PureChem®
Services
Completion Fluids

AWAKE

purechemservices.com

2024

“We are asking all water users to start planning now to use less water in 2024.”

Alberta Environment Minister Rebecca Schulz, January 2024, Calgary Herald.

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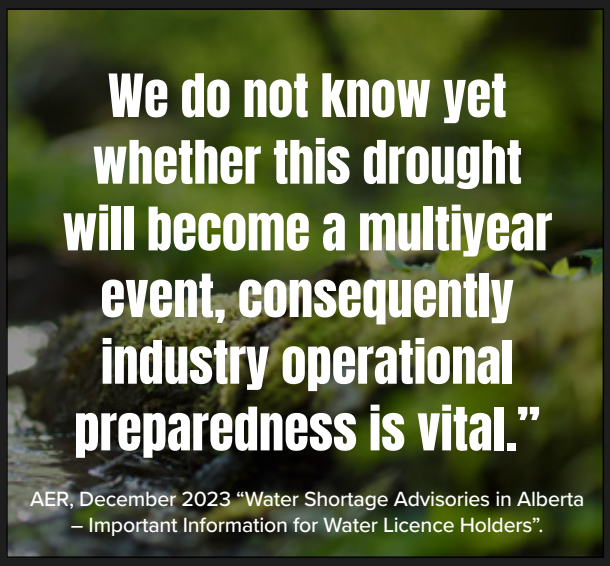
Produced Water Leadership

Sustainable water management through innovative use of produced water for environmental stewardship.

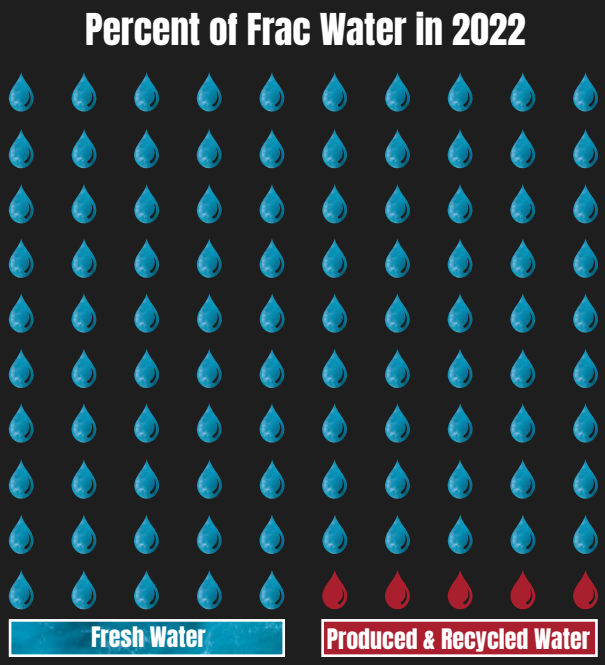
In Western Canada, hydraulic fracturing relies heavily on fresh (non-saline) water, with a majority of the water sourced from surface bodies like rivers and lakes. The Alberta Energy Regulator (AER) and British Columbia Energy Regulator (BCER) have reported a significant rise in freshwater demand for fracing over the past decade, highlighting the need for sustainable water management practices in the face of growing environmental challenges.

The oil and gas industry's preference for surface water stems from its availability, purity, and handling costs. However, this approach faces scrutiny due to potential ecological impacts and concerns about the future viability of these water sources. This has led to calls from regulators and communities for more sustainable water management strategies in the sector.

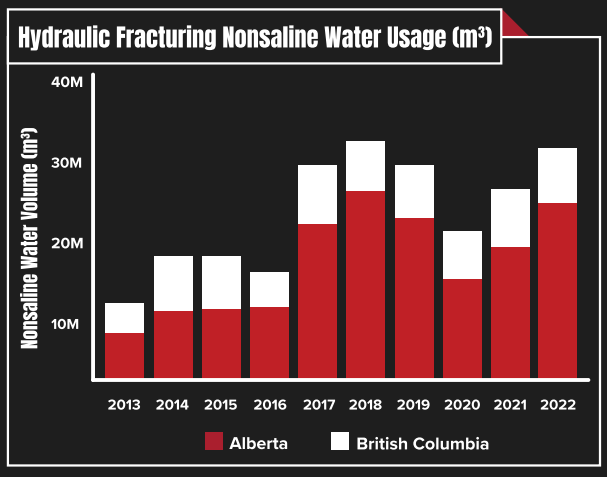


Produced water is a viable alternative to freshwater for frac operations that can significantly reduce industry's reliance on freshwater resources. Challenges for produced water include treating contaminants and managing total dissolved solids (TDS), which can be complex for those unfamiliar with the chemistries involved. Additionally, logistical issues like storage and transportation need to be efficiently managed to fully leverage this alternative water source.

Utilizing produced water in hydraulic fracturing aligns with evolving Environmental, Social, and Governance (ESG) objectives. This approach not only conserves freshwater resources but also enhances a company's ESG profile, an aspect that is increasingly important to investors and the public. This strategy demonstrates the industry's commitment to sustainable resource management and environmental stewardship.



The shift towards using produced water represents a strategic approach towards environmental sustainability. This transition addresses water resource management concerns and places industry leaders at the forefront of adopting sustainable practices. It reflects a commitment to overcoming the challenges of resource utilization and conserving the environment for future generations.



Partnering with PureChem Services

Over A Century of Frac Expertise At Your Disposal

Experience a seamless transition to integrated chemistry services with PureChem, where our team's average frac expertise exceeds 15 years channeled directly from our R&D center to our labs, to blending with superior chemistry. With our customer-first approach, we assure smooth and effective completions chemistry tailored to your wells.

SECURED SUPPLY OF COMPLETIONS CHEMISTRY COMPATIBLE WITH FRESH & PRODUCED WATERS + **LAB TECHNICIANS AND CHEMISTS AT THE FOREFRONT OF INNOVATION** + **TECHNICAL ACCOUNT MANAGERS DEDICATED TO STRONG COMMUNICATION AND SERVICE DELIVERY**

Secured Supply & Superior Completions

Our vertical integration of oilfield chemistry is unparalleled with a team of chemists, engineers, technicians, and account managers is well-versed in the logistics of product management, QA/QC, and blending requirements. Our staff ensures that all aspects of your completions chemistry are looked after with methodical testing and tailored solutions maintaining a consistent flow of operations.

Best Distribution Network in Canada

Innovative Logistics for Reliability & Ease

Experience the ease of our comprehensive storage and delivery solutions. With ample heated storage, transport options, and advanced warehousing and blending capacity, we guarantee the reliability of your chemicals, right where you need them:

01 FRAC TANK FOR ON-SITE HEATED AND AGITATED STORAGE OF 90 M3

02 TRANSPORT-READY CHEMICAL REEFERS FOR HEATED TOTE TRANSFER

03 BULK TANKER UNITS FOR BULK TO BULK TRANSFER FOR LARGE VOLUME OPERATIONS

04 FR INJECTION SKID FOR EFFICIENT WATER TRANSFER

05 ADVANCED ASSETS FOR ENHANCED FRAC OPERATIONS

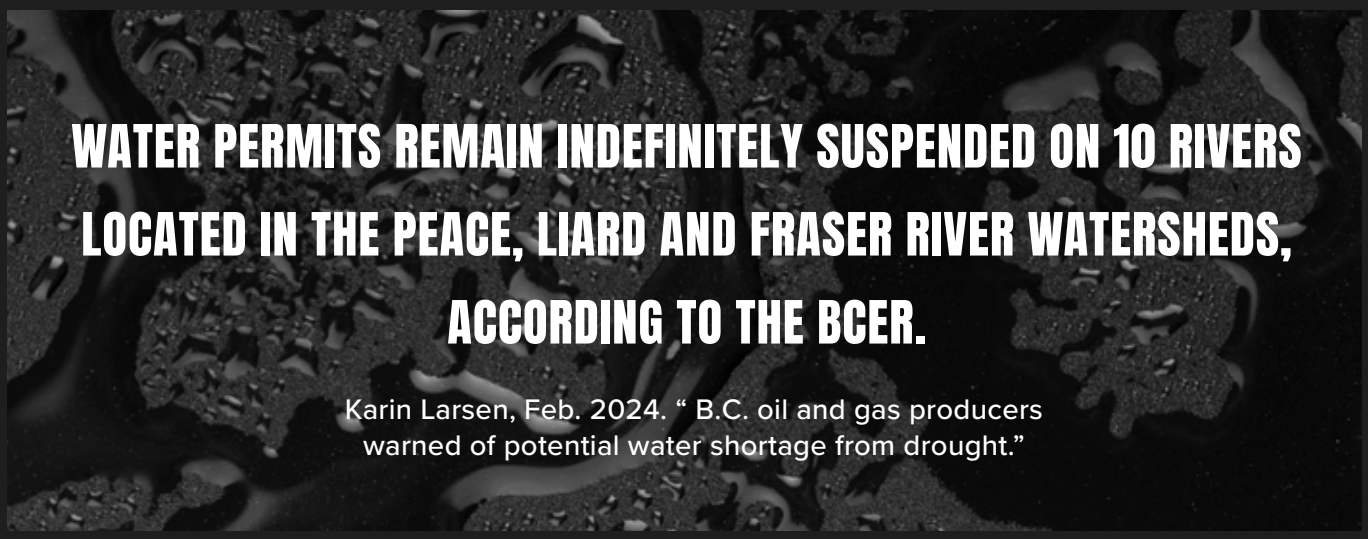
Customized Chemistry for Superior Results

Choose PureChem for engineered chemical solutions that enhance your frac operations. Our extensive selection, innovative research, and cutting-edge instruments are all focused on one thing: boosting your efficiency and adapting to your formations unique needs.

Navigating Water and Choosing the Right Chemistry

Enhancing Frac Operations with Advanced Water Solutions

In the evolving landscape of oil and gas production, efficiently managing produced water is crucial. Customers are increasingly turning to produced water strategies, from developing dedicated hubs to revamping supply chains.



Understanding Produced Water

Produced water is a byproduct of oil and gas production, often carrying hydrocarbons and other substances, necessitating careful management. As the industry moves toward a blend of freshwater and produced water or 100% produced water, the need for stronger treatment and recycling methods has never been greater.

Commingled Water - Transitioning from Fresh to Produced

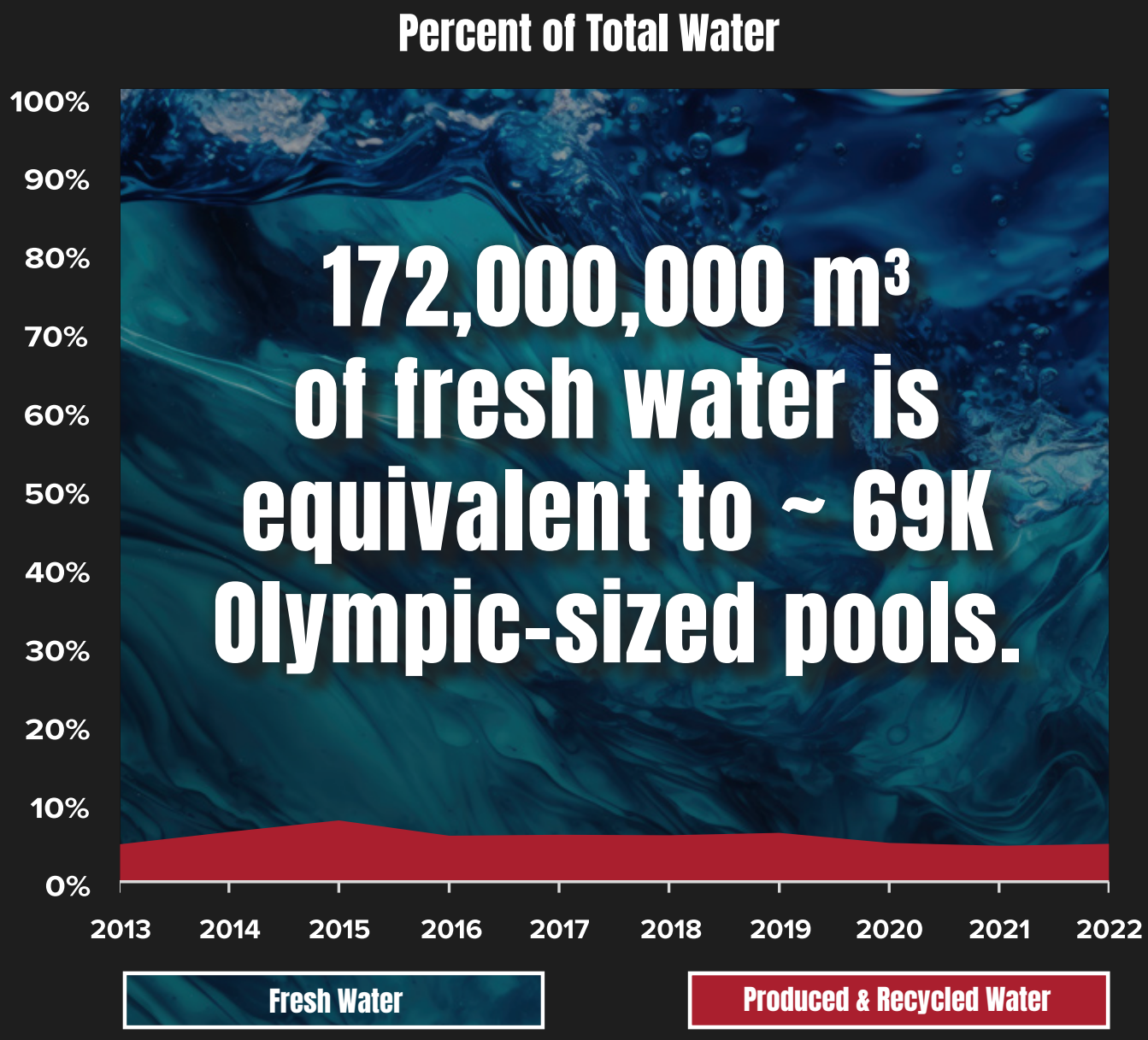
Commingling fresh and produced water for hydraulic fracturing is gaining traction as a sustainable practice. This approach conserves freshwater resources and mitigates waste by increasing produced water cut. Challenges such as contaminant control, multiple water sources, and friction reducer performance are mitigated with our lab’s advanced analysis and tailored chemistry.

Complexities of High TDS in Produced Water

The intricate mixture of substances in produced water, from salts to hydrocarbons, demands a nuanced approach to treatment to prevent operational difficulties. High levels of total dissolved solids (TDS) in produced water can lead to formation damage and a drop in permeability, while the presence of various substances may cause scale, biological growth, iron issues and corrosion, posing a significant challenge to maintaining efficient operations.

Mitigating Risks with Tailored Treatment

Leveraging our in-depth knowledge, we turn the challenge of produced water into an opportunity for enhanced well productivity. Our proven treatment methods not only mitigate risks but also promote improved formation compatibility and performance.



Salinity Matrix and Friction Reducers

Don’t Compromise on Proppant Transport and Friction Reducer Degradation

While produced water presents new challenges, it also offers an opportunity to innovate. PureChem’s FR additives are designed for modern frac operations. Our additives quickly integrate into your processes, providing real-time efficiency no matter the TDS levels of the water. With the PFR and PCFR series, expect reliable operations, optimized proppant transport, superior friction pressure reduction, all leading to higher pumping and operational efficiences.

Responsive and Versatile Additives for Real-Time Efficiency

Our FR solutions are designed for instant integration, allowing for on-the-spot friction reduction and increased rates that streamline your hydraulic fracturing processes.

Enhanced Proppant Transport	**In addition to the core competency as excellent friction pressure reducers, our FRs ensure that proppants are delivered effectively to keep fractures open and facilitate better extraction.**
Logistical Simplicity	**Streamlining your operations by reducing the need for excess water and chemicals on-site, while increasing proppant efficiency.**
Viscosity Management	**Tailored for viscosity-building applications, our additives maintain the desired thickness of the fluid without unnecessary complexity.**

The PureChem Edge

PureChem stands at the forefront of water analysis and compatibility, building and engineering treatment strategies that ensure the successful use of produced water in frac operations.

Our expertise

01 Balancing different water source cuts to ease the transition from fresh to produced

02 Mastering the complexities of total suspended solids (TSS) and total dissolved solids (TDS)

03 Thoroughly assessing each formation to meet water and production requirements

04 Designing targeted treatment for both produced and reused waters, ensuring optimal performance and avoiding unforeseen contaminants.

A Friction Reducer Selection Built To Maintain Frac Efficiency and Performance

Advantages Engineered for Optimal Performance In Produced Water

Our PFR and PCFR series are all designed with the following key attributes:

Maximum Friction Pressure Reduction

Achieve optimal flow with reduced pumping pressure.

Experience quick integration to achieving desired viscosity levels (inversion time).

Rapid Activation

Shear Stability

Designed to maintain their integrity, providing consistent performance throughout pumping and mixing.

Specially designed to perform in the unique conditions of produced and commingled water sources, maintaining effectiveness without compromise at all salinity ranges and different ion complexities.

Compatibility with Produced Water

Ease of Dispersion

Designed for easy dispersion under low shear conditions.

“BECAUSE NO CHEMISTRY IS A ONE-SIZE FITS ALL.”

Looking Ahead with PureChem

As the industry adapts to these shifts, our focus remains on providing solutions that not only meet, but exceed the demands of modern frac operations. PureChem is dedicated to equipping you with the knowledge and tools necessary to navigate new terrain confidently.

Our expertise extends beyond just supplying chemicals; we offer a holistic approach that encompasses water analysis, treatment plans, and ongoing support to ensure that you can continue to meet your production goals despite the changing environmental and regulatory landscape.

Partnering for Sustainable Success

The road ahead may have its challenges, but with the right partner, these can be transformed into opportunities for growth and sustainability. We invite you to reach out to us, to learn more about how we can assist in integrating produced water solutions into your operations, ensuring you stay ahead of the curve while adhering to conservation principles.

For a detailed exploration of produced water strategies and to discuss how our chemical applications can be tailored to your specific needs in British Columbia, Alberta, and Saskatchewan, our team at PureChem is ready to engage. Let's work together to turn water management into a strategic advantage for your frac operations.

"Industry should be proactive and plan for water shortages during 2024, including conserving water in their operations now."

AER, December 2023, "Water Shortage Advisories in Alberta – Important Information for Water Licence Holders".

Product Spotlight PFR-Z™

PRODUCT DETAILS

PureChem's exclusive PFR-Z HVFR Emulsion product has been developed for enhanced performance in extremely high salinity produced water brines pushing the boundaries of the most exertive completion designs in shale development.

PFR-Z is an HVFR that has found the ideal balance between HV and FR. With enhanced proppant suspension and viscosity building capability, PFR-Z excels in proppant transport enabling higher proppant and flow rates while decreasing friction pressure reduction and the resultant injection rate.

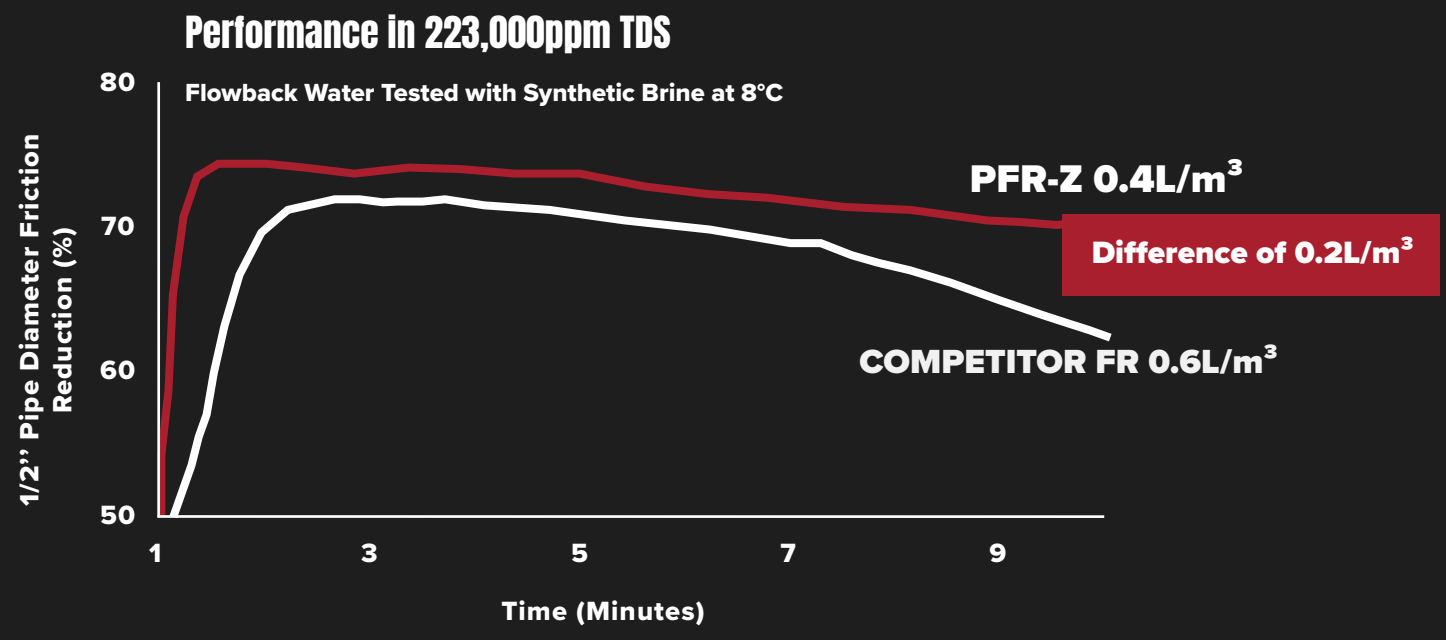
WHAT MAKES PFR-Z BETTER?

PFR-Z differentiates through its ability to utilize 100% produced or flowed-back water. With amphoteric and zwitterionic properties it is highly resistant to changes in water chemistry such as iron and other contaminants, while maintaining frac efficiency.

A case study with PFR-Z in the Montney demonstrated increased friction pressure reduction (inversion time and drag reduction) and optimized dynamic proppant suspension capacity leading to two days of time savings on a frac pad and increased cluster count of 19. PFR-Z is specifically formulated for cold water performance, necessitating less heating cost.

PURECHEM CALGARY FLOW-LOOP DATA

Pre-job testing utilizing PureChem's Chandler 6500 flow-loop accurately predicted better friction reduction capability and lower chemical loadings with high TDS flowback water and lower fluid temperature with PFR-Z during fracturing operations.



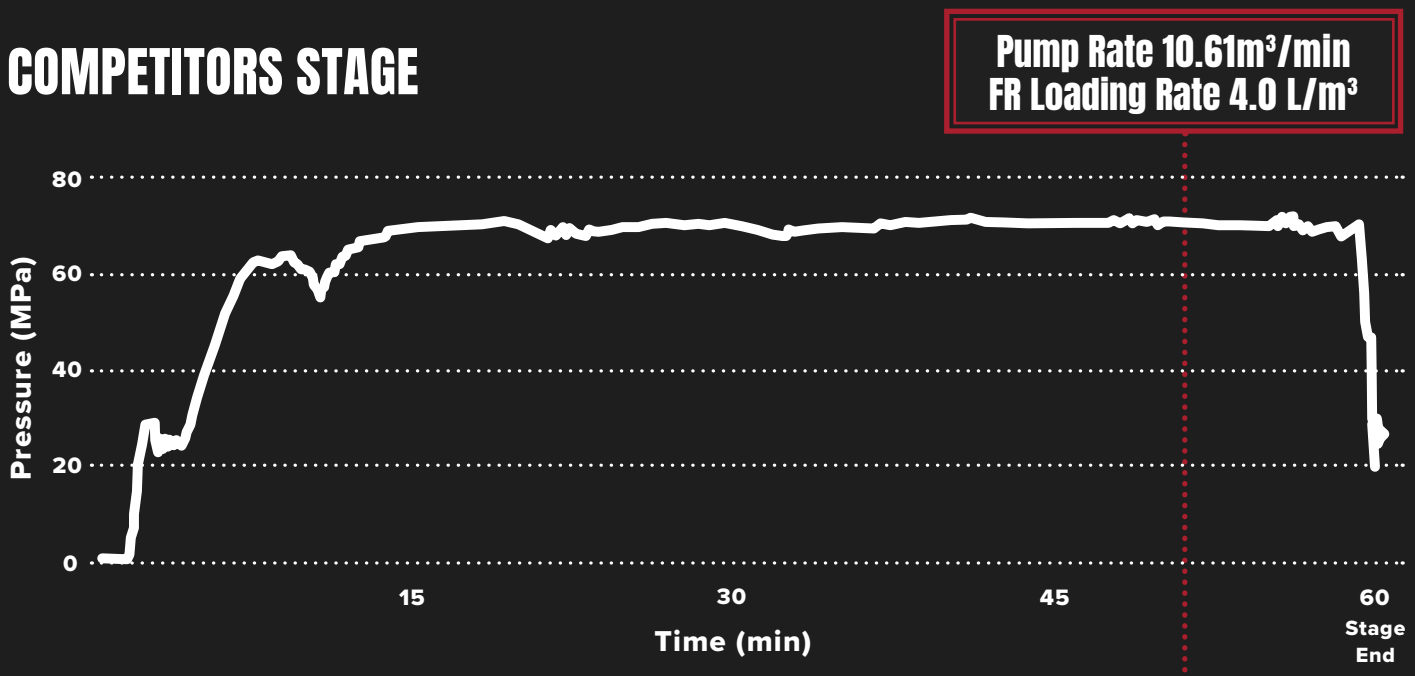
02 *Days Saved*

19 *Clusters Added*

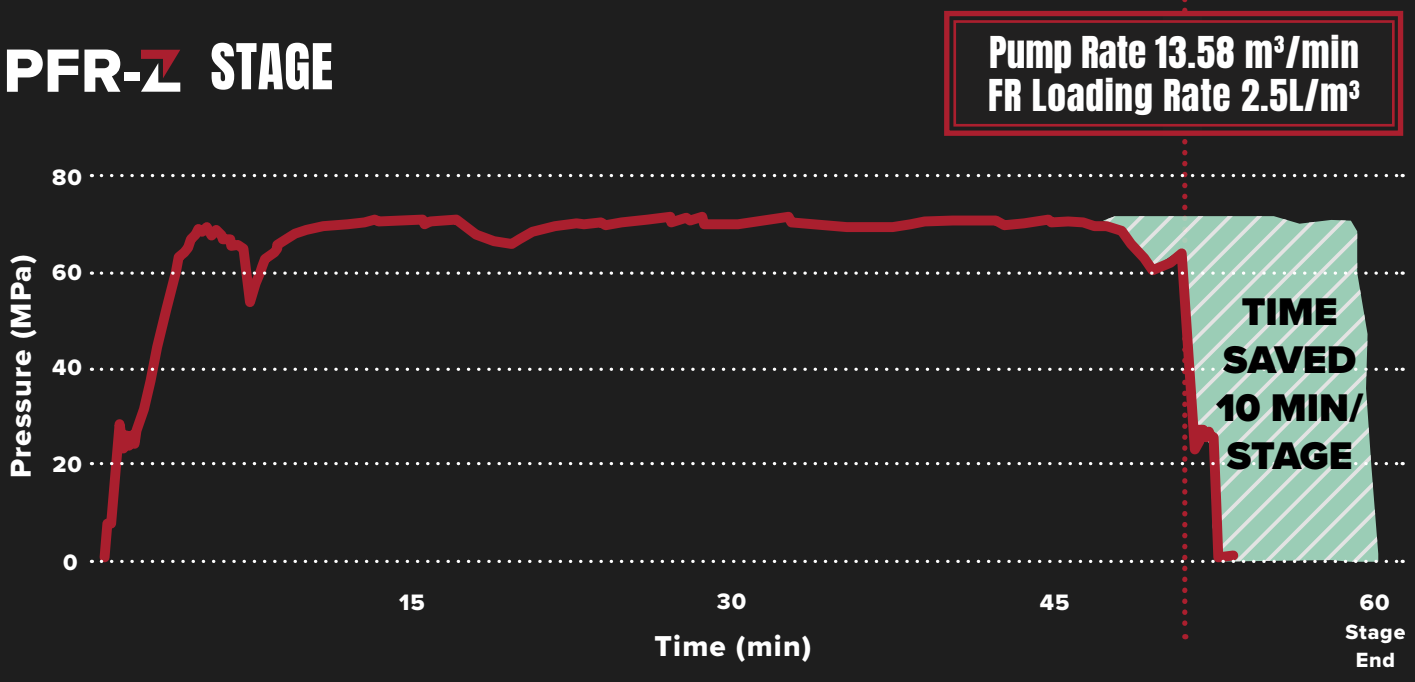
PFR-Z was trialled side by side with the competitor FR (friction reducer) during a Zipper Frac Montney Pad in North East B.C.

After the switch back to the competitor FR, the operator saw a noticeable decrease in flow rate, while FR concentrations had to be increased to maintain pressure savings. **By utilizing PFR-Z it enabled the operator to increase the number of clusters per frac stage, leading to a significant time savings of almost two days on a single frac pad and preferable zonal stimulation.**

COMPETITORS STAGE



PFR-Z STAGE



“If snowpacks do not improve, or if we have a similar spring and summer to 2023, it could mean another season of potentially critical water shortages, primarily in the northeast.”

BCER hydrologist Ryan Rolick

“The B.C. Energy Regulator (BCER), formerly the B.C. Oil and Gas Commission, says persistent drought last summer and fall in the northern part of the province continue to negatively affect streamflows and groundwater, with snowpack levels at last reading only 72 per cent of the historical average.”

Karin Larsen, Feb. 2024. “ B.C. oil and gas producers warned of potential water shortage from drough.”

“The Alberta Energy Regulator has warned fossil fuel companies that their access to water, a key resource for extracting and processing hydrocarbons, may be restricted next year because of parched conditions in Western Canada.”

The Globe and Mail, December 2023, “Alberta may cap water for oil and gas companies”.

“Alberta is experiencing extremely low water levels in many parts of the province due to below-average snowpack and precipitation...”

BOE Report, December 2023, “Water Shortage Advisories in Alberta”.

“Alberta is experiencing extremely low water levels in many parts of the province due to below-average snowpack and precipitation over the past several months, resulting in less runoff to rivers, lakes, and reservoirs.”

AER, December 2023, “Water Shortage Advisories in Alberta – Important Information for Water Licence Holders”.

“This notification also provides advance notice of the potential for regulated restrictions on WSA Section 9 water licenses should conditions worsen.”

BCER - Jan 2024 Water Use Suspensions Expected in 2024 (IU 2024-02)

“Alberta, in the presentation, noted ‘some licence holders have been asked to stop taking water due to low river levels’ and that the government is working with them to find alternative water sources.”

The Globe and Mail, December 2023, “Alberta may cap water for oil and gas companies”.

“Industry operational preparedness is vital... Industry should be aware of active water shortage advisories and plan accordingly.”

BOE Report, December 2023, “Water Shortage Advisories in Alberta”.

“We do not know yet whether this drought will become a multiyear event, consequently industry operational preparedness is vital.”

AER, December 2023, “Water Shortage Advisories in Alberta – Important Information for Water Licence Holders”

“In the last couple years, B.C. has seen a lot of weather that’s been described as ‘unprecedented’, ‘recordbreaking’ and ‘historic.’ The drought in the northeast is all three, yet it’s been largely overlooked.”

BCER hydrologist Ryan Rolick

“Industry should make sure they’re updating their water management plans and that they’re looking at having appropriate storage solutions so that they can withdraw when it is available and store it for use in the dry season,”

BCER hydrologist Ryan Rolick

“Industry should be proactive and plan for water shortages during 2024, including conserving water in their operations now.”

BOE Report, December 2023, “Water Shortage Advisories in Alberta”.

“Alberta is preparing a drought emergency plan for 2024, and some parts of the province have been operating under water restrictions for months.”

The Globe and Mail, December 2023, “Alberta may cap water for oil and gas companies”.

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