

Innovative Friction Reducer Maintains High Performance While Reducing Completion Costs in the Appalachian Basin



CHALLENGE

Reduce the total cost of operations for fracturing wells with produced water, which requires the use of premium cationic friction reducer.



SOLUTION

NexTier worked quickly to develop a new FR offering superior friction reduction at a reduced cost.



RESULT

Projected cost savings exceeding **\$1.2MM per fleet** for one Appalachian operator and **\$400K+** for another, achieved through targeted application of ViscStim 250CE-164.

A mid-sized operator in the Appalachian Basin asked NexTier to help decrease their friction reducer (FR) costs, specifically during the final third of the stages on each well where a premium FR was proving unnecessary. Like most operators in the area, this client utilizes a variable amount of produced water to frac their wells, with TDS levels as high as about 225,000 mg/l.

Temp (°F)	Friction Reducer	Loading (gpt)	Max % FR	Time to Max % FR (min:sec)	Time to 90% FR (min:sec)	2 min % FR Average	4 min % FR Average	6 min % FR Average	8 min % FR Average	Base Fluid
70	ViscStim 250CE-164	0.50	81.43	0:33	0:14	80.3	80.6	80.6	80.5	Fresh Water
70	ViscStim 250CE-164	0.50	80.94	0:34	0:14	80.0	80.1	79.7	79.2	50,000 TDS Synthetic Brine
70	ViscStim 250CE-164	0.50	80.65	0:49	0:15	79.2	79.5	79.2	78.8	100,000 TDS Synthetic Brine
70	ViscStim 250CE-164	0.50	80.27	0:45	0:15	79.0	79.0	78.5	77.9	150,000 TDS Synthetic Brine
70	ViscStim 250CE-164	0.50	79.46	0:52	0:16	77.7	77.7	77.0	76.1	200,000 TDS Synthetic Brine
70	ViscStim 250CE-164	0.50	78.35	1:18	0:17	76.4	76.5	75.7	74.9	250,000 TDS Synthetic Brine
70	ViscStim 250CE-164	0.50	76.48	1:17	0:23	72.8	73.4	72.5	71.5	300,000 TDS Synthetic Brine

Fig. 1 ViscStim 250CE-164 Friction Reduction Flowloop Data

After reviewing NexTier’s extensive FR performance database, it was quickly determined that there were no existing products that would meet the required performance and price criteria. Rather than forcing a sub-optimal solution, NexTier leveraged its unique ability to collaborate directly with a major oilfield chemical manufacturer to create a product to meet the performance and price specifications. Over the next 2 weeks, several friction reducer options were created by the manufacturer and tested in the NexTier lab to find an optimum formulation balancing performance and cost (Figure 1).

After developing a viable formula in the lab, several totes of the product were swiftly produced for field trials. Following verification that the performance of the totes lined up well with the original lab created samples, the totes were taken to the field and trialed on two separate jobs for two different operators. Both field trials demonstrated that the new product, ViscStim 250CE-164, offered roughly equivalent friction reduction (up to 250K TDS) to the incumbent premium product, at the same or lower concentration (Figure 2).

The adoption of ViscStim 250CE-164 is expected to deliver significant cost savings, with projected reductions of more than 10.3%, or approximately **\$1.2 million per fleet** for one major Appalachian operator. Another operator is expected to **save more than \$400,000** using it only during the final 1/3rd of stages in each well. Through close collaboration with the operator, NexTier leveraged its extensive friction reducer database and rapid formulation and testing capabilities to deliver a successful outcome.

	Stage 5 ViscStim 250CE-164	Stage 6 Incumbent FR	Stage 57 Incumbent FR	Stage 58 ViscStim 250CE-164	Stage 69 Incumbent FR	Stage 70 ViscStim 250CE-164
Plug Depth (ft)	22,238	22,064	13,157	13,009	11,111	10,936
Average Rate (BPM)	88	90	99	100	98	99
Average Pressure (psi)	10,668	10,778	9,638	9,312	8,352	8,164
Clean Volume (BBL)	6,674	6,653	5,063	5,208	6,707	6,801
Avg FR Concentration (gpt)	0.98	1.59	1.01	0.86	0.89	0.92

Fig. 2 ViscStim 250CE-164 vs Incumbent FR Field Trials

ViscStim 250CE-164 exhibits equal or better performance to the incumbent friction reducer at a lower concentration and cost.