

Iron Sulfide Prevention, Enhanced Oil Recovery and Corrosion Inhibition in Disposal and Production Wells Using Cambrex™ FBS and Cambrex™ 908F

Case Study

Primary Function

The treatment program is primarily targeted at Iron Sulphide solids and the related problems caused from Iron Sulfide but it is also effective against a broad species of inorganic scales.

Conditions

The use of two specialized chemicals has achieved best results:

- a) Cambrex™ 908F - a combination scale, corrosion, and iron control treatment; and
- b) Cambrex™ FBS - a strong de-oiling surfactant

Observations

These two treatments work together to break up Iron Sulphide "pads" and solids, and have proven effective at multiple locations to deliver the benefits listed below:

- Initial treatment of "fouled" tanks - with bottom solids and floating pads - is 25-50 gallons via shock dose of Cambrex™ 908F + 10-20 gallons of FBS as this will jump-start the clean up process
- Starting continuous dose rate of Cambrex™ 908F is 80-120 ppm - which equates to approx. 1 litre per 10 m³
- Starting dose rate of Cambrex™ FBS is 50 ppm - which equates to 0.5 litres per 10 m³
- Both products should be fed as early as possible into the system - ideally into the truck offloading line leading to the first tank(s)

Treatment Cost Performance Analysis

Many SWD operations have much lower chemical costs, but when assessing the big picture there are significant improvements in performance and overall functioning of the disposal system that translate into realizable cost savings when applying Cambrex™ FBS and Cambrex™ 908F, as follows:

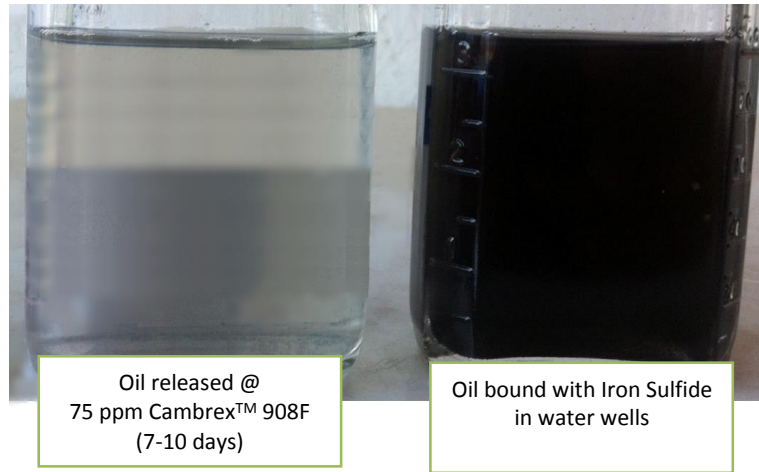
- a) Reduced filter changes
 - Customers have reported \$0.12/m³ as changes went from six times to only once per 24 hours
- b) Elimination of tank bottom solids/pads removal
 - Reported \$0.15/m³ due to actual removal vs. build-up of solids
- c) Increased oil recovery
 - Estimated \$0.18 - 0.30/m³ in additional revenue created (an increase from 0.5% oil recovery to 0.55% oil recovery on a 1600 m³/day facility at \$80/BBL oil = \$0.24/m³)
- d) Reduced time for tank clean-out/pressure spikes
 - Estimated at \$0.06 - 0.12/m³

Treatment Summary

- One customer has yet to haul away any bottom solids since treatment started 4 months ago - previously they were hauling out up to 180 m³ per month at a cost of \$100/m³
- Amount of solids left in tanks have reduced dramatically, from ~ 5' down to < 1' in all tanks
- Surface "pads" that were once 3-5' high (and contained recoverable oil) have essentially ceased to exist
- Injection pressures that routinely exceeded 2200 psi (the upper permitted limit) continue to stay below 2000 psi, and have allowed the SWD to take on over 500 m³ more water per day
- Oil recovery continues to increase

Application

Performance of Cambrex™ 908F to Break Up Iron Sulphide



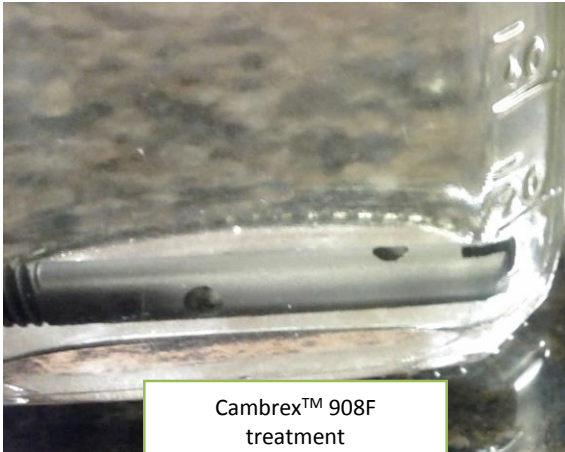
Corrosion Inhibition Properties of Cambrex™ 908F

365 Day Coupon Test – Cambrex™ 908F vs. Competitors



These show corrosion of
> 1 mm per year

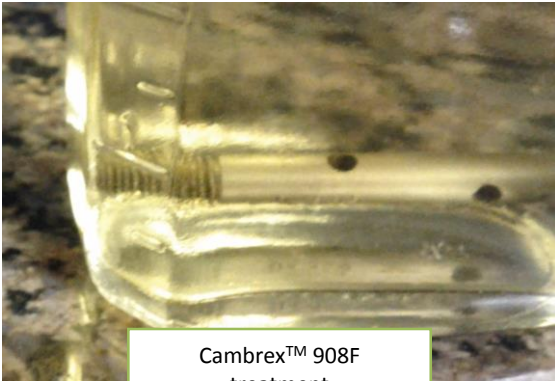
Cambrex™ 908F vs. Competitors as Corrosion Inhibitors



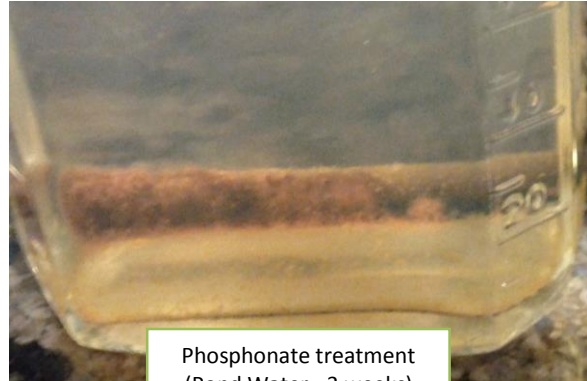
Cambrex™ 908F
treatment
(Fresh water - 48h)



Phosphonate treatment
(Fresh Water - 48h)



Cambrex™ 908F
treatment
(Pond Water - 3 weeks)



Phosphonate treatment
(Pond Water - 3 weeks)