

PRODUCT BULLETIN

PER-Z



Canadian Energy
SERVICES



PFR-Z

Amphoteric, Zwitterionic HVFR Emulsion

PRODUCT DETAILS

PureChem's exclusive PFR-Z HVFR product has been developed for enhanced performance in the most exertive completion designs that are currently pushing the operational and productivity limits in shale development. PFR-Z is an HVFR that has found the ideal balance between HV and FR: there is sufficient viscosity to aid in proppant transport and optimize frac geometry but not compromise on friction pressure reduction and the resultant injection rate.

WHAT MAKES PFR-Z BETTER?

PFR-Z differentiates through its speed of on-set for friction pressure reduction (inversion time), overall friction pressure reduction, and optimized dynamic proppant suspension capacity. PFR-Z allows for placement of higher proppant concentrations at faster pumping rates, utilizing 100% produced or flowed back water, and maintains its performance in cold water, necessitating less heating costs. **Re-use your production water more effectively** due to the unique polymer backbone, making it more resistant to changes in water chemistry. PFR-Z is highly resilient to iron and other common contaminants.



MINIMIZED PUMP PRESSURE



LOWER LOADING RATES



LOWER COST



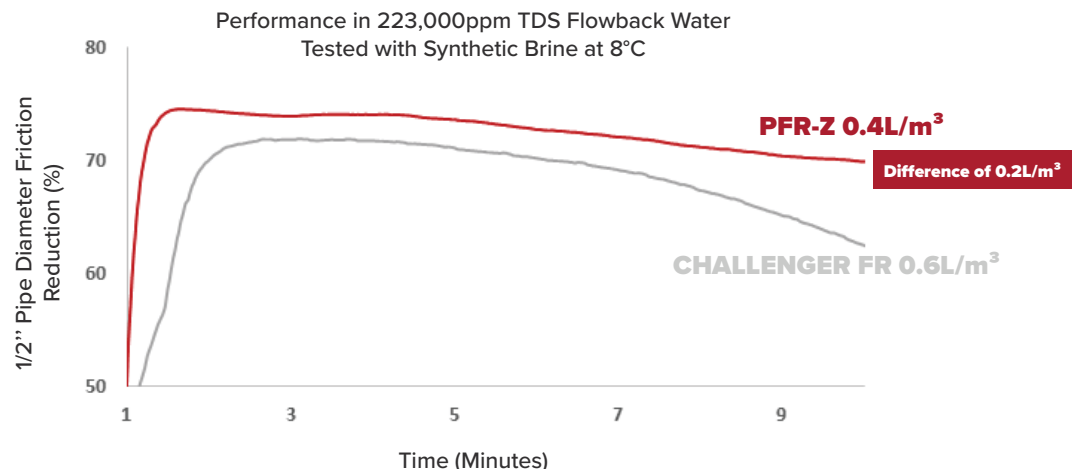
SALINITY FLEXIBILITY /
ESG BENEFITS



INCREASED CLUSTER
COUNT, PREFERABLE
ZONAL STIMULATION

PURECHEM CALGARY FLOW-LOOP DATA

Pre-job testing utilizing PureChem's Chandler 6500 flow-loop has accurately predicted the realized benefit of the PFR-Z during fracturing operations.



CASE STUDY

N.E. BC - Montney

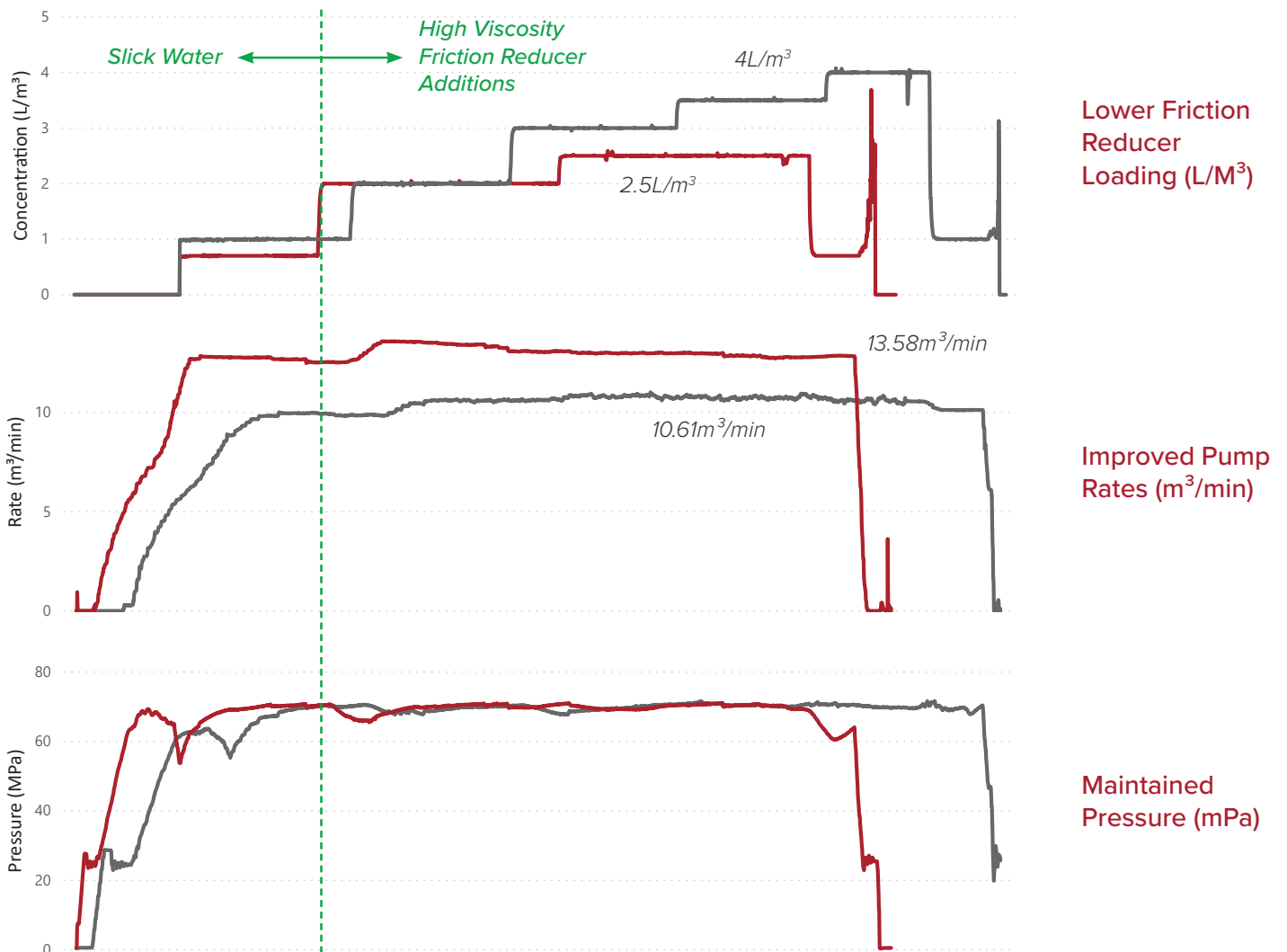
02 Days Saved

PFR-Z was trialled side by side with the Challenger FR (friction reducer) during a Zipper Frac Montney Pad in North East B.C.

19 Clusters Added

Below is a comparison of back to back stages where PFR-Z was used against the Challenger FR for the initial 3 stages, at which point the switch was made back to the Challenger FR high molecular weight anionic FR. The regular FR showed a noticeable decrease in flow rate, while loading rates had to be increased to maintain pressure savings. PFR-Z enabled the operator to increase the number of clusters per frac stage, leading to a significant time savings of almost 2 days on a single frac pad and preferable zonal stimulation.

PFR-Z vs CHALLENGER FR



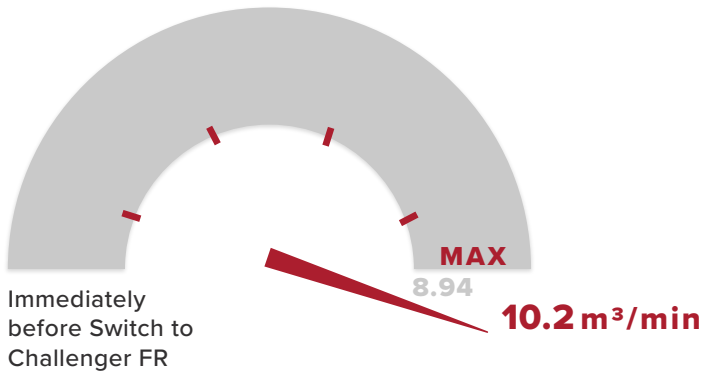
BIG DATA ANALYTICS

Frac Flow Rates in Area (m³/min)

Using our Frac Analytics we compared the maximum flow rates experienced on 35 wells by the same operator in the same area at subsequent depths. PFR-Z saw greater than 100% of previous highest flow rates according to publicly available frac data, while the stages that used the Challenger FR were right in line with other maximums.

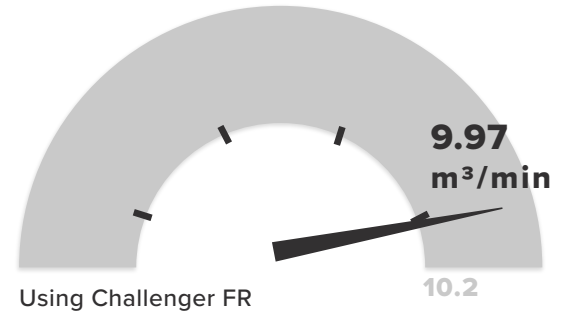
INITIAL STAGES

Depth: 4,500m - 5,000m



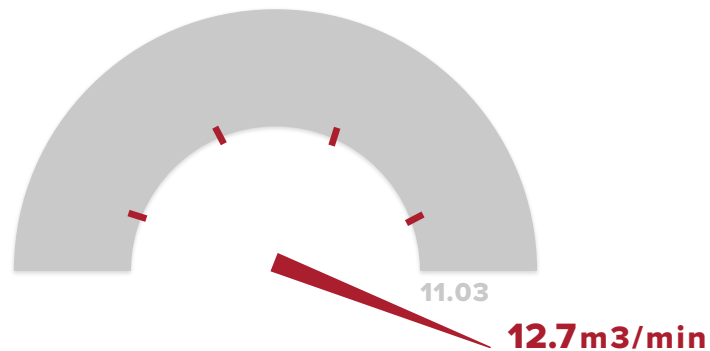
SWITCH OVER TO CHALLENGER FR

Depth: 4,000m - 4,500m



SWITCH BACK TO PFR-Z

Depth: 3,500m - 4,000m



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