

Solugen

Verza360™ FT320+

Cost Effective Biocide Potentiation for Produced Water

Challenge

High Program Cost versus Performance

An operator was using two biocides, THPS and DDAC, to treat 45,000 bbl/day in their produced water (PW) recycling system to control sulfate reducing and general bacteria activity going into their above-ground storage tanks (ASTs) and in-ground water pits. At the frac site itself, the operator was also using a glutaraldehyde/quat-based biocide. Due to the observance of bacterial growth despite treatment and increasing program cost, the operator wanted to trial other solutions that would be more effective.

Solution

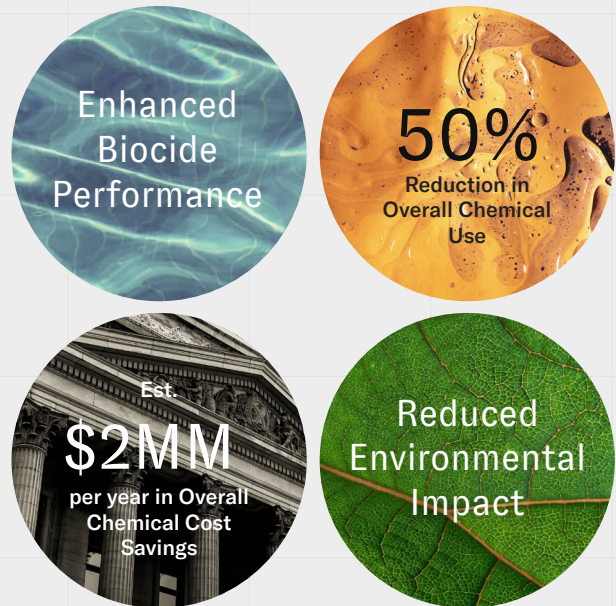
Verza360™ FT320+ for Biocide Potentiation

To reduce costs and enhance performance, Solugen proposed trialing Verza360™ FT320+ (Verza) for biocide potentiation. While not a biocide itself, Verza is a carbon-negative, biodegradable, and non-toxic organic acid typically used for iron control in stimulation, completion, and production applications. Verza can also be winterized for cold weather climates. Previous microbiological studies via Adenosine Triphosphate (ATP) analysis demonstrated Verza's ability to act as a biocide potentiator, boosting the effectiveness of the various biocides evaluated.

Trial

Applying Verza to the PW Recycling System

The initial goal of this trial was to eliminate THPS, replacing it with Verza as a complement to DDAC. If successful, a secondary goal was to reduce DDAC use until performance no longer improved.



The trial was split into three phases to assess Verza's impact on enhancing biocide performance:

- Phase 1: 120 ppm DDAC (Baseline)
- Phase 2: 120 ppm DDAC and 120 ppm Verza
- Phase 3: 60 ppm DDAC and 60 ppm Verza

Note: A baseline using THPS and DDAC as originally used could not be obtained due to time constraints and chemical injection maintenance of the pump feeding THPS.

Within each phase, samples were taken continuously from the inlet water coming from three different fields/batteries (Inlet) and outlet water dispensing directly to the frac (Outlet). ATP values were captured for each sample and averaged to calculate the relative percent in ATP from Inlet to Outlet as a reflection of performance across each phase.



Results

Verza Enhances Biocide Performance & Reduces Chemical Use & Spend

Prior to the trial, the operator was using the following biocides and dosages (Table 1).

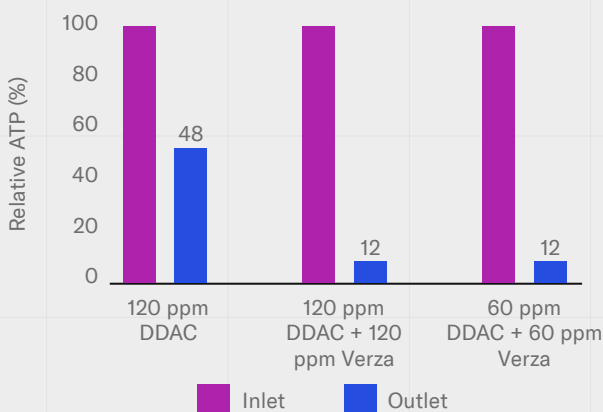
Table 1
Biocide Use Before Trial

Biocide	Pre-Trial Dose (ppm)	Injection Points
THPS, 75%	120	AST, pit
DDAC, 50%	120	AST, pit
25% Glut/12% Quat	100-150*	Frac

*Dose dependent on incoming bacteria levels.

As presented in Figure 1 below, the addition of 120 ppm down to 60 ppm Verza along with DDAC improved performance, yielding 12% versus 48% relative ATP value using 120 ppm DDAC alone.

Figure 1
Relative % ATP from Inlet to Outlet across phases.



As a result, the following chemicals and dosages were achieved (Table 2).

Table 2
Chemical Use Post-Trial

Chemical	Post-Trial Dose (ppm)
THPS, 75%	0
DDAC, 50%	60
Verza360™ FT320+	60
25% Glut/12% Quat	100-150*

*Dose dependent on incoming bacteria levels.

Thus, relative to how much chemical the operator was originally using before the trial (Table 1), Verza allowed for 50% reduction in overall chemical use, translating to an estimated \$2MM/year in overall chemical cost savings.

Conclusion

This trial supported conclusions drawn from prior internal data – Verza demonstrated a biocide potentiation effect, helping to reduce incumbent biocide and overall chemical use plus associated costs without sacrificing performance.

Given the success of this trial, the operator has continued to incorporate and optimize Verza use within their systems. In a separate trial conducted at the same location, the operator was able to reduce glut/quat biocide use at the frac site by ~17% given DDAC and Verza use upstream, suggesting an improvement in performance over THPS and DDAC as originally used.

In another trial conducted at the operator’s saltwater disposal (SWD) site, the operator was able to replace THPS and DDAC with Verza and glut/quat biocide, resulting in ~80% reduction in culture media results.

Solugen continues to monitor culture media results from these trials to ensure long-term consistency in performance.

To learn more, visit solugen.com/oilandgas or email us at energysolutions@solugen.com.