Case History

Fusion® Production Water Chemicals help Canadian operator drill "the greenest well on the planet"

Canadian Operator had the ambitious goal of drilling the "greenest well on the planet." They undertook a variety of challenges to shrink environmental footprint of a standard drilling operation, with a focus on zero freshwater usage.

CHALLENGE	SOLUTION	RESULT
• Operator wanted to drill "the greenest well on the planet" • Zero freshwater usage • Reuse produced water to reduce environmental damage	• Fusion® Flocculating Polymers • Fusion® H_2S Scavengers • Fusion® Scale Inhibitors • Fusion® Oxygen Scavengers	• Goal of zero freshwater usage was achieved through use of Fusion technology • Even though produced water had H_2S levels above operating limits, no safety incidents occurred • On-site fluid management allowed continuous floc polymer testing

OVERVIEW

In the Western Canada Sedimentary Basin (WCSB), the operator had set a lofty goal of drilling what they referred to as "the greenest well on the planet", which included drilling the well with zero freshwater use. This would be achieved by reusing their production water to help reduce the environmental impact.

CHALLENGES

Newpark needed to find a local source of production water that could be used to engineer a custom fluid for specific density and inhibition requirements. By doing this, mined commodities would be eliminated, waste would be reduced, transportation and other hidden impacts from the drilling fluids process would be lessened.

There are many benefits of using production water. Other than being locally available and generally treated as waste, production water is a composition of salts and minerals. These salts give the fluid an inherent density without adding mined solids such as barite and calcium carbonate.

The brines can also be engineered to provide inhibition requirements for any well. In some cases, it can even be used as a low damage drill-in fluid for enhanced production.

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In this particular project, when looking at the water analysis *(Figure 1),* the water was not very saline, but still had potential challenges in using it. It did not appear saline enough to cause chloride-based corrosion issues, however modelling showed it had the potential for carbonate scale formation at high temperatures or on increasing pH. The production water was tested for compatibility with polymers and scale inhibitors in the lab prior to the project. Along with preliminary corrosion tests that determined only minor amount of oxygen scavengers would be required to insure adequate corrosion protection.

Figure 1 – Water analysis results

Total Disolved Solids (PPM)		
Evaporated @110°C	Evaporated @180°C	
18,962.0		
Calculated	At Ignition	Measured
	7.9 @ 25.0°C	1.0140 @ 15.6°C
Organic Matter	Observed PH	Relative Density
1.3350 @ 30.0°C	0.478 @ 25.0°C	
Refractive Index	Resistivity (ohms)	Salinity (%)

There was also the challenge that the source for the production water would have the potential to contain H_2S, which is a hazardous gas, and thus would need to be treated.

SOLUTION

Newpark Fusion® system lubricants and lost circulation materials are made from reused and renewable materials. The H_2S scavenger does not produce formaldehyde when used and is 100% biodegradable. It also has the added benefit of not forming scale with the use of production waters and is not dependant on the pH for reaction.

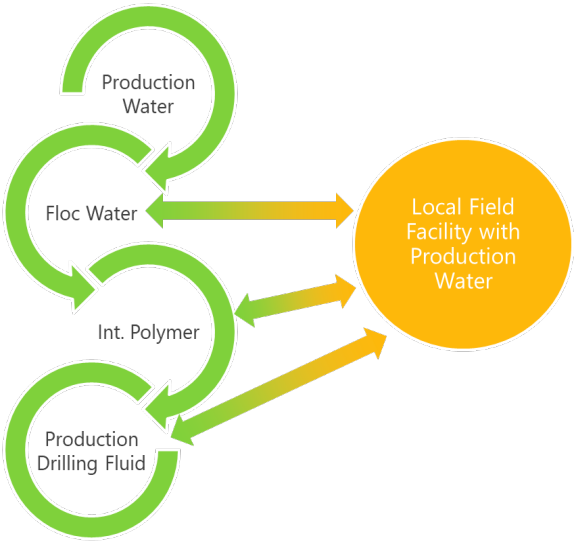
Fusion Flocculating polymers permitted easy dewatering and solids stripping to ensure that disposal was kept to a minimum and also allowed the reuse of the fluids systems for makeup volume in subsequent sections of the hole.

They also had the added benefit of being able to be hydrated in production water, which eliminated the need for freshwater usage through polymer hydration tanks, just as the operator preferred.

In addition, it also allowed the operator to use smaller tank volumes and achieve the same fluid clarity, thus reducing overall product treatment rates, disposal, and fluids transportation.

Fusion H_2S Scavengers were also used to treat the field production water free of H_2S to make it usable. The Scavengers proved to be more effective over other products due to its reaction speed regardless of the pH and produced water chemistry.

It also continues to work in cold weather, in one instance treating 40ppm of H_2S down to trace amounts (<1ppm) in overnight storage.



Fusion Scale Inhibitors were employed to eradicate any scale deposit induced corrosion to the drill pipe and equipment as well as reducing any formation damage in the main hole.

During the planning stages, scale modelling and lab-compatibility testing were done in advance on three different production water sources from various batteries in the field to insure proper treatment and product application. The modelling and tests had shown that Reaction™ scale inhibitor would prevent scale from forming at a treatment rate of <2.00$ per m³.

Fusion Oxygen Scavengers were used to reduce oxygen pitting and corrosion when using the production water.

Corrosion lab testing using pressurized cells was conducted prior to the job and had indicated that the production water was indeed moderately corrosive. It was determined that the oxygen scavenger should be used to help prevent any damage to the equipment and maintain oxygen levels at <1ppm in the lateral.

Corrosion rings were run in the field and showed acceptable results.

RESULTS

The Fusion line of technologically advanced products were used to help achieve the operator's objective of no freshwater use in their drilling fluids. In fact, more freshwater was used in the boiler systems for the rig than were used in the drilling fluid systems.

Floc polymer testing was done continuously in the field during the dewatering phases to help with polymer chemistry compatibility to aid in processing volumes and efficiency.

Case History

Despite working with production water that had H_2S levels above the operating limits, Newpark was able to effectively treat the H_2S while maintaining all safety protocols, resulting in an incident-free operation.

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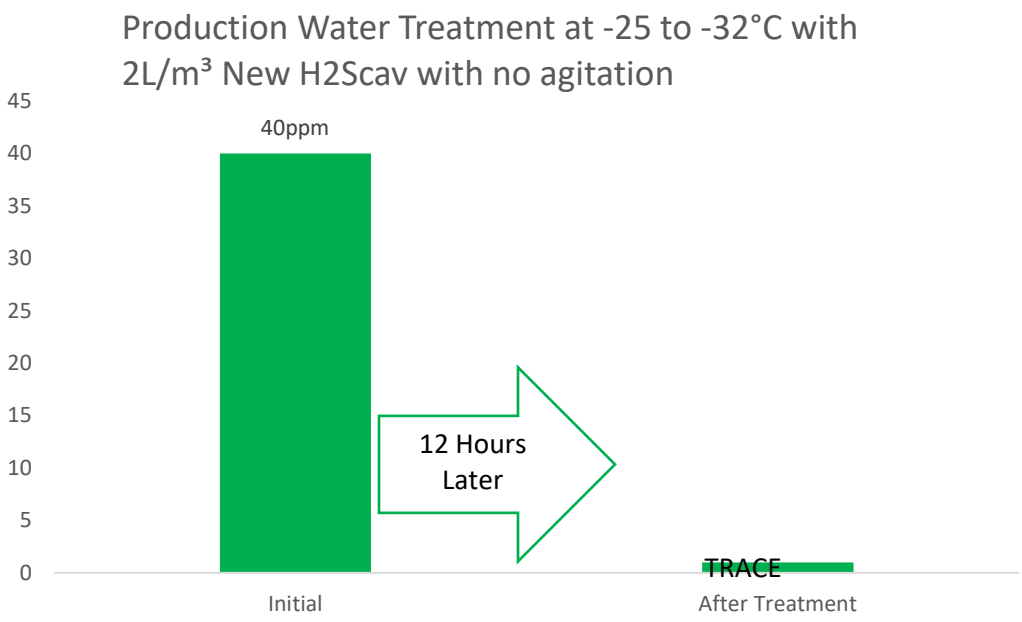

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