution: Multilateral well completion with TAML 3 junction installation in the open hole preserving its mechanical integrity, with the possibility of selective access to both laterals during following downhole operations without involving additional service equipment.
This paper describes the field experience of TAML 3 system deployment in the open hole for the land project, which confirmed the effectiveness of an integrated approach and targeted solutions for further optimization of hydrocarbons production by the example of the Multilateral well construction.

## Theory / Method / Workflow

The first Multilateral well completion using TAML 3 technology in the open hole was performed at the Yaro-Yakhinskoye oil and gas condensate field situated in the Purovsky district of the Yamalo-Nenets Autonomous Okrug of the Russian Federation. Initially the project was designed to be TAML 1 in order to increase oil recovery due to a larger pay zone coverage. But operation of such wells necessitated interventions in both laterals, which was not possible due to the limitations of the completion system used.

## Results, Observations, Conclusions

Overall, there were 3 attempts of TAML 3 system installation in the open hole. A thorough analysis of the first two unsuccessful attempts resulted in development of an exclusive mitigation option (lowering the TAML level of the well down to 1) preserving the well functions, which is essential for highly sophisticated operations with a risk of total loss of a well.

## Novel/Additive Information

Up to the present time the Russian oil companies have not expressed strong interest in regard to the gas cap deposits since the peculiarities thereof complicate development and define their status as hard-to-recover reserves. Suffice to say that compared to traditional oil fields, in the gas cap deposits the oil is usually influenced by two displacement agents at the same time: water from below and gas from above. So, there are more parameters to be considered complicating the oil recovery estimates and well designing.

This paper attempts to test economic feasibility of mainstream multilateral completions as effective technology in gas-cap development providing: a) permanent selective access to both laterals; b) the ability to control each lateral during production (the ability to cut off any of the laterals due to water/gas breakthrough) and; c) the ability to control production from both laterals (compatible with the ICD, AICD systems, etc.)

## Acknowledgements

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