



## N-FLOW™ 325 Delayed Reaction Filter Cake Breaker

### N-FLOW™ 325 Filter Cake Breaker System Yields Strong Production Increase on Four Uranium Extraction Wells

Location: Southern Kazakhstan

#### Operator’s Challenge

A joint venture was created to develop the Moynkum and Tortkuduk uranium fields in south Kazakhstan. Baroid was awarded a one-year contract to supply fluids, additives, and engineering services to drill 800 shallow wells. The operator’s key concerns were protecting the production reservoir and increasing formation fluid production.



Lab tests showing filter cake on ceramic disks, before (left) and after (right) N-FLOW™ 325 breaker treatment.

#### Halliburton’s Solution

The Baroid technical team recommended drilling the production zone with a customized drill-in fluid containing sized BARACARB® bridging agent to protect the reservoir, followed by treatment with the N-FLOW™ 325 delayed reaction filter cake breaker system to improve producibility. The N-FLOW 325 breaker system is widely used to clean up water-based fluid filter cakes in openhole completions and is safe to handle at the surface. After the breaker is pumped into place in the wellbore, acid reaction can be delayed for several hours to accommodate other operations. This helps ensure the uniform delivery of an effective breaker throughout the productive zone.

Another advantage that the N-FLOW 325 breaker has over the starch-degrading enzyme alone is that calcium carbonate embedded in the pore throat of the formation during drilling is degraded to enhance production.

Extensive lab testing, including permeability plugging and simulation of the removal under specific well conditions, determined the best N-FLOW formulation for this project. All test results were reviewed by Baroid Completion Global Technical Advisors who approved the final system formulation. Then the proposed system was submitted to the customer by the Baroid technical team to be implemented on production and injection wells of the Moynkum and Tortkuduk fields. As per the operations program, the N-FLOW 325 breakers were pumped into the first four production wells, along with the gravel placement. A significant increase in formation fluid production rate was observed in all four wells, in a much shorter time than had been achieved on previous wells.

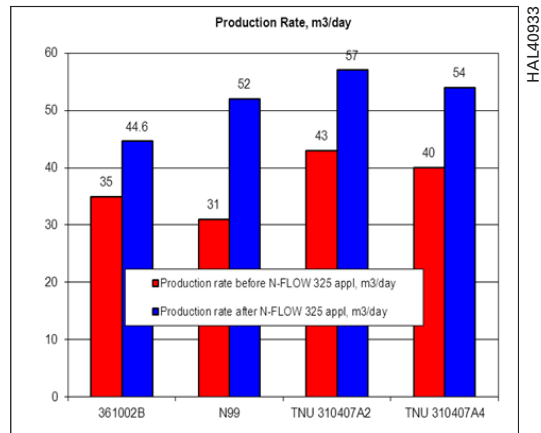
CHALLENGE	SOLUTION	RESULT
Improve formation fluid recovery in uranium pay zone	Treat reservoir with delayed-reaction N-FLOW 325 filter cake breaker	Significant increase in production on all four treated wells

### Economic Value Created

The operator's production team observed a Productivity Index increase on the four wells treated with N-FLOW breaker.

In comparison to surrounding production wells and previous outputs, the fluid production rates of all four wells increased (see graph).

The operator has continued the application of Baroid's highly effective N-FLOW 325 system on all subsequent wells.



*Increased production rate on producing wells, before and after N-FLOW™ 325 breaker treatment.*