NAVIGATING THE WATERS OF INNOVATION:
Oilfield Water Management in 2024

Effective oilfield water management is not just a matter of compliance; it is the key to maximizing efficiency and profitability. As operators are now consolidating and interconnecting their disposal infrastructure through extensive pipelines, the importance of efficient water management has never been greater.

Traditionally, the industry has been accustomed to segmented and separated approaches when addressing various aspects of water treatment. **JGL Solutions provides innovative biotechnology solutions and services that address the multifaceted challenges of oilfield water management with a system-wide approach.**

TECHNOLOGY OVERVIEW

MICROBE BIOREACTOR

Microbes are introduced at the intake of a SWD system, where they attach to surfaces, reproduce, and colonize. This results in a consistent concentration throughout the entire system of approx. one million cells/mL of fluid at all times, ensuring they are always present and working at full strength.

FACULTATIVE ANAEROBES

JGL's Microbes are facultative anaerobes, meaning they utilize an aerobic pathway first, removing available oxygen. Then, the microbes convert to an anaerobic pathway and continue to thrive downhole.

ABILITY TO REMOVE SKIN DAMAGE

Injectivity is enhanced by the microbe's unique ability to remove and prevent skin damage, including damage caused by scale, iron compounds, paraffin, and asphaltenes.

MICROBIAL SOLUTIONS FOR MILES OF INFRASTRUCTURE

The diagram below depicts a typical SWD infrastructure and what the microbes achieve throughout:

MICROBE INJECTION POINT

Batch microbe treatments are injected at the intake and then the microbes will colonize throughout the entire system.

Sand Tank

- Improves the ability of the sand tank to separate the soilds from produced water and flowback water

Gunbarrel

- Improves oil and water separation
- Changes paraffin to oil
- Reduces viscosity of oil and improves the quality of oil
- Dissolves pads + tank bottoms
- Reduces BS&W + iron in oil
- Increases sellable skim oil
- Reduces scale and corrosion

Oil Tanks

- Increases sellable oil
- Reduces BS&W
- Reduces iron in oil
- Improves oil quality
- Dissolves tank bottoms

Pipeline Network

- Keeps miles of pipeline clean 24/7
- Reduces scale and corrosion
- Inhibits scale from precipitating
- Prevents paraffin and asphaltene formation

Suction Tanks

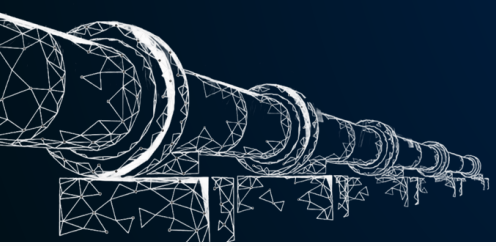
- Continues to separate oil
- Continues to improve water quality
- Reduces filter changes
- Reduces scale and corrosion

Water Recycling

- Reduces filtration costs as iron compounds and scale are pre-dissolved
- Hydrocarbons can be completely bioremediated

Disposal Wells

- Improves injectivity by reducing pressure and/or increasing volume
- Reduces solids injected in the system
- Reduces scale and corrosion
- Removes skin damage



In addition to each system location, our treatments also keep transfer lines and injection lines clean.

CASE HISTORY HIGHLIGHT
Commercial Disposal | Permian Basin, Texas

The case history featured below highlights how JGL's Microbe Treatment design works throughout the entire system, from intake to injection.

HISTORY:

A West Texas disposal system had 12 feet of pads in its holding tank. The operator was using **chemical to try and break the pads for over a year but found no success.**

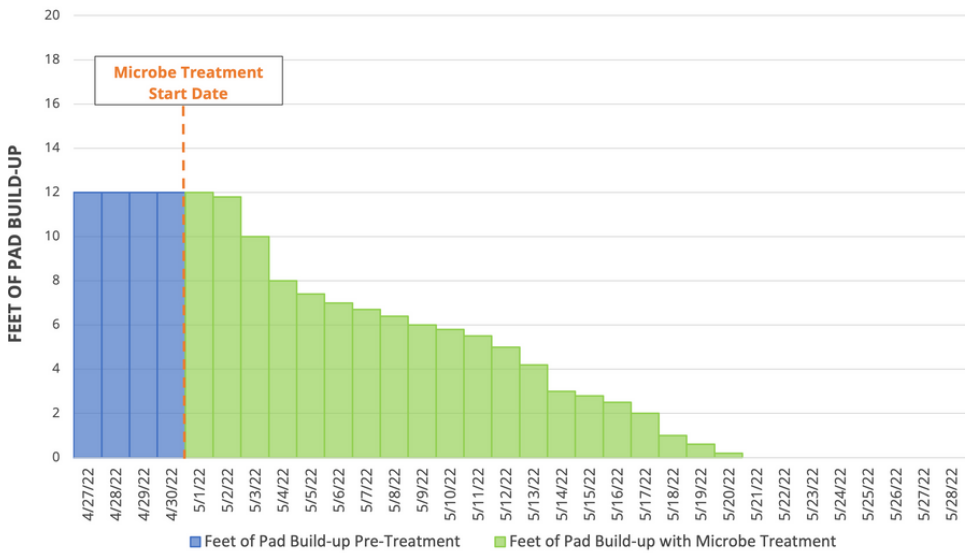
Meanwhile, injection pressures were consistently increasing, resulting in periodic acid jobs.

TREATMENT DESIGN

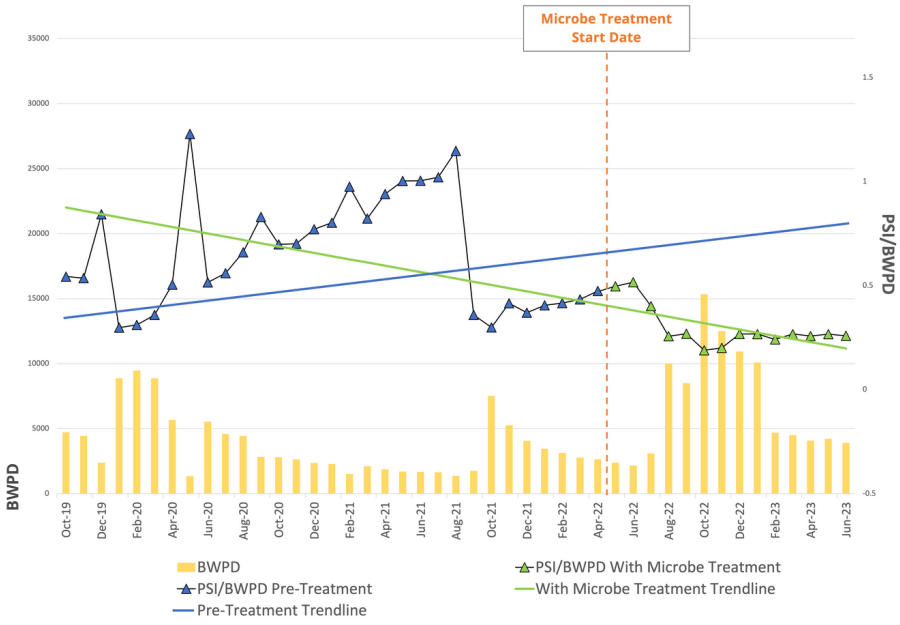
JGL's experienced field and office personnel worked together to create the optimal microbial blend to address these problems based on detailed lab analysis.

This system did not have a sand tank, so our treatment was injected into the intake of the gunbarrels.

PAD BUILD UP CHART



INJECTIVITY CHART



PSI/BWPD = the ratio of pressure to barrels, representing a rate of injectivity.
When the PSI/BWPD trendline increases, this is an indication that skin damage is occurring.
When the PSI/BWPD trendline decreases, this is an indication that skin damage is being removed.

RESULTS AND SAVINGS:

PAD REMOVAL

The Pad Build Up Chart (above) highlights the pad remediation timeline.

Pads were completely dissolved in 3 weeks.

Sellable skim oil was doubled due to improved oil in water separation.*

In addition to removing the pads, JGL's Microbe Treatment has also prevented any additional pad formation to date.

INJECTIVITY EFFICIENCY

The Injectivity Chart (left) illustrates skin damage removal and improved injectivity; significantly reducing operating costs, while extending the life of the well.

* During 2023, two additional West Texas disposal operators have reported **a threefold increase in sellable skim oil** since beginning JGL's Microbe Treatment.

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